

**Paul Rivlin**

**World Oil and Energy Trends:  
Strategic Implications for the Middle East**



## **Jaffee Center for Strategic Studies**

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**Jaffee Center for Strategic Studies**

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## Notes and Definitions

- FSU - Former Soviet Union, comprising Russia, Georgia, Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.
- GCC - The Cooperation Council for the Arab States of the Gulf, known as the Gulf Cooperation Council, was founded in 1981 by Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. In 1982, it issued an agreement covering the freedom of movement of people and capital, the abolition of customs duties, technical cooperation, harmonization of banking regulations, and financial and monetary coordination. A common, minimum customs levy of between 4 percent and 20 percent was imposed in 1986 and in 1992. GCC ministers agreed to set up a common market by the year 2000 but, as of the time of writing, no united external tariff had been agreed upon.
- IEA - The International Energy Agency, located in Paris, was founded in 1974 as an autonomous body within the OECD. It carries out an energy cooperation program among 24 of the 29 countries in the OECD. Its main aims are to reduce excessive dependence on oil; to provide information on the international oil market; to cooperate with oil producing and consuming countries in order to ensure stable conditions on international energy markets; to prepare plans to help member states avoid the risks of major disruption of oil supplies; and to share supplies in the event of an emergency. Its members are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg,

the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Union also takes part in the work of the IEA.

OECD - The Organization for Economic Cooperation and Development, located in Paris, was founded in 1960. Its aim is to promote economic growth, employment and financial stability in member states and to contribute to the development of the international trade and the world economy. Its members are Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Union also takes part in the work of the IEA.

OPEC - The Organization of Oil Producing Countries was formed in 1960 and is headquartered in Vienna. Since the 1970s, OPEC has had 13 members. The Middle Eastern members include Iran and seven Arab countries: Saudi Arabia, Iraq, Libya, Algeria, Kuwait, Qatar and the UAE (at first, before the establishment of the UAE in 1971, Abu Dhabi and Dubai had separate membership). There are also four non-Middle East members: Indonesia, Nigeria, and Venezuela. OPEC's basket price is a weighted average of the following crudes: Saharan Blend, Minas, Bonny Light, Arabian Light, Dubai, Tia Juana, and Isthmus.

OAPEC -The Organization of Arab Petroleum Exporting Countries was established in 1968 by Saudi Arabia, Kuwait and Libya. Members of OAPEC now include the Arab members of OPEC and Egypt, Syria, Bahrain, Oman, Tunisia and Morocco.

Transition Economies - Non-OECD Europe (excluding Poland), the FSU, Cyprus, Gibraltar and Malta.

b - barrels  
bcf - billion cubic feet  
b / d - barrels a day  
bn - billion  
bn b / d - billion barrels a day  
GDP - Gross Domestic Product  
km - kilometers  
mb / d - million barrels a day  
mn - million  
mtoe - million tons oil equivalent  
tcf - trillion cubic feet

## Summary

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This paper examines the role of energy and oil in the Middle East strategic balance. The Middle East is the world's largest producer of oil, and oil is the world's largest source of energy. Much of this paper is therefore concerned with the Middle East and with oil. The analysis of oil is placed within the wider context of total energy supply, including so-called unconventional energy sources.

Oil reserves in the GCC states are also among the cheapest to recover. Yet, in the last 10 to 15 years the share of the GCC, Middle East and the Organization of Oil Exporting Countries (OPEC) in world oil production has been much smaller than their share of reserves. This paradox is a central issue in the analysis of oil and energy issues.

The increase in oil production has come from outside the GCC and this was the result of three factors. The first was the exclusion of the major Western oil companies from the GCC upstream (exploration and extraction). This, together with a perception of the region as unstable, has limited Western investment in the region. The second factor was the improvement in technology that made it possible, and then made it cheaper, to explore for oil in what had been uneconomic or technically difficult areas. The third was the fiscal encouragement (i.e. tax policies) adopted by the United Kingdom and other medium-sized producers, which encouraged companies to invest in new technology in order to exploit the North Sea and other areas outside the GCC, the Middle East and OPEC.

These developments continued despite relatively low oil prices and the failure of OPEC's attempts to increase them until recently. Low oil prices were explained by the success of policies followed in industrialized countries to diversify away from oil following the price rise and boycotts of 1973-74 and the price rise of 1979-80, and needs of the oil producers to maximize short-term revenues. They were also explained by the changes in Saudi Arabia's policy. This was most dramatically emphasized in the mid-1980s and in the policies followed during and after the Gulf Crisis and War of 1990-91. Saudi Arabia, the world's largest oil exporter and holder of the world's largest oil reserves, concluded that its interests

were best served by ensuring a stable supply without large price jumps on world markets. Only in this way could it discourage the shift away from oil toward other fuels and from reliance on Gulf oil toward that from more stable parts of the world. This analysis suggests that Saudi Arabia has limited room for maneuver in changing its policy because it has not reduced its reliance on oil as a source of budget and export revenues. Oil also continues to be throughout the GCC a crucial nexus between the ruler, the budget, and the economy and society at large.

Nevertheless, the Middle East remains potentially unstable and political changes there could cause disruption on oil markets. Turmoil in Iran, further aggression by Iraq, instability in Saudi Arabia, all these are possible. The latter could have large and relatively rapid effects on the amount of oil supplied and on its price. On the other hand, the experience of Algeria, and even of Iran, suggests that Islamic fundamentalists are wary of damaging the infrastructure that they want to take over and use themselves.

In the long run, however, the relative cost advantage of GCC oil may have an effect as the level of reserves in the North Sea and in other non-OPEC and non-Middle East regions decline. The large oil reserves in the Caspian region may delay this; other oil sources may be found and new sources of energy may be developed, but, according to the United States Energy Department and the International Energy Agency, these factors may not ultimately prevent Gulf oil playing a larger role in the international market.

The decline of oil prices since the mid-1980s led to a fall in Middle Eastern oil revenues. This in turn resulted in a reduction in demand throughout the Middle East. Western companies and countries began to reconsider the consequences of dealing with Israel, whose economy grew rapidly in the early 1990s. While the Gulf Crisis and War of 1990-91 resulted in a temporary rise in oil prices, it did not cause a prolonged upswing in the Gulf or Arab economies. Israel, like other consumers, was able to buy oil more cheaply, and changes in the structure of oil markets, with the development of spot markets in which buyers and sellers were anonymous, also helped.

The economic crisis in South and East Asia in the late 1990s reduced demand for GCC oil. This, together with the deflationary effects of the

crisis on the world economy, put downward pressure on prices and reduced the amount of finance available in oil producing countries for further development of that sector. Since then, as the recovery has taken hold, prices have increased sharply. However, pressures from consumers (mainly the United States) and Saudi fears that limiting production and consequent high prices will affect long term demand for oil are likely to reduce them.

The Energy Information Administration's *International Energy Outlook 1998*, suggested that world energy consumption would triple in the 50-year period between 1970-2020. The increase between 1995 and 2020 would be 75 percent, with much it continuing to come from developing countries. It is important to note that the effects of the Kyoto Climate Change Protocol of December 1997 were not included.

Long-term projections for oil prices show a slow rise in real terms. Although non-OPEC supply is expected to continue to increase in the short term, OPEC producers are forecast to increase their share from 39 percent in late 1996 to 52 percent in 2020. The share of Gulf producers is also forecast to rise. Resources are not considered to be a key constraint in satisfying oil demand in the period until 2020. More important will be political, economic and environmental circumstances. The sanctions against Iraq, the development of an infrastructure to market oil from the Caspian region, as well as the future of OPEC are examples of the uncertainties that could affect these projections.

A similar assessment was made by the International Energy Agency. Its *World Energy Outlook 1998* projected that world energy demand will increase by 65 percent between 1995-2020, assuming that no major changes in policy were made. Two-thirds of this increase was expected to come from China and the developing world. Fossil fuels were expected to account for 95 percent of the increase in demand. Oil would continue to play the key role in road and air transport, which are forecast to grow strongly. The dependence of oil importing countries on supplies from the Middle East would increase until liquid fuels from such unconventional sources begin to play a more important role around the year 2020. Until then, oil supply disruptions and price shocks could occur. Demand and supply for oil therefore needs to be seen in the wider context of energy markets, including the use of unconventional oil sources, gas, coal and other fuels.

# 1. Energy, Oil and the Role of Middle East Politics

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## **a. The Arab Oil Weapon**

World demand for oil rose from 22-25 mb / d in the early 1960s to 60-65 mb / d in the early 1970s. The developed countries in the Organization for Economic Cooperation and Development (OECD) accounted for two-thirds of demand in the early 1980s, and as it grew those countries became increasingly dependent on imports. These were supplied by OPEC, with Middle East producers, especially those in the Gulf, dominating. Japan was the most reliant on imports, followed by the European OECD states, and finally the United States, but as its domestic oil production declined, its reliance on imports rose.

The oil embargo and price increases of 1973-74 had a profound impact on the development of the international energy and oil markets. They also affected public perceptions of oil as a reliable source of energy and are at the back of much thinking about oil and energy. It is therefore necessary to look in some detail at what happened and then place these developments in their wider energy context.

In the period 1970-73, conditions on international oil markets were very tight. The United States suffered supply shortages in the cold winter of 1969-70, while imports of oil were restricted by administrative controls that were then in force. In 1971, price controls were placed on oil and other goods as part of the anti-inflation policy in the US. This discouraged domestic production and helped enhance feelings of an energy crisis. Early in 1973, in response to the shortages, quotas on US imports were abolished and a voluntary allocation scheme was introduced to ensure supplies to independent refiners and retailers. US net imports of oil rose by 87 percent between 1970 and 1973, with most of the increase occurring in the latter year. As a result America's share of OECD imports rose from nearly 16 percent in 1970 to nearly 23 percent in 1973.<sup>1</sup>

Meanwhile, market prices exceeded official posted prices, indicating an end to the 20-year surplus of supply on international oil markets. Between 1970 and 1973, the market price for crude doubled but the international oil companies rather than the producing states were the

main beneficiaries. Naturally, the producing countries did not want to see the profit from the growing gap go to the companies.<sup>2</sup> On September 1, 1973, President Muammer Qaddafi of Libya nationalized 51 percent of those foreign operations that had not already been taken over. The radical states in OPEC – Iraq, Algeria and Libya – wanted to change the agreements that governed the oil markets, and by mid-1973, less radical states in the region came around to their way of thinking.

King Faisal of Saudi Arabia, despite his staunchly anti-Zionist views, opposed mixing oil and Middle East politics: Saudi Arabia had not gained by reducing oil exports during the Six Day War in 1967.<sup>3</sup> Faisal feared the rise of Arab radicals in Yemen, Libya and Sudan, and believed that the US was his country's main ally. Yet, in 1973, he changed his mind about the use of oil as a weapon. According to Daniel Yergin, this was due to three main changes in the oil market: the Gulf producers, especially Saudi Arabia, were now the swing producers (i.e. the suppliers that would adjust production to meet market needs) and only they could meet the increases in international demand; America's dependence on imports was growing; and the devaluations of the US dollar in 1971 and 1973, that reduced the value of financial assets of oil producers, which were largely held in dollars. Gulf oil producers asked the question: why swap oil for dollars, which was losing it value? Why not reduce oil exports and avoid the loss? In the spring of 1973, Faisal publicly called for the US to change its pro-Israeli policies. The growing tension surrounding Faisal's remarks and the tightening of the oil market pushed the Federal Republic of Germany and Japan in 1973 to announce energy supply security policies for the first time.<sup>4</sup>

In September 1973, OPEC oil ministers met in Vienna and called for a new deal with the international oil companies. They summoned representatives of the oil companies to a meeting in Vienna on October 8, chaired by the Saudi oil minister Ahmed Zaki Yamani. By the time the oil executives had arrived in Vienna, the Yom Kippur War had broken out. The companies offered a 15 percent (\$ 0.45 / b) increase in the posted price; the producers wanted 100 percent (\$3 / b)!<sup>5</sup> On October 14, OPEC announced that the negotiations with the oil companies had broken down and that another meeting of Gulf OPEC oil ministers was to convene on October 14, in Kuwait. On October 16, they announced that the posted

**Table 1**  
**Spot Crude Prices: Arabian Light/Dubai (\$/barrel) 1972-1999**

|      | Current prices | Constant prices (1990) |
|------|----------------|------------------------|
| 1972 | 1.90           | 6.89                   |
| 1973 | 2.83           | 8.42                   |
| 1974 | 10.41          | 24.84                  |
| 1975 | 10.70          | 23.06                  |
| 1976 | 11.63          | 25.17                  |
| 1977 | 12.38          | 24.81                  |
| 1978 | 13.03          | 23.06                  |
| 1979 | 29.75          | 45.70                  |
| 1980 | 35.69          | 48.43                  |
| 1981 | 34.32          | 49.60                  |
| 1982 | 31.80          | 46.65                  |
| 1983 | 28.78          | 44.23                  |
| 1984 | 28.07          | 44.58                  |
| 1985 | 27.53          | 43.57                  |
| 1986 | 12.97          | 17.09                  |
| 1987 | 16.92          | 19.69                  |
| 1988 | 13.22          | 14.43                  |
| 1989 | 15.69          | 17.20                  |
| 1990 | 20.50          | 20.50                  |
| 1991 | 16.56          | 16.61                  |
| 1992 | 17.21          | 16.68                  |
| 1993 | 14.90          | 15.30                  |
| 1994 | 14.74          | 14.70                  |
| 1995 | 16.10          | 14.56                  |
| 1996 | 20.29          | 18.46                  |
| 1997 | 18.68          | 17.88                  |
| 1998 | 12.28          | 12.21                  |
| 1999 | 17.47          | 16.69                  |

Note: 1972-1995: Arabian Light / Dubai; 1995-1999: OPEC Basket

Source: *Middle East Economic Survey*, and author's calculations based on IMF unit value of exports of manufactured goods by industrialized countries.

price of oil would rise by 70 percent to \$5.11/b, which brought it into line with the spot price. The decision was significant, not only because of the size of the increase, but because it was taken unilaterally by the producers.<sup>6</sup> The Gulf producers had the upper hand, and neither the oil companies nor the oil consuming countries were able to do much about it. OPECs strength was to last until the early 1980s, when prices collapsed. As a result, for only seven or eight years in the whole of the twentieth century were the major producing countries virtually in control of international oil markets.

In the latter part of 1973, Arab ministers and their governments were concerned not only with the development of the oil market, but also with the course of the war and of Middle East politics generally. During October, they had decided to use the oil weapon, given the fact that the United States was then rearming Israel. The US had informed the Arabs that it could not allow Israel using American arms to be defeated by Egypt and Syria using Soviet weapons. Re-supplying Israel was not only a matter of helping an ally, but also of facing up to an aggressive Soviet Union. On October 25, US forces were put on a state of alert, as its military commanders believed that the Soviets might intervene directly in the Middle East.<sup>7</sup>

On October 17, members of the Organization of Arab Oil Exporting Countries (OAPEC) proclaimed an oil embargo with an immediate 5 percent production cutback. The same percentage was to be cut each month until withdrawal was completed from all the Arab territories occupied by Israel in the June 1967 war and the legal rights of the Palestinian people were restored. At first the embargo was imposed on virtually all oil consuming countries. Later they were classified into three groups: "friendly" countries would get their regular supplies; neutrals would be subject to the monthly cuts; and hostile countries - the US and the Netherlands - against which a total embargo would be applied. However, the embargo was not implemented as planned. The size of the percentage cuts and the classification of countries changed each time OAPEC met. Finally, following sharp divisions among its members, OAPEC lifted its embargo on March 18, 1974. According to Benjamin Shwadran, US pressure on Egypt and Saudi Arabia, as well as its successful mediation attempts between Israel and Egypt, played a role in getting the embargo scrapped.<sup>8</sup>

The cuts in Arab production between October and December 1973 equaled 5 mb/d, although Iran and Iraq *increased* their production in protest against the lack of more radical measures by the other Arab states. Together with other producers, their output increased by 600,000 b/d. The United States was unable to increase domestic production as it had in the past because it had reached the limit of its production capacity at that time. The net loss of production, 4.4 mb/d, equaled 9 percent of world supplies (50.8 mb/d), or 14 percent of internationally traded oil.<sup>9</sup>

On December 23, 1973, the oil ministers of the Gulf oil states decided to raise the posted price of oil to \$11.65/b, a rise of 400 percent from its October 1, 1973 price of \$2.59 (see Table 1).<sup>10</sup> The world was a different place, not only because of the jump in oil prices but also because of Western perceptions of Arab oil power. The Arabs managed to focus international attention on Israel: if the latter “behaved”, then all would be well in the oil market and prices would fall. In fact, as has been shown, higher oil prices were in large part a result of a belated reaction to long-term trends, namely, growing international demand and a lack of supply outside the Gulf. The reaction by the consuming countries, especially when coupled with the increases of 1979, was severe. Higher prices could not be tolerated, and thus they adopted measures to protect themselves. The United States initiated a conference of the major consuming countries in February 1974, which set up the International Energy Agency (IEA). This organization, which was an autonomous part of the OECD, carried out an energy cooperation program. In order to become a member, a country had to commit itself to maintaining certain levels of oil stocks that could be used to assist any member which became subject to an oil boycott. It was, in effect, the consumers’ response to the oil producers’ cartel.

The Arab-Israel conflict was only part of the political background to Middle East oil policies. Also important were developments in oil producing countries: those of Iran in the late 1970s were the most dramatic. In 1978, strikes in the Iranian oil fields formed part of the revolt against the Shah. Iran was then the world’s second largest exporter. By December, Iranian exports had ceased. Although Saudi Arabia and other OPEC countries increased their production in reaction, by the first quarter of 1979, oil output in the non-communist world was 2 mb/d below its

level in the last quarter of 1978. The loss of Iranian production equaled about 4-5 percent of world supply, and this caused a 150 percent jump in prices.<sup>11</sup> The market was tight and Saudi Arabia responded to the fall in Iranian output by restricting output.<sup>12</sup> A new wave of panic buying engulfed the market, resulting in enormous price jumps: by March 1979 the price of Arabian Light oil went up to \$14.55 a barrel, compared with \$12.70 in 1978. Above an official base price, every producing country set its own price, some reaching as high as \$46 a barrel. Saudi Arabia, following its own interests, tried to maintain the official price of \$14.59. However, in an effort to persuade the others to reestablish the uniform price, it increased its price to \$18, then to \$24 and \$28, finally to \$32. But each time Saudi Arabia raised its price, the others added the differential to theirs.

The consequences of this rush for high prices were soon felt. The demand for oil began to fall rapidly in 1981, and by October of that year the drop reached such proportions that the other OPEC members agreed to reestablish a uniform price at \$34 a barrel, provided Saudi Arabia raised its price to \$34. Saudi Arabia agreed, and the uniform price was reestablished. But the compromise failed; the demand continued to drop. OPEC's high prices also created a rival: the non-OPEC producers. While prices were low, the oil resources of several areas – the North Sea and others – were not developed. However, when prices skyrocketed, a number of new producers entered the oil market and competed with the OPEC producers. For the same reason a number of alternatives to oil were activated, at first on a small scale.

With a glut forming in the world oil market, a crisis for the oil producers began. OPEC's strength was still limited to price control. When OPEC was formed, Venezuela had advocated production control as the second element of a cartel. But the Middle East producers, having fought hard to gain sovereign control over their oil production, refused to cede it to OPEC. With supply growing and demand declining, OPEC was ready to attempt production rationing for its members. In March 1982, OPEC decided for the first time to control production and set a production ceiling of 18 mb/d to defend the \$34 price. But the glut continued. OPEC leaders blamed it on the increased production of non-OPEC producers and the stock draw down by the consuming countries.

In 1982, Saudi Arabia assumed the role of "swing producer", agreeing to produce the quantity remaining after the fulfillment of all the other member states' quotas, believing that its interests were best served by strengthening OPEC in this way. As a result, the Saudi oil output fell from about 8 mb/d in 1982 to about 2 mb/d in August 1985. In mid-September 1985, the Saudi oil minister threatened both OPEC and non-OPEC producers with a price war which would bring down all producers. At the same time, Saudi Arabia gave up the role of swing producer and accepted a quota of about 4.35 mb/d. This created new difficulties in OPEC, as no member was ready to reduce its quota.

By the end of 1982 it became clear that production ceilings alone would not increase the demand for oil. Non-OPEC producers, especially Great Britain, lowered their prices by \$5 to about \$30 a barrel, while the OPEC price for Arabian Light was still \$34. Consequently, in March 1983 OPEC decided to lower the price of Arabian light oil from \$34 to \$29 a barrel. Yet demand continued to fall and the glut kept growing. Henceforth, OPEC battled on two fronts: the non-OPEC producers must curtail production and maintain OPEC prices; and OPEC members must abide by OPEC's production quotas and prices. But OPEC lost out on both fronts. Cheating on both price and production rates was widely practiced, and members tried to overcome the restrictions of price and production levels by many devices. In October 1985, OPEC reluctantly abandoned its uniform price and attempted to concentrate on controlling production levels.

### **b. The Collapse of Prices in the Mid-1980s**

Between 1973-75, OECD oil imports fell by 9 percent, and in the period 1979-85, they declined by 40 percent. They peaked at 1,400 mtoe in 1978 and went down to a low of 802 mtoe in 1985. OECD Europe imports of oil fell from 681 mtoe to 394 mtoe and OECD North America fell from 420 mtoe to 135 mtoe over the same period.<sup>13</sup> This was a result of the oil crises and price rises of 1973-74 and 1979-80 and of the related increases in Alaskan and North Sea oil field production, as well as of the recession that these price hikes brought about in OECD member states. Alternatives to oil were fostered at this time and market forces forced greater economy in the use of oil.

The turning point came in December 1985, when OPEC abandoned its position as the determinant of oil prices. While deciding to "secure and defend for OPEC a fair share of the world oil market consistent with the necessary income for member countries' development", and maintaining a production quota, it began, de facto, acting as the world's swing producer. Its share of the world market dropped from about 45 percent in 1970 and nearly two-thirds in 1979-80 to 32-35 percent in the early and mid-1980s. OPEC's abandonment of price control and the threat of a price war caused oil prices throughout the world to tumble from about \$28 to \$10-\$12 a barrel. In spite of Saudi Arabia's threats and dire predictions in case the price of oil dropped to \$20 a barrel, the consumers welcomed lower oil prices. During 1986 OPEC members quarreled about quotas and ways of raising prices and by how much. Its members, however, could not agree on any of the issues. Saudi Arabia's threat of a price war backfired, and King Fahd dismissed his oil minister, Sheikh Yamani, one of the main architects of OPEC, who had been in office for nearly 25 years.

During the first half of 1986, the price of oil fell to below \$10 a barrel. Some non-OPEC countries agreed to cooperate with the majority of OPEC members in reducing output, but disagreements within and outside the cartel prevented an agreement in the spring of that year. In August, OPEC members, with the exception of Iraq, agreed on a cut in production. Iraq insisted on parity with Iran, an issue that was to bedevil OPEC until late in 1988. As a result, oil prices rose. In December 1986, OPEC agreed on a fixed pricing system with a reference price of \$18 a barrel, and OPEC production for the first half of 1987 was set at 15.8 mb/d. In June 1987, a production ceiling of 16.6 mb/d was set, including Iraqi production, and intensive efforts were made to get OPEC member states to comply with the organization's target. During the second half of the year, however, OPEC exceeded its production targets and output was between 1 mb/d and 2 mb/d above the ceiling, thus undermining the relative stability that prevailed in the first half of the year.

By the second quarter of 1988, prices had fallen below \$15 a barrel. Saudi Arabia and Iran had a total of 800,000 b/d in storage on tankers or overseas. Non-OPEC members once again offered to reduce production if OPEC would cooperate, but Saudi Arabia refused and demanded that

existing OPEC quotas should be more strictly enforced. In June, the previous production limit was rolled over for six months with the expectation that higher demand would result in an increase in prices. By October 1988, the oil price fell to \$12 a barrel. OPEC member states agreed to reduce output to 18.5 mb/d from January 1, 1989. This compared with an estimated actual production level of 21 mb/d during the seven-year long war between Iran-Iraq. In June 1989, with prices barely at \$18 a barrel, OPEC ministers agreed to increase the production ceiling to 19.5 mb/d for the second half of the year. Kuwait and the UAE rejected the quotas implied in this ceiling, and by September the ceiling was increased to 20.5 mb/d. In November, a production level of 22 mb/d was agreed on for the first half of 1990.

Production during the first half of 1990 was, once again, so high that prices declined. Although some reductions in production were implemented, the oil price was only \$14 a barrel in June 1990. In July, Iraq threatened to take military action against Kuwait unless it reduced its output. OPEC agreed to raise prices to \$21 a barrel and to limit production to a total of 22.5 mb/d.

In August 1990, Iraq invaded Kuwait. An international embargo was placed on Iraqi and Kuwaiti exports, which had totaled 5 mb/d before the invasion. The price of oil jumped to \$23 a barrel, but in August, OPEC agreed on an increase in production, mainly implemented by Saudi Arabia, the UAE and Venezuela. Oil prices reached \$40 a barrel in early October 1990, but fell to \$25 a barrel by the end of the month. OPEC revenues rose by nearly 40 percent in 1990 as a result of the price rise and panic buying by some consumers. Most of this accrued to Saudi Arabia, which used the increase in revenues to help fund the US-led military action against Iraq in 1991.

In the first quarter of 1991, OPEC produced about 23 mb/d and the average price was \$19 a barrel. The oil price fell to \$17.5 a barrel in the second quarter and to \$16 a barrel a year later. The world economy had gone into recession and the demand for oil was weak. OPEC members' revenue rose as a result of the reallocation of Iraq's and Kuwait's quotas. By 1992, Kuwaiti production had come back on stream and Iran was opposing the high overall production level in OPEC that it saw as the main cause of low prices. In February 1992, a production ceiling of 22.98

mb/d was agreed for the second quarter, and in September a level of 24.2 mb/d was agreed for the final quarter. During 1993, OPEC continued to accommodate Kuwait's return to full production. OPEC was also preoccupied with the US and EU proposals for increased taxation on petroleum designed to reduce pollution. By the middle of the year, the oil price was further unsettled by discussions between Baghdad and the United Nations on possible oil sales by Iraq, and Iran's demands that Saudi Arabia accommodate increased Kuwaiti production. By October a compromise agreement was reached under which Saudi Arabia froze production at current levels. This did not prevent the price falling to a low of \$12.87 a barrel at the end of the year.

The period since 1985 has brought dramatic changes in OPEC's fate. The marker price system was abandoned. Most significantly Saudi Arabia stated that it would not adjust its production down to compensate for other OPEC members over-production. This resulted in the oil price falling, and it remained weak until the recovery of the world economy in 1989. Saudi Arabia opposed attempts by more radical OPEC members to raise prices because it felt that only stability of prices and quantities would guarantee a place for oil in the international energy market. The events of 1973-74 and 1980-81 had resulted in massive attempts to reduce oil use and increase energy efficiency in Western countries. This reduced the demand for oil, weakened oil prices and lowered OPEC's revenues. According to Richard Allen, the former national security advisor to President Ronald Reagan, Saudi Arabia connived with the US in 1986 to lower oil prices from \$30 to \$12 a barrel in order to undermine Soviet oil revenues.<sup>14</sup> It did this by raising production in 1986 from 3.7 mb/d in 1985 to 5.3 mb/d, a 43 percent increase.<sup>15</sup>

The Iraqi invasion of Kuwait caused only a temporary jump in prices and virtually no disruption in international oil trade. Following the war, Iraqi output was replaced with Saudi and other OPEC production until Kuwaiti production had resumed. OPEC members once again were unwilling to restrain production in order to support prices, and so the oil price remained weak from 1991 until 1995. The recovery in 1996 was temporary, and in 1997 and 1998, prices fell.

Further evidence of Saudi moderation was its attempt to increase prices in 1998. If it had tried to lower them or gone with the trend and

allowed them to fall then it would have knocked Mexican and Venezuelan production out of the market because their oil is relatively expensive. By trying to increase the price it ensured that they would stay in the market.<sup>16</sup>

## 2. THE DEMAND FOR ENERGY AND OIL

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### a. Types of Energy Demand

There are four major types of energy demand. The first is the consumption of electricity by final consumers; the second is for mobility, which consists of non-electric fuel used in transport. The third is for stationary processes, such as heating and for some industrial processes, which uses fossil fuels. Finally, there is the demand for fuel to generate electricity.<sup>17</sup>

All forms of energy demand are driven by economic growth. Demand is also a function of the level of income: the rich do not heat their homes in winter to more than a comfortable level and so there is a slow down in the growth of demand at high income levels. Until 1995, in much of the world the consumption of electricity and energy use for transport followed the growth of output. These forms of demand were largely unaffected by the oil shocks of 1973 and 1979. The exception was the United States, which between 1979 and 1982 introduced a program to increase fuel efficiency in automobiles. Fossil fuel demand for heating of buildings, however, dropped dramatically as a result of the oil shocks. This was due to the effectiveness of energy saving projects, the move of some energy intensive production to developing countries and a shift towards the service sector which was less energy intensive than industry in the developed economies.<sup>18</sup>

Industry uses more energy than agriculture, and so as an economy industrializes its energy use increase. As income rises, households become significant users of energy and this is one of the consequences of successful industrialization. The amount of oil versus other fuels used depends on technology and on prices and scarcities, real and perceived.

The main types of fuels are fossil fuels (coal, coke, gas, oil and oil products), nuclear power, hydro-electricity and renewables such as the use of waste products (biomass), solar, wind, geothermal and tidal power. Most electricity is produced using fossil fuels, mainly coal and oil, but also gas. In developing countries that have low-cost coal production, such as India and China, and also in North America, Australia and South Africa, it is the favored fuel in power generation. As concern about CO<sub>2</sub>

emissions increases, coal is likely to be replaced by gas in the developed countries.

Table 2 shows how world energy consumption increased between 1971 and 1997, and how this was broken down between major consumers and by type of energy. The pattern of faster growth of oil consumption than that of total energy consumption prevailed in the period 1971-1980, was reversed in 1980-1990 and reasserted itself in 1990-1997.

Between 1971 and 1980 total energy consumption rose by 25.6 percent, and oil consumption increased by 31 percent. In the period 1980-1990, world energy consumption rose by 16.7 percent, while oil use went up by only 3.3 percent. In the period 1990-1997, world energy consumption rose by 5.9 percent and oil by 9.5 percent.

**Table 2**  
**Primary Energy Consumption, 1971-1997 (mtoe)**

|             | Oil     | Natural Gas | Solids  | Hydro | Nuclear | Total   |
|-------------|---------|-------------|---------|-------|---------|---------|
| <b>1971</b> |         |             |         |       |         |         |
| USA         | 719.3   | 545.6       | 301.8   | 22.1  | 3.0     | 1,591.8 |
| W. Europe   | 655.3   | 86.7        | 278.7   | 28.3  | 3.6     | 1,052.6 |
| Japan       | 219.3   | 3.3         | 60.4    | 7.1   | 0.7     | 291.2   |
| World       | 2,398.2 | 923.4       | 1,745.2 | 104.0 | 9.0     | 5,179.8 |
| <b>1980</b> |         |             |         |       |         |         |
| USA         | 791.4   | 492.0       | 409.9   | 78.9  | 70.9    | 1,843.1 |
| W. Europe   | 682.5   | 184.9       | 266.2   | 103.5 | 46.0    | 1,283.1 |
| Japan       | 240.9   | 22.1        | 57.6    | 21.2  | 20.2    | 362.0   |
| World       | 3,001.4 | 1,678.3     | 2,020.9 | 414.6 | 167.4   | 7,282.6 |
| <b>1990</b> |         |             |         |       |         |         |
| USA         | 778.9   | 490.5       | 476.5   | 72.0  | 156.0   | 1,973.9 |
| W. Europe   | 617.8   | 223.0       | 312.0   | 97.0  | 156.6   | 1,401.1 |
| Japan       | 245.0   | 45.4        | 75.0    | 21.4  | 48.9    | 435.7   |
| World       | 3,101.4 | 1,738.1     | 2,192.1 | 540.6 | 461.1   | 8,033.3 |
| <b>1997</b> |         |             |         |       |         |         |
| USA         | 846.5   | 569.3       | 527.9   | 29.6  | 170.9   | 2,144.2 |
| W. Europe   | 678.3   | 315.4       | 235.8   | 196.2 | 43.4    | 1,469.1 |
| Japan       | 266.4   | 58.6        | 89.8    | 83.4  | 8.1     | 506.3   |
| World       | 3,395.5 | 1,977.3     | 2,293.4 | 617.4 | 225.9   | 8,509.5 |

Source: British Petroleum, *Statistical Review of World Energy*, 1972, 1980, 1991, 1997.

The trends described above resulted in a fall in the share of oil in world energy consumption between 1971 and 1980, and again between 1980 and 1990. As shown in Table 3, between 1990 and 1997, the share of oil rose.

**Table 3**  
**Oil as a Share of Total Primary Energy Consumption (in percent)**

|           | 1971 | 1980 | 1990 | 1997 |
|-----------|------|------|------|------|
| US        | 45.2 | 42.9 | 39.5 | 39.5 |
| W. Europe | 63.4 | 53.2 | 43.9 | 45.2 |
| Japan     | 76.4 | 66.4 | 56.3 | 52.6 |
| World     | 47.3 | 43.6 | 38.6 | 39.9 |

*Source:* Calculated from Table 2.

There has always been an element of substitutability between oil and other fuels, but technological changes, spurred by the increased price of oil in the 1970s, resulted in changes in production techniques and transport technologies which lowered energy intensities and increased use of other fuels. Both of these factors have affected the demand for energy and oil. The move away from oil in the 1980s was due to the increase in its price (in real terms and as compared with other prices including those of other fuels) and problems related to the security of supply, both actual and perceived. Oil remains, however, the largest source of energy used in the world.

### **b. The Rise in Oil Prices, 1999-2000**

In the period February 1999 to February 2000, the OPEC basket oil price tripled from \$10 a barrel to \$30 a barrel. This increase was not forecast by any of the major bodies that monitor energy trends. How far did it represent a major structural change in the oil market? Examining the sequence of events provides an answer.

The OPEC basket price fell sharply, from nearly \$19 per barrel in November 1997 to under \$10 per barrel in December 1998. During 1998 and early 1999, oil prices had been at their lowest levels since 1973, the result of several factors. In December 1997, OPEC agreed to increase its production quota by 10 percent. Warmer than normal winters in 1997-98 and 1998-99 in the Northern Hemisphere reduced demand for energy and for oil. Increased Iraqi oil exports contributed to a glut and oil demand was depressed due to the economic crisis in East Asia.

In March 1999, in an effort to raise oil prices, OPEC and some non-OPEC countries agreed to cut oil production starting April 1, 1999. OPEC members agreed to cut 1.72 mb/d, while several non-OPEC countries pledged reductions totaling 388,000 barrels per day. The OPEC quota was reduced in April by 7 percent, to 22.98 mb/d: production of the 10 OPEC states excluding Iraq fell from 25.32 mb/d in March to 23.53 mb/d in April, a decline of 7 percent. If Iraq is included in the figures then the totals were 27.77 mb/d and 26.31 mb/d respectively, a decline of 5.3 percent. Further, smaller, reductions occurred in May and June 1999. Non-OPEC producers also cooperated by reducing their production and against a background of strong international demand, oil prices rose. By the end of the year prices were almost double the level that they had been at the beginning. As a result, the OPEC basket price in the second quarter rose by 39 percent to \$15.38 a barrel. The increase in prices continued in the third and fourth quarters with rises of 30 percent and 17 percent respectively.

In 1998, OPEC produced an average of 27.87 mb/d, a 2.6 percent increase over the previous year. Average production in the first 11 months of 1999 was 26.57 mb/d, 5 percent less than in 1998. On the other hand, world oil demand increased by 1.2 mb/d to 75.2 mb/d in 1999 (1.6 percent), compared to an increase of 600,000 b/d (0.8 percent) in 1998. Most of this was due to the recovery of the East and South East Asian economies after their 1997-98 slump. The stronger state of demand made it possible for reductions in output to be translated into price rises. Total output fell by 2 percent in 1999 with OPEC down by 5 percent and non-OPEC supplies by 0.2 percent. The balance was made up by a reduction in stocks, which fell by 1.2 mb/d compared to a rise of 1.5 mb/d in 1998.

The price rises of 1999 that continued during the first quarter of 2000

were a reaction to the very low prices of 1998. In that year, the real price of oil fell to just under a quarter of its all time peak (see 1981 in Table 1), and half of its 1974 level (immediately after the first price jump of 1973-74). During the first two months of 1999, the spot price averaged \$10.33 or \$10.79 in 1990 prices. The latter equaled about 22 percent of the peak 1981 level.

The current price of about \$30 represents an overreaction rather like the prices of the early 1980s. If they are maintained as a result of tight supply then the pattern of demand will change, with a further intensification of the development oil saving technologies, i.e. using less oil and moving to other fuels. Another reaction is likely to be the more rapid development of non-OPEC sources, even though some non-OPEC states have been involved in the recent restriction of supplies. A third factor that suggests that prices are likely to fall is the reaction of the Saudis and some other OPEC producers to the current high level of prices. Their overriding interest is to maintain a stable market for their main export and source of revenue. Low prices made for financial difficulties at home and even threatened investment in the oil industry. High prices threaten sales abroad and the image of Saudi Arabia as a supplier which can be relied on. This is *the* key difference between the recent price rises and those of 1973-74 and 1979. At that time the producers did not anticipate that price increases would affect demand and thus eventually prices. Now they do.

### **c. Regional Demand**

Since 1970, the growth in the demand of energy has shifted from the industrialized countries of the West and Japan to the new industrialized countries of China and India, as well as the so-called Asian Tigers: Indonesia, South Korea, Singapore, Thailand, Malaysia, Hong Kong and Taiwan (see Table 4). They have been big buyers of Gulf oil, and the oil market has become increasingly regionally segmented. The long-term decline of energy intensive sectors in industrialized countries, encouraged by rising energy costs, involved the closure or reduction of energy-intensive heavy industries, such as steel and shipbuilding, and the expansion of high-tech manufacturing and services.<sup>19</sup> It also reflected

relative economic growth rates, which were, at least until 1996-97, faster in the new industrialized countries.

Table 4 shows how the share of the consumption of the United States and Western Europe declined in the period 1970-80 as a result of the slowdown in their economic growth and the measures they took to reduce the energy intensity of production. The Western European economy grew slowly in the 1990s, thus constraining energy consumption. In contrast, the American economy grew strongly and thus its share of world primary consumption during the period 1990-97 rose. The share of the USSR and Central Europe declined from 1980 to 1997 by 9 percent as a result of the economic crises that affected those regions.

**Table 4**  
**Regional Consumption of Primary Energy\*, 1970-1997 (in percent)**

|                         | 1970 | 1980 | 1990 | 1997 |
|-------------------------|------|------|------|------|
| OECD                    | 55.9 | 57.9 | 51.8 | 58.2 |
| US                      | 32.1 | 27.2 | 24.6 | 25.2 |
| Latin America           | 3.7  | 5.2  | 5.9  | 4.2  |
| Western Europe          | 20.7 | 19.8 | 17.5 | 17.1 |
| USSR and Central Europe | 21.5 | 22.3 | 16.7 | 13.3 |
| Middle East             | 1.3  | 2.0  | 3.0  | 4.1  |
| Africa                  | 1.8  | 2.3  | 2.8  | 3.0  |
| Asia, Pacific**         | 15.4 | 19.2 | 20.9 | 26.6 |
| China                   | 5.6  | 6.4  | 8.4  | 10.6 |
| India                   | n.a. | n.a. | 2.3  | 3.1  |
| Japan                   | 5.5  | 5.3  | 5.4  | 6.0  |
| Tigers***               | 1.3  | 1.7  | 3.1  | 5.4  |

\* Primary energy is only that which is commercially traded. Wood, peat and animal waste, which is important in some countries, is therefore excluded. This biases the consumption of some poor countries downwards.

\*\* Excluding Australia and New Zealand

\*\*\*Indonesia, Malaysia, Singapore, South Korea, Taiwan and Thailand

Source: BP Statistical Review of World Energy, 1971, 1991, 1998.

Energy consumption in the Asia-Pacific region rose continuously from 1970 to 1997.

Table 5 shows that changes in the consumption of oil were similar to those for energy. A substantial increase in oil consumption occurred in China and India. In Indonesia, Malaysia, Taiwan, Singapore, and South Korea the increase was most dramatic. The Asia-Pacific region as a whole recorded a 6.2 percent increase in its share of world oil consumption in the period 1990-97. The most significant change in the regional pattern of oil consumption was the fall in the share of the former Soviet Union between 1990 and 1997. As a result of the collapse of the economy, oil consumption fell by over 50 percent, from 420 mn tons in 1990 to 199 mn tons in 1997, or from 13.4 percent of world consumption to 5.8 percent. This was accompanied by a decline in consumption in the former communist states of central Europe as well.

**Table 5**  
**Regional Consumption of Oil, 1970-1997 (in percent )**

|                         | 1970 | 1980 | 1990 | 1997 |
|-------------------------|------|------|------|------|
| OECD                    | 60.8 | 60.7 | 56.3 | 62.7 |
| US                      | 30.4 | 26.3 | 24.9 | 24.9 |
| Latin America           | 5.6  | 7.4  | 7.5  | 6.3  |
| Western Europe          | 27.2 | 22.5 | 19.9 | 20.0 |
| USSR and Central Europe | 14.5 | 18.1 | 16.2 | 7.5  |
| Middle East             | 2.2  | 3.3  | 5.2  | 5.9  |
| Africa                  | 1.8  | 2.3  | 3.1  | 3.3  |
| Asia, Pacific           | 16.3 | 16.1 | 19.6 | 25.8 |
| China                   | 1.6  | 2.9  | 3.5  | 5.5  |
| India                   | n.a. | n.a. | 1.8  | 2.4  |
| Japan                   | 9.6  | 7.9  | 7.9  | 7.8  |
| Tigers*                 | 2.4  | 2.9  | 5.0  | 8.2  |

\* Indonesia, Malaysia, Singapore, South Korea, Taiwan and Thailand

Source: BP Statistical Review of World Energy, 1971, 1991, 1998.

#### **d. Imports of Oil and Petroleum Products**

Between 1950 and 1973, oil was cheap, plentiful and there were no significant fears that supplies would be restricted. As a result, international trade in oil increased faster than oil consumption, which itself grew faster than energy consumption.<sup>20</sup> Imported oil was, therefore, the preferred energy option.

In the 1970s there was a major change. Trade in oil fell faster than production or consumption. Between 1979 and 1985, the volume of oil movements between the main regions of the world declined by nearly a third. The larger trade volume crossing national frontiers, which includes that between countries in the same region, fell by a quarter.<sup>21</sup> This was despite the fact that oil was, and is, the cheapest form of energy to move over long distances.<sup>22</sup> The movement of oil has been a major element in international trade and been a source of tension in international relations. In order to understand the economic and strategic balance between countries or regions it is therefore necessary to see how much oil, as well as other forms of energy, were internationally traded.

The share of imports in world consumption fell by 2.7 percent between 1970 and 1980 and between 1980 and 1990, it fell by nearly 4 percent. It then rose by 7.7 percent between 1990 and 1997 due to the rapid growth of demand in the rest of the world which was mainly accounted for by China, the Asian Tigers, and India. These were parts of the world that experienced rapid economic growth but did not have large indigenous sources of energy. On the supply side it is important to note that in the period 1990-1997, unlike the 1980s, the Middle East increased its exports at a similar rate to that of world exports.<sup>23</sup>

Between 1987 and 1997, OECD oil imports increased by 21 percent, from 18 mb/d to 21.8 mb/d. Those of the United States rose by 56 percent, while imports by the European OECD members by fell by 5 percent because of increased North Sea production. During the same period, Japan's imports rose by 32 percent. The EIA forecasts that US gross imports of oil will increase from 9.5 mb/d in 1996 to 16.1 mb/d in the year 2020. Crude oil will account for the bulk of the increase until the year 2000, afterwards petroleum products will become relatively more important. By the year 2010, OPEC will account for more than half of US petroleum imports and by 2020 it is expected to reach to more than 54

percent. The Gulf's share of US imports from OPEC is expected to rise from 38 percent to 50 percent.<sup>24</sup>

OECD imports from the Persian Gulf between 1987 and 1997 rose by 35.6 percent, from 7.3 mb / d to 9.9 mb / d. In 1987 the Gulf accounted for 40.6 percent of OECD oil imports and in 1997, they accounted for 45.4 percent. In 1987, the United States imported 5.9 mb / d and by 1997, 9.2 mb / d. In 1987, OPEC supplied 50.5 percent of US imports, in 1997, 49.6 percent.

Imports accounted for 63 percent of oil demand in 1987 for OECD Europe\*, and 50.8 percent in 1997. OPEC's share of those imports rose from 72.3 percent to 85.3 percent. That of the Gulf rose from 43 percent to 47.3 percent and that of Libya from 12.4 percent to 17.4 percent. As a result, the Gulf and Libya accounted for 35 percent of oil demand in 1987 and 32.8 percent in 1997.<sup>25</sup> The share of OECD Europe's oil imports coming from Arab producers and Iran increased from 63.5 percent to 73.9 percent.<sup>26</sup>

### **e. Energy Consumption in the United States and Western Europe**

The United States and Western Europe are two areas of strategic importance to Israel. They are its major trading partners and provide diplomatic, political and military support and so their reliance on Arab oil imports is of strategic importance to Israel.

Changes in the amounts of energy used by each sector are largely explained by changes in demand - in other words by how fast output in each sector grew. The change in the relative price of energy and of each type of energy source also had effects. How fast a sector grew was also affected by the costs of its inputs. A number of heavy industries - such as steel and shipbuilding - which depended on relatively large energy inputs went into decline in the United States and OECD Europe. They were replaced, at least in part, by industries using less energy-intensive processes of production. In these and other sectors, more energy efficient technologies were employed. As a result, in both the United States and OECD Europe, industrial use of oil fell sharply (see Tables 6 and 7). In the residential sector, oil was partly replaced by other fuels and more energy-efficient technologies were introduced. As in other sectors, greater

use of insulation helped to reduce energy use and this helped to reduce oil consumption. The transportation sector registered large increases in oil consumption due to the increased use of all transport systems, especially private automobiles, which are the most energy intensive means of transport. Technological change did not permit a significant move away from the use of petroleum products.

Table 6 shows the pattern of energy use in the United States between 1970 and 1996. During that period the total energy requirement rose by 35 percent, but that of oil increased by about 19 percent. As a result, the share of oil in total energy use declined by 5 percent. While oil use in industry fell by 15 percent and in the residential sector, by 47 percent, in the transport sector it rose by 54 percent.

**Table 6**  
**United States Energy, Oil and Gas Consumption 1970-1996**  
**(mtoe)**

|                          | 1970  | 1975  | 1980  | 1985  | 1990  | 1995  | 1996  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| Total energy requirement | 1,582 | 1,680 | 1,828 | 1,755 | 1,919 | 2,088 | 2,134 |
| Oil                      | 684   | 760   | 782   | 713   | 756   | 804   | 812   |
| Oil use in:              |       |       |       |       |       |       |       |
| Industry                 | 116   | 114   | 141   | 99    | 96    | 93    | 99    |
| Transport                | 352   | 408   | 426   | 445   | 486   | 527   | 541   |
| Residential and other    | 118   | 105   | 87    | 76    | 61    | 61    | 63    |
| Gas                      | 509   | 466   | 488   | 423   | 439   | 508   | 504   |
| Oil as percent of        |       |       |       |       |       |       |       |
| total energy requirement | 43.2  | 45.2  | 42.8  | 40.6  | 39.4  | 38.5  | 38.0  |

Sources: IEA *Energy Balance of OECD Countries, 1970-1985* (OECD, Paris, 1987), 1990-1991 (1993), 1995-1996 (1998).

Since 1990, the origin of United States oil imports has changed significantly. In 1990, Middle East OPEC countries accounted for 34.5 percent of US oil imports; in 1997, they accounted for 20.5 percent. During the same period, imports from Venezuela (a member of OPEC), Mexico and the Netherlands Antilles rose from 21 percent to 33 percent.<sup>27</sup> This shift was due to the effects of political risk, which were greater in the

Middle East, and transport costs, which were lower from South America.

Table 7 shows that in OECD Europe between 1970 and 1996, total energy use rose by 68 percent. The use of oil rose by only 16 percent and so its share in the total declined by 18 percent. The use of oil in industry declined by 34 percent and in the residential sector it fell by 15 percent, however in transportation it rose by 140 percent.

**Table 7**  
**OECD Europe Energy, Oil and Gas Consumption 1970-1996**  
**(mtoe)**

|                          | 1970  | 1975  | 1980  | 1985  | 1990  | 1995  | 1996  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| Total energy requirement | 1,021 | 1,113 | 1,240 | 1,255 | 1,419 | 1,656 | 1,717 |
| Oil                      | 591   | 622   | 646   | 547   | 602   | 667   | 684   |
| Oil use in:              |       |       |       |       |       |       |       |
| Industry                 | 166   | 147   | 146   | 106   | 105   | 111   | 109   |
| Transport                | 135   | 167   | 202   | 215   | 274   | 316   | 325   |
| Residential and other    | 149   | 164   | 153   | 130   | 112   | 119   | 127   |
| Gas                      | 63    | 147   | 180   | 195   | 229   | 310   | 343   |
| Oil as percent of        |       |       |       |       |       |       |       |
| total energy requirement | 57.9  | 55.9  | 52.1  | 43.6  | 42.4  | 40.3  | 39.8  |

Sources: IEA *Energy Balance of OECD Countries, 1970-1985* (Paris: OECD, 1987), 1990-1991 (Paris: OECD, 1993), 1995-1996 (1998).

### 3. THE SUPPLY OF ENERGY AND OIL

#### a. Types of Energy

The supply of energy is defined as the amount marketed or sold for inventory. This may equal the amount produced but not necessarily, in that the production of energy requires energy inputs (e.g. coal in electricity generation). Electricity networks lose electricity in transmission, so that the gross amount supplied by the power producers will not equal the net amount supplied by the transmission system. Table 8 gives figures for world primary energy supply in 1971 and 1995. It shows that oil remained the most important source of primary energy throughout the period, despite a 9 percent fall in its share of the total.

**Table 8**  
**World Primary Energy Supply 1971-1995**

|                                              | 1971  | 1995  | 1971           | 1995 |
|----------------------------------------------|-------|-------|----------------|------|
|                                              | mtoe  |       | percent shares |      |
| Solid fuels                                  | 1,503 | 2,347 | 30             | 28   |
| Oil                                          | 2,448 | 3,324 | 49             | 40   |
| Gas                                          | 899   | 1,810 | 18             | 22   |
| Nuclear                                      | 29    | 608   | 1              | 7    |
| Hydro                                        | 104   | 215   | 2              | 3    |
| Other renewables                             | 4     | 36    | 0              | 0    |
| Total*                                       | 4,988 | 8,341 | 100            | 100  |
| Non-OECD combustible<br>renewables and waste | —     | 904   | —              | 10   |
| Grand total                                  | 4,988 | 9,245 | 100            | 100  |

\* Includes OECD combustible renewables and waste.

Source: IEA *World Energy Outlook* 1998.

The world supply of oil (including crude oil, natural gas, plant liquids, other liquids and refinery gains) rose by 25 percent between 1985 and 1997. In 1985 the United States accounted for almost 19 percent of world supply, but by 1997 its share had fallen to 12.8 percent. During the same period OPEC's share rose from 30 percent to 43 percent, that of OPEC rose from 19.4 percent in 1985 to 27.5 percent in 1997 and that of the Gulf rose from 17.4 percent to 26.5 percent.<sup>28</sup> The increase in OPEC's share and in that of the Gulf followed declines from 55 percent and 38 percent respectively in 1973. The decline reflected the rise in oil prices and the increase in non-OPEC and non-Gulf production following the oil shocks of 1973-74 and 1979-80. The increase in their shares since 1985 reflects lower prices and greater security of supply.

### **Gas**

Proven world reserves in 1997 were estimated at 5,112 tcf, of which 1,726 tcf (33.7 percent) were in the Middle East and 349 tcf (6.8 percent) were in North Africa.<sup>29</sup> The former Soviet Union and the Middle East accounted for 93 percent of world reserves, with about one-third in Russia, 16 percent in Iran, 6 percent in Qatar. Gas accounts for 15 percent of world final energy consumption. According to EIA forecasts, gas consumption is expected to increase faster than that of any other fuel in the period to 2020. Massive investments are currently being made with thousands of miles of pipeline being installed, especially in Europe.<sup>30</sup>

### **Coal**

Coal is mainly used for electric power generation and residential uses and accounts for 12 percent of world final energy consumption. According to the IEA, unlike oil, there are enough coal reserves to last for the foreseeable future. Coal reserves are more evenly distributed around the world than oil. The major problem in burning coal is that greenhouse gases are given off in the process, which cause global warming and air pollution. If measures against global warming are introduced then the pressure to reduce the use of coal will increase. In the OECD coal is being replaced by gas in power plants because it is cleaner. (The availability of coal in India and China, where demand for electric power is forecast to expand strongly, means that reductions in its use in richer countries will probably be balanced by increases there).

### **Biomass**

Biomass consists of firewood, charcoal, crop residuals and animal wastes. It accounts for about 14 percent of world final energy consumption. Biomass provides up to 75 percent of energy use in households in poor countries. The use of biomass is increasing at a slower rate than that of the population and at a much slower rate than that of conventional fuels. This is because as incomes rise and urbanization continues in developing economies, biomass is replaced by electricity which is cleaner, more hygienic and more convenient. However the rise in population has resulted in increased use of biomass and this is expected to continue. In the OECD, biomass accounted for only 3 percent of total final energy supply in 1995 and this is forecast by the IEA to fall to 2 percent in 2020.

### **Oil**

As oil is the largest source of energy and plays a crucial role in the Middle East strategic balance as well as the global economy, it is examined here in detail.

### **b. OPEC and Arab Producers**

Eight out of the 11 OPEC members are in the Middle East and they account for about 75 percent of its output. Events in the Middle East - the Yom Kippur War and the fall of the Shah - have dominated the history of oil.

Since the mid-1980s, OPEC Middle East has been weakened by the refusal of many of its members to accept foreign investment, including production-sharing agreements. They have thus partly denied themselves the most modern technology and have had to concentrate their activity in existing oil fields rather than develop new ones. Furthermore three countries in the region - Iran, Iraq and Libya - have been subject to various international sanctions, which have limited their output. This section examines the GCC states and the four radical states in the Middle East: Algeria, Iran, Iraq and Libya.

### **The GCC**

The six members of the GCC accounted for almost 45 percent of the world's proven oil reserves in 1998 and 21 percent of its output (see

Table 9). GCC oil was therefore a vital component of the world's reserves and supply. Oil was also the most important sector in the economy of those countries.

**Table 9**  
**GCC Oil Reserves and Production, 1998**

|              | <b>Reserves</b><br>Dec. 31, 1998<br><b>(bn b)</b> | <b>Share</b><br><b>( percent)</b> | <b>Production</b><br>1998<br><b>(000 b/d)</b> | <b>Share</b><br><b>( percent)</b> |
|--------------|---------------------------------------------------|-----------------------------------|-----------------------------------------------|-----------------------------------|
| Kuwait       | 96.5                                              | 9.2                               | 2,180                                         | 3.1                               |
| Oman         | 5.3                                               | 0.5                               | 905                                           | 1.3                               |
| Qatar        | 3.7                                               | 0.4                               | 805                                           | 1.0                               |
| Saudi Arabia | 261.5                                             | 24.8                              | 9,230                                         | 12.6                              |
| UAE          | 97.8                                              | 9.5                               | 2,710                                         | 3.6                               |
| GCC          | 464.0                                             | 44.5                              | 15,830                                        | 21.4                              |
| OPEC         | 800.5                                             | 76.0                              | 30,730                                        | 42.1                              |
| World        | 1,052.9                                           | 100.0                             | 73,105                                        | 100.0                             |

*Source: BP / Amoco Statistical Review of World Energy, 1999.*

### ***The Economy in the GCC***

The GCC states are in varying degrees rich in oil and gas. These assets dominate their economies and many of the features of their economic systems derive from the fact that they are oil rich and have relatively small populations. As a result, oil wealth has meant high average per capita income.

In the GCC, the state has been able to provide its citizens with Western levels of social welfare and to develop the economy without the need to rely on taxation. The implicit return has been public acquiescence to the rulers' decisions with no debate. The slogan "no taxation without representation" has therefore been replaced by a GCC variant "no taxation and no representation" or, at most, "very little taxation and very little representation".

The provision of free or heavily subsidized services by the state reduced pressures for political freedom during periods of economic growth and prosperity. The state and/or the ruler have been seen by many to be successful in providing most of their population with rising standards of living. Problems arose when economic growth slowed or even declined. In economies that relied on one product this was an ever-present danger, and the lack of democratic freedoms meant that responsibility for making cutbacks was entirely the responsibility of the ruler. He could not announce tax increases or subsidy cuts with the same ease as the finance minister of a democratically-elected government. The lack of public debate about economic and social issues meant that little could be expected from the public in terms of solidarity with the ruler during hard times. The personal responsibility of the ruler and his family was reinforced by the extensive involvement of the royal family in the government and the economy. Princes were ministers, and in some of these states they were also businessmen operating in the public and private sectors and in the large areas where the two overlap.

In the case of the GCC states, there was an additional factor. Oil resources of those countries were considered the personal property of the ruler, a fact that was not only internationally condoned, but had its origin in international agreements. The basis lies in how oil concessions were allocated as a result of negotiations with the ruler. He became the link between the international oil companies, powerful foreign governments (particularly Britain and United States) and the domestic economy. Foreigners bought oil from the king or the emir, who allocated oil wealth at home. None of the Gulf States has ever disclosed in any detail how much they earn from oil, because this is considered the personal income of the ruler.<sup>31</sup>

In recent years oil has accounted for between 35 percent and 40 percent of GDP in the GCC states. It provided up to 80 percent of government revenues and over 85 percent of exports.<sup>32</sup> Increases in oil revenues such as occurred in 1995-96 had rapid effects on the economies of the regions, reducing budget deficits, easing balance of payments constraints, and providing a stimulus to the private sector. They also reduced the pressure for economic reform.

The rise in oil prices of 1973-74 and 1979 resulted in huge increases in the income and wealth of the GCC states. They used these revenues to develop their economies, investing large amounts in expensive economic and social infrastructures and developing social services that were provided free or at minimal cost to their populations. They encouraged population growth by providing social benefits to large families and imported workers from poorer Arab countries and elsewhere. They also had, at least until the mid-1980s, surplus funds that were invested abroad and which yielded substantial incomes. These accrued to the public and private sectors and so for many years the GCC states were able to avoid problems in financing their state budgets and their balance of payments. These large expenditures also sowed the seeds of financial problems that were to affect the economies of the region from the late 1980s.

The rise in oil prices resulted in a recession, which caused the demand for oil to decline. In the major industrialized countries of the OECD demand peaked in 1978 at 40.9 mb / d. During the following 17 years it failed to reach that level again and only in 1996 did it reach 41.4 mb / d. Furthermore the price of oil, which peaked at about \$35 a barrel in 1981, fell to \$20.6 in 1996, a fall of just over 40 percent in nominal terms and 58 percent in real terms.<sup>33</sup> As a result, during the period 1982 to 1988, GCC oil revenues in real terms fell sharply.<sup>34</sup>

The Gulf War of 1991 resulted in an increase in oil prices, and as a result of the international boycott of Iraqi and occupied-Kuwait's oil a redistribution of oil revenues from Iraq and Kuwait to the other Gulf producers occurred. The major beneficiary was Saudi Arabia, whose oil revenues rose between 1989 and 1990 from \$24 bn to \$40 bn or by 67 percent.<sup>35</sup> For the GCC as a whole, 1990 saw a rise in oil revenues of 38 percent in current dollar terms.

Following the end of the Gulf War, international oil prices declined and, although they have been volatile over short periods since then, the price shocks of 1973-74 and 1979 have not been repeated. Between October 1995 and April 1996, there was a 25 percent rise to about \$20.6 per barrel.<sup>36</sup> This came about as a result of increased tension between the United States and Iraq and a low level of US oil stocks coupled with strong demand in northern, industrialized economies for oil. In the first

quarter of 1996, oil prices reached their highest level in five years, with the OPEC basket price reaching \$19.35 in March of that year. In April 1996, President Bill Clinton announced that in order to counter rising prices 12 million barrels of oil would be released from the United States' strategic reserve over the following six months.<sup>37</sup> After a fall in the second quarter, prices continued to increase in the second half of the year.

The increase in prices caused GCC oil revenues to rise between the years 1993-94 and 1995-96 on an annual average rate of 22 percent in current dollar terms. The average annual oil export revenue of the four GCC states which are in OPEC (Kuwait, Qatar, Saudi Arabia and the UAE) rose from \$34.6 bn between 1985-89 to \$69.5 bn between 1992-96. This doubling of oil revenues reflected increased production partly made possible by the near disappearance of Iraqi oil from world markets since mid-1990 and by higher oil prices since 1992. In 1997, oil revenues in those four countries were estimated to have declined by 5 percent as a result of a 3 percent production rise and an 8 percent fall in prices.<sup>38</sup> In the third quarter of 1998, oil prices, as measured by the OPEC reference basket, fell to \$12.33, 34 percent below their average 1997 level.

There were other changes that affected the market. In 1988, Soviet oil production fell sharply and in 1990 the international embargo on Iraq, following its invasion of Kuwait, removed nearly 3 mb/d from international markets. The GCC states, especially Saudi Arabia, responded by increasing their production, but despite this the Gulf only accounted for one-third of the increase in international demand of 12.1 mb/d between 1988 and 1996.<sup>39</sup>

### ***Cost Advantages in the Gulf***

Table 10 shows how much cheaper Middle Eastern oil is to produce than that in the rest of the world. The cheapest oil in the Middle East is from Iraq.

There are a number of reasons why costs are so low in the Gulf. First, the oil fields are large and are single concessions. This means that there are economies of scale in their operation. Geological factors make drilling and recovery of oil relatively easy. Many of the fields are close to the sea and this means that there are important cost advantages given that most of the region's oil is exported.<sup>40</sup>

Despite the cost advantages in the Middle East and especially in the Gulf, the bulk of exploration in the last 10-20 years has been outside the region. The reasons for this are explored in the section on non-OPEC producers.

**Table 10**  
**Estimated Oil Production Costs, 1995**

|                                                                     | <b>Production costs (\$/barrel)</b> |
|---------------------------------------------------------------------|-------------------------------------|
| Middle East                                                         | less than 2                         |
| Middle East, Africa, North Sea,<br>Latin America, Asia, former USSR | 2-4                                 |
| North Sea, Africa, US, Asia,<br>Canada, Latin America               | 4-6                                 |
| US, Canada, North Sea                                               |                                     |
| Europe, Latin America, Asia                                         | 6-8                                 |
| US, Canada, Latin America, Asia                                     | 8-10                                |
| US, Canada                                                          | 10-15                               |

*Source: UN World Economic and Social Survey 1995, "Technology, OPEC and the Supply of Crude Oil", pp. 159-170.*

Between 1998 and 2005, Arab countries will need to invest about \$5.5 bn a year at 1998 prices to maintain existing oil production levels and an additional \$3.5 bn in order to increase them in accordance with current plans. These are sums are becoming increasingly difficult for them to raise as a result of low oil prices and revenues.<sup>41</sup>

### **Gas**

The GCC has one of the world's largest reserves of natural gas as well as some of the largest producers. According to estimates of proven reserves on January 1, 1998, Qatar had 300,000 billion cubic feet (bcf), the third largest reserves in the world after Russia and Iran. This amounts to 6 percent of the world's and 14 percent of OPEC's. reserves The UAE has the fourth largest reserves in the world, 205,000 bcf; Saudi Arabia had the fifth largest with 190,000 bcf and Kuwait the eighteenth with 52,400 bcf. Oman's reserves were 27,450 bcf and Bahrain's 5,100 bcf.<sup>42</sup>

Gas resources in the GCC as in other parts of the Middle East have been under-used. Associated gas, which is found in oil fields, has traditionally been flared and only in recent years have attempts been made to make use of it, including re-injecting it into oil fields so as to maintain pressure. Other main uses of gas are for domestic consumption, electricity generation, water-desalination, and for export, both in liquid form (LNG) via tankers and through pipelines.

The export of LNG requires large-scale investments in equipment to liquefy and compress the gas as well as to buy tankers. This means that long term contracts, usually for periods of 25 years, are necessary to make the investment worthwhile. The fact that oil has a greater thermal content and does not require such large-scale investments has discouraged the development of the gas industry.

The main market for GCC gas is the Far East, especially Japan. Pipelines to Europe and to the Indian sub-continent have been under consideration for years but so far have not been constructed.

Kuwait's natural gas reserves are associated with oil and therefore the production of gas has fluctuated with that of oil. The share of gas that was flared declined in the 1980s and 1990s and this permitted more to be marketed. In the late 1980s Kuwait imported gas from Iraq to meet growing domestic needs, but this ended with the Iraqi invasion. Oman has been very active in developing its gas resources and has discovered large reserves of non-associated gas. As a result of these discoveries, gas may overtake oil in its importance as an export fuel.<sup>43</sup> Large investments have been made in LNG for domestic use and for export to the Far East, due to commence in 2000. Qatar is the gas-state par excellence, with gas reserves worth 40 bn barrels of oil equivalent. About 5 percent of the reserves are associated and the rest are non-associated, with the bulk in the offshore North Field that borders on Iranian offshore fields. After initial uncertainties, contracts have been signed with Japanese companies for the development of the field and downstream (processing) plants. Japanese companies are also buying gas and are involved in its shipping to Japan. Between 1991 and the year 2000, about \$39 bn was to be invested in North Field development projects.<sup>44</sup>

Saudi Arabia does not export gas and it lacks processing capacity. The flaring of associated gas remains relatively large. In 1993 it flared

about 35 percent of gas produced, although this has fallen since then. Gas is supplied to domestic consumers at very low prices and this has been a disincentive for Saudi Aramco to increase processing capacity. The development of the gas industry in Saudi Arabia has suffered from the financial difficulties that have faced the country during the last decade. Given the scale of financing required, foreign investment is necessary and the government has not been willing to countenance it.

Most of the UAE's proven reserves are in Abu Dhabi, with Sharjah and Dubai being smaller but significant producers. Flaring accounted for about 35 percent of production in 1993, but domestic production has increased sharply since the mid-1980s with large investments in offshore and onshore fields.

### ***Economic Growth***

Given the importance of oil in the GCC, the pattern of economic growth has been very closely connected to changes in the price of oil and the amount sold. The Gulf War brought a 3.3 percent rise in GDP, measured in constant price terms, in all of the GCC except Kuwait as a result of the increase in oil revenues.<sup>45</sup> In 1990, oil revenues rose by 38 percent in the GCC and by 66 percent in Saudi Arabia, more than offsetting the fall of revenues in Kuwait and the immediate effects of the conflict. In 1991 oil revenues fell and GDP in the GCC declined by 0.2 percent.<sup>46</sup> There was a recovery in 1992 to 5.2 percent as a result of an increase in oil revenues, but this was short-lived.<sup>47</sup> The 1993-95 period was also one of slow growth, although oil revenues rose in 1995. The reason for the recession was that fiscal policy was tightened in order to reduce budget deficits which had developed. Between 1993 and 1995, the budget deficit fell from the equivalent of 10 percent of GDP to 4 percent. In 1996 with the rise in oil prices, fiscal restraint was eased and the economy grew by an estimated 5 percent, a rate that was nearly maintained in 1997, according to a UN estimate.<sup>48</sup>

### ***The Fiscal Crisis***

In the late 1970s and early 1980s high oil prices enabled GCC states to invest heavily in their social and economic infrastructure and to build up foreign reserves. Between 1981-85, oil and gas accounted for 37 percent

of total revenues in the GCC. When oil prices began to drop in 1982, budget surpluses declined and deficits started to emerge, but balance of payments difficulties did not initially develop. From 1986, when oil prices fell by nearly 50 percent, deficits on the budget and balance of payments' current account emerged. In the period 1986-89, oil and gas accounted for only 23 percent of revenues. In response to the fall in revenues and the emergence of deficits, public sector spending was reduced, with most of the cuts falling on capital outlays. In 1992 total government spending in the GCC came to \$86 bn.; in 1995 it was \$73 bn – a fall of 15 percent. This reduction was not enough to close the gap: in 1992 the budget deficit equaled 9.4 percent of GDP in the GCC as a whole. Given their excellent credit ratings, GCC states were able to borrow abroad to finance the current account deficits that emerged and thus, with the exception of Kuwait, avoid depleting reserves or assets held abroad. As a result they began to pay interest on loans taken abroad. Since 1995, spending has increased and it is estimated that the deficit rose in 1997.

The Gulf crisis of 1990-91 led to an increase in oil prices, a re-allocation of oil revenues from Iraq and Kuwait to the other GCC states, and to a large increase in government spending in the latter. In 1990 and 1991, not surprisingly, the budget deficit in Kuwait exceeded 100 percent of GDP; in Saudi Arabia, despite the huge increase in oil revenues, however, the deficit grew there too. Excluding Kuwait, the current account deficit of the GCC reached the equivalent of 7 percent of GDP in 1991 and foreign reserves declined.

The Gulf crisis and war weakened the GCC economies and the aftermath of the war, when oil prices fell and growth in the international economy slowed, made the adjustment process harder. The period 1992-94 was marked by deficits in the budget and in the current account of payments as a result of the war and lower oil revenues in 1993 and 1994. Economic growth was weak in the period 1992-94 with an average annual GDP growth rate of 2 percent, which represented a fall in per capita terms. Deflationary policies were maintained into 1995, when oil prices started to rise and the pressure on state budgets and the balance of payments eased. Two problems underlying the adjustment process were the need for high levels of investment in order to maintain the economic infrastructure and the effect of demographic pressures. Investment

income fell as some foreign assets were liquidated and the burden of debt servicing increased. This was a double squeeze: on both the revenue and expenditure sides of the budget.

The investment crisis was due to the fact that high quality infrastructure was supplied to the population without charge, while the state retained responsibility for maintaining it. Energy supplies were cheap, as was water, with large implicit subsidies. This encouraged consumption and when oil revenues declined the governments of the region found it increasingly hard to raise the resources to fund these sectors and make further investments in order to meet increasing demand. This was most noticeable in Saudi Arabia where there have been electricity shortages and the cheap water policy for agriculture has been partially re-evaluated. Shortages of domestic revenues were compounded by low rates of return on foreign assets, much of which were held in liquid, and thus low-interest, assets such as cash, government securities, or government bonds. In 1989, about 75 percent of the total foreign assets of the GCC were in these types of liquid assets.<sup>49</sup> The accumulation of foreign assets decelerated in the late 1980s and became negative for some members of the GCC in the 1990s.

The rise in oil revenues in 1995 and 1996 enabled GCC states to reduce their budget deficits. The strength of the US dollar, in which oil was priced and against which the currencies of the GCC states were tied, increased their revenues in terms of non-dollar currencies still further. As most of their exports were sold to non-dollar area states and most of their imports came from there, they benefited from an increase in their terms of trade compounded by the currency effect.<sup>50</sup>

In 1995, under the influence of relatively low oil revenues, GCC states started to draft development plans designed to achieve fiscal balance by the year 2000. Bahrain planned to eliminate its budget deficit by the year 2000 by increasing revenues and reducing expenditures. The private sector's role in the economy was to be expanded and it would play an increased role in generating employment. Kuwait's draft five-year plan for the period 1995-2000 aimed to achieve fiscal balance by controlling spending as well as increasing revenues by introducing sales tax, taxing corporate profits and increasing customs duties. Private sector activity was to be encouraged, partly through privatization and partly by

allowing foreigners more freedom to invest in petrochemicals and even in the upstream sector. Oman's five-year plan also envisaged a zero budget deficit by the year 2000. Revenues would rise as a result of increased oil production and sales of gas. Spending on defense and development would be reduced. Qatar's five-year plan for the period was based on the expansion of its massive gas-field. Plans for increasing taxes and government fees and for cuts in subsidies and other forms of current spending were also announced.

The Saudi Sixth Development Plan for the period 1995-2000 aimed at ending the budget deficit by 2000. Non-oil revenues were to be increased with higher charges for publicly provided services such as electricity and airline fares. Proposed spending was to be cut, regardless of changes in oil revenues.

In the UAE, the federal budget accounts for a minority of public spending and revenues. More significant are the budgets of the two largest members of the federation: Abu Dhabi and Dubai. Both of them announced plans to increase government duties and fees so that they would reach between 30 percent and 40 percent of non-oil revenues by the year 2000. The federal government also announced its intention of reducing subsidies to prevent the duplication of capital spending between it and the various emirate governments.<sup>51</sup> The collapse of oil prices in 1998 reinforced this process.

### ***The Balance of Payments***

Official figures are only available for the balance of payments of Bahrain, Kuwait, Oman and Saudi Arabia. The current account worsened dramatically, but temporarily, as a result of the Gulf War in 1991. The deterioration in the current account came despite a near doubling of the trade surplus of goods in 1990 to over \$29 bn as a result of the rise in oil revenues. This boosted exports and as the increase in imports was much smaller, the trade surplus rose. The Gulf crisis resulted in a large increase in imports of services and a massive increase in remittances of funds out of the region. It was these factors that caused the current account to go into deficit to the tune of \$55 bn in 1991. In the four years 1991- 1994, the deficit came to about \$100 bn. Between 1991 and 1997, as a result of tight fiscal policies and weak demand in the private sector, Saudi Arabia's

current account deficit was eliminated. Kuwait and Bahrain also experienced an improvement in the current account of the balance of payments during that period.

### ***September 1998: Change in Saudi Oil Policy***

In September 1998, the Saudi Crown Prince invited American oil companies to submit proposals for investments in the kingdom that would be of mutual benefit. Although the phrasing was cautious, this represented a dramatic change of policy, reversing nearly 30 years of nationalization and self-reliance which had characterized the upstream sector in Saudi Arabia and other Arab countries.<sup>52</sup> It can be explained by the collapse of oil prices in 1998 that sharply reduced its revenues. Saudi Arabia has also been badly affected by the economic crisis in South East and East Asia which is its largest market. The combined effects of these changes were that Saudi oil earnings were forecast to fall from \$45.5 bn in 1997 to \$29.4 bn in 1998, a fall of 35 percent.<sup>53</sup>

Given that oil dominates Saudi exports, this will worsen its balance of payments, reduce its GDP, and cause deterioration in the state budget. Most significantly the Saudi national oil company, Saudi Aramco, has been forced to reassess its investment program. This has also affected plans to develop the gas network in the kingdom, which was designed to replace oil with gas on domestic markets and thus make more oil available for export. By inviting foreign companies to invest, the government is trying to avoid or reduce the need for financial restraint at home.

The position of other Middle Eastern OPEC members is similar. In real terms, measured in 1990 prices, their revenues fell from \$349.5 bn in 1990 to \$61.9 bn in 1997 and \$61.4 bn in 1998.<sup>54</sup> On the positive side, low oil prices discourage the development of alternatives to oil and the investment in more expensive oil sources, both conventional and unconventional.

### ***GCC: Conclusions***

The GCC states have a vested interest in stability. They want to maximize their long-term revenues and this cannot be done by price hikes or interruptions in supply.

Elsewhere in the Middle East there is more pressure to maximize short-term revenues: Iraq needs to rebuild its economy; Iran wants to finance the development of its oil and gas fields and is a high absorber; Libya's economy has suffered from sanctions and needs investment; and Algeria will one day want to repair the damage caused by the civil war. The instability of the regimes in the non-GCC oil states of the Middle East and their economic needs make their oil pricing policies more radical and they may threaten interruptions to supply. GCC producers, especially Saudi Arabia, cannot afford to restrict oil supplies in order to raise prices. They have accumulated financial problems that require a continuous flow of finance and they lack the internal cohesion to demand sacrifices of their populations.

All of these states, although to a slightly varying degree, have an interest in maintaining oil's share in international energy markets. The demand for Middle Eastern oil will depend on the share of oil in total energy demand, the perception of risk in the Middle East, and the availability of non-Middle Eastern oil. Eventually the size of Gulf reserves and their low cost will be a dominant factor in the market. Much depends on views about reserves: are total reserves being used up and/or are non-Middle Eastern reserves peaking?

Furthermore, OPEC members outside the Gulf adopted different policies from those in the Gulf. Algeria has encouraged foreign investment in its upstream since 1992, a significant reversal of its socialist and nationalist economic tradition. Ecuador left OPEC in 1993 and Gabon left in 1996. Venezuela has opted for a policy of maximising output and has become one of the largest suppliers to the United States. Its output (including lease condensate) rose by 89 percent in the decade to 1997 compared with a 53 percent rise for OPEC as a whole.

Low oil prices have reduced profits in the oil industry and this has promoted a spate of mergers among major international companies in the industry. The bargaining power of these companies has increased as Middle Eastern producers, which excluded them from the upstream, have themselves been financially squeezed by low oil revenues. Recognizing their mutual dependence, Saudi officials have advocated a deal in which Western oil companies invest in the Saudi upstream. By opening this lucrative sector to foreign investment, Saudi Arabia and

other Middle East producers could discourage investment in other parts of the world where exploration and recovery costs are higher.

### **The Radical States in the Middle East**

At the end of 1997, Algeria, Libya, Iraq and Iran had total estimated oil reserves of 244.2 bn / b. This was equal to 56 percent of OPEC's reserves and 37 percent of the world total.<sup>55</sup> This means that a very large share is located in countries that can either be considered unstable (Algeria) or hostile to the West and Israel (Iran, Iraq and Libya). Furthermore Iraq's production of oil is tightly limited by UN sanctions and so it is using up its reserves at a slower rate than other countries. This means that, all things being equal, it will figure as a larger potential producer in the future than it does at present.

**Table 11**  
**The Radical Middle East States: Oil Reserves and Production, 1998**

|         | <b>Reserves (bn barrels)</b> | <b>Production (mb/d)</b> |
|---------|------------------------------|--------------------------|
| Algeria | 9.2                          | 1,355                    |
| Iran    | 89.7                         | 3,800                    |
| Iraq    | 112.5                        | 2,165                    |
| Libya   | 29.5                         | 1,445                    |

*Source: BP Statistical Review of World Energy, 1999*

In 1998, the radical states produced 8.795 mb / d, nearly 29 percent of OPEC production and 12 percent of world production. They had 24 percent of the world's oil reserves and the disparity between production and reserves was similar to that for the GCC.

How these countries will use their oil will depend primarily on their domestic needs. Iran has a large and rapidly growing population which needs to feed and employ. It is therefore a high absorber that can use all the revenues it can get. Iraq will have huge reconstruction projects to complete if and when its oil production restarts at pre-July 1990 levels. Libya has suffered the effects of sanctions, draught, economic mismanagement and has a rapidly growing population. Algeria's needs

when the civil war ends will be huge: battle damage to be repaired, as well as a large population to be fed and employed. Logic suggests that these countries will have plenty of constructive uses for oil revenues rather than sacrifice them for political ends, but logic has not necessarily played a major role in their decision making in the last 20 years. However, economic logic cannot be avoided forever. Even the most extreme state, Iraq, pursued economic as well as political / strategic interests in invading Kuwait.

### ***Algeria***

Despite the state of near civil war that has prevailed in Algeria in the 1990s, oil, oil products and gas production have been unaffected. One of the main reasons for this was that most of its installations are in the south of the country, far away from the main centers of population.

Algeria went further than any other country in the Middle East or North Africa in encouraging foreign investors through liberal legislation permitting production sharing. The state-owned hydrocarbon development company, Sonatrach, plans to increase non-condensate oil production from 850,000 b / d in early 1998 to 1.5 mb / d in the year 2004.<sup>56</sup>

Algeria has 4.5 trillion cubic meters of natural gas reserves or 36 bn barrels of oil equivalent. In November 1996, the Maghreb-Europe Gas Pipeline (GME), which runs from Algeria to Europe via Morocco, was completed. It was designed to transport 10 bn cubic meters of gas a year to Europe. The Transmed Gas Pipeline (TME) runs from Algeria to Italy. It has been expanded to 25 bn cubic meters a year capacity and there are plans to expand its capacity to 75 bn cubic meters within the decade.

### ***Iran***

Iran's oil sector is run by the state through the National Iranian Oil Company. This controls the upstream and the downstream sectors, as well as distribution and marketing. Gas and petrochemicals are also under state control.

Since the end of its war with Iraq in 1988, Iran has made major efforts to repair war damage. The international boycott of Iraqi oil since 1990 enabled it to increase the volume of its oil exports and revenues. From 1991, as the economy began to recover from war, domestic demand for

oil rose and major plans were announced for expanding production capacity. These could only be carried out with foreign capital and technology that was not available on a sufficient scale. In 1994, a 9.5 bn barrel oil discovery was announced, worth \$41 bn at the prices then prevailing. Petroleum accounted for over 80 percent of Iran's exports, and in 1994 oil revenues accounted for 64 percent of government revenues in the budget approved by parliament.

Iran's proven reserves are mainly onshore in areas near the Iraqi border. Iran's crude oil is low in sulfur and light. There has been little exploration in the last 30 years and one of Iran's major problems has been finding the resources and technology for offshore exploration. The development of the oil and gas sectors has been hindered by United States sanctions. French and other companies have been willing to invest, but the scale of finance required has been a problem given Iran's international isolation. Iranian oil production peaked in 1974 at just over 6 mb/d, but since then there has been little exploration. Sustainable production capacity is about 3.6 mb/d, although a daily peak rate of 4 mb/d has been reached. Iran has had difficulty funding exploration and gas-injection and in-fill drilling of existing wells. Iran is a high absorber of oil revenues with a growing population and massive development requirements. It therefore needs all the funds that it can get, but this has not stopped it from calling for radical policies such as production cuts in OPEC.

Iran has the world's second largest natural gas reserves: 20 trillion cubic meters. Like all gas resources, these require major investments for them to become usable, both for domestic consumption and for exports. The domestic prices of energy have been increased in recent years, with beneficial effects on the amount available for export and government revenues. Gas is also being substituted for oil in household and industrial use and in power generation, thus releasing more oil for export.

Iran's share in OECD's oil imports rose from 9 percent in 1985 to 15 percent in 1996. Japan has been the main reason for this increase. Its imports from Iran rose from 0.3 mb/d in 1985 to 0.5 mb/d in 1996.

Iran has been subject to varying degrees of United States' sanctions since 1979. In May 1995, the US announced an embargo on Iran that restricted trade and investment. In 1996, the United States introduced

the Iran and Libya Sanctions Act that provided for sanctions against foreign companies that invest more than \$40 million in either country. These measures have limited Iran's access to Western finance and technology and have constrained economic growth.

### ***Iraq***

Iraq has the second largest oil reserves in the world after Saudi Arabia, with 112 bn barrels and 215 bn barrels of probable and possible reserves. The fact that it produced 1.2 mb/d on average in 1997 and about 2 mb/d in the first eight months of 1998 compared with 3.5 mb/d in the first half of 1990 is the clearest testament to the fact that politics dominated economics in the Middle East. Iraq's oil exports are regulated by UN Resolution 986, which was passed in 1995 as a result of its invasion of Kuwait and the subsequent UN decision to detect and end Iraq's non-conventional weapons production capacity. By removing most Iraqi oil from world markets, the amount that can be sold by other producers, particularly Saudi Arabia, has been increased and so therefore have their revenues. The increase in Iraqi production and exports in 1998 was one of the factors that resulted in lower international oil prices.

During the Iran-Iraq war, Iraq demanded parity with Iran in OPEC quotas and this was agreed to at the end of the war in 1988. In need of funds to rebuild a war-damaged economy, Iraq demanded that Arab Gulf states cease producing above their OPEC quotas. In July 1990, Iraq threatened action against Kuwait and the UAE, and in August 1990 it invaded Kuwait. This led to an international boycott of Iraq and its oil sales virtually ceased. Air attacks against Iraq during the Gulf War of 1991 led to massive damage of oil industry but experts estimated that production could be restarted rapidly under the right conditions. However, it would take up to three years to reach an export capacity of 3.2 mb/d and cost \$6 bn. At the end of 1993, the UN proposed an emergency export quota that permitted Iraq to export \$1.6 bn of oil a year.

By 1998, the UN had increased the amount that Iraq could export to (\$5.2 bn every six months. This had unintended effects on the oil market. As oil prices fell in 1998, Iraq had to sell a larger quantity of oil in order to meet its revenue quota and so its exports rose. The increased volume,

given the weak state of international demand, resulted in downward pressure on oil prices. This in turn made it necessary for Iraq to sell even more in order to earn its permitted amount. Saudi Arabia and other Gulf and OPEC producers have benefited from Iraq's partial absence from the international market, but by specifying a revenue rather than quantity quota, in conditions of weak demand the market has been partly destabilized.

Iraq's huge oil fields are the cheapest in the world to exploit. It is therefore generally agreed that Iraq's oil production could be increased quite rapidly if international sanctions were lifted. Most of the damage caused by the 1991 Gulf War has been repaired although some facilities have to be operated in rotation and the quality of oil produced is lower than the Iraqi authorities desire.

Iraq has 110 tcf of proven gas reserves and 150 tcf of probable reserves. About 70 percent of this are associated gas that is produced along with oil. Production in 1996 was 128 bcf compared with the peak of 700 bcf reached in 1979.

### ***Libya***

Libya's oil industry has been run by the state-owned National Oil Corporation (NOC) since 1968. The NOC has production and exploration agreements with a number of foreign companies, the most important of which is the Italian Agip-ENI group. Libyan oil is high-quality low-sulfur crude. Production, estimated at nearly 1.5 mb/d in 1997 and 1998, is well below the peak of 3.3 mb/d reached in 1970.

In response to its links with international terrorism, the United States has imposed sanctions on Libya since 1982, and the United Nations has done the same since 1992. In 1993, the UN expanded its sanctions and in 1996, the United States expanded those that it was applying. The American measures include a provision for sanctions on foreign companies that invest more than \$40 mn a year in Libya.<sup>57</sup> The sanctions imposed by the UN included an air embargo, a ban on the sale of arms, the freezing of Libyan assets abroad, a ban on sales of equipment for the Libyan oil industry and restrictions on Libyan diplomats abroad.

Sanctions have prevented Libya from fully developing its oil and gas resources. Although it is able to sell oil and gas in Europe (Italy

being its main customer), the unwillingness of many foreign companies to engage in business with Libya (despite offering production sharing agreements), coupled with low oil revenues due to weak prices has limited investment. This has affected the operation of existing fields as well as prevented the exploration of new ones.

Libya probably has the largest oil reserves in Africa and only 50 percent of its territory has been explored. NOC has plans to increase production capacity to 1.65 mb/d by 2000, an increase of almost 14 percent over 1998. This and other expansion plans seem technically feasible but the finance and equipment is not available because of sanctions.

Libya also has significant proven gas reserves, estimated at 46.3 tcf in 1997. Potential reserves (including proven reserves) may total 50-70 tcf. A contract to export large volumes of gas by underwater pipeline to Italy was signed in 1996. Libya became the second country in the world after Algeria to export liquefied natural gas (LNG) but due to technical factors this development has not been fully exploited.<sup>58</sup>

In April 1999, the United Nations Security Council suspended UN sanctions against Libya, after it handed over for trial in the Netherlands two Libyans accused of the bombing of a Pan Am aircraft over Lockerbie, Scotland, in 1988. The UN secretary general was due to recommend the cancellation of sanctions, conditional on an Libyan declaration renouncing terrorism, cooperation in the trial and a satisfactory offer of compensation to the families of the victims of the bombing. The US did not lift its own ban on trade or investment by its own firms in Libya.<sup>59</sup>

### **c. Non-OPEC Producers**

Since the mid-1980s, the main increase in oil production has come from outside OPEC and the GCC. This has been the result of three factors. The first was the fiscal encouragement through tax policies adopted by the United Kingdom and other medium-sized producers. This involved lowering tax rates and even abolishing them on new fields. In Norway, the government eased its policy of taking a share in the equity of oil projects in its zone of the North Sea.<sup>60</sup>

The second, and closely related, factor was the major improvement in technology that made it possible, and then made it much cheaper, to

explore for oil in what had been uneconomic or technically difficult areas. One of the main challenges to the oil industry has been to increase the recovery rate of oil fields, which have typically been in the range of 25-35 percent. Oil companies have also tried to stabilize the projected decline in the extraction rate of mature fields. In both respects they have had major successes using water injection, gas injection (where gas fields are located nearby), horizontal well drilling, advanced three-dimensional seismic modeling and other methods. Very deep sea drilling has been used successfully off the coast of West Africa, in the North Atlantic and in the Gulf of Mexico.<sup>61</sup> Related to improvements in the technology of oil extraction have been developments in the extraction of oil from other hydrocarbons such as heavy oil, bitumen and shale oil. The use of these resources has become increasingly economic as technology has developed. In 1994, there were an estimated 15 trillion barrels of oil-yielding hydrocarbons; Canada produced about 400,000 b/d from tar sands in 1995.<sup>62</sup> Technological change made it quicker, easier and cheaper to find oil, and thus led to more oil being discovered. The rate at which oil was discovered in the United States doubled between 1986 and 1990; outside the US it increased five-fold.<sup>63</sup> The rate at which oil was discovered also lowered the cost of running the upstream sector of the petroleum industry, which in turn increased the profitability of oil companies in the late 1980s and early 1990s, thus encouraging more investment.

The third was the exclusion of the major Western oil companies from the GCC upstream sector, which includes exploration and extraction. This, together with a perception of the region as unstable, has limited Western investment in the GCC and the Middle East more generally. Political risks and the unwillingness of Gulf producers to allow foreign investment in the upstream outweighed the cost advantages that existed in the Gulf.

The price rise of 1973-74 did not result in an increase in the share by non-OPEC suppliers although their output did increase. The reason was that OPEC increased its output as well. OPEC's market share fell sharply following the rise in prices of 1979-80 because by that time the effects on supply in the non-OPEC states had come into operation. The drop in oil prices since the early 1980s has helped to restore OPEC's share, although

it should be noted that the decrease in prices was an incentive for OPEC to increase production so as to maintain revenues.

The most dramatic increase in non-OPEC supply came from the North Sea. In 1971, production began and quickly reached 6000 b/d. By 1977, it had reached 1 mb/d and by 1980, 2.1 mb/d. In 1997, it reached a peak of 5.8 mb/d. Other non-OPEC areas also increased their output. Mexico, China, Angola, Argentina, Brazil, Colombia and Ecuador all stepped up their production in the 1980s and 1990s. Since the later 1980s, there was a fall in Soviet and then Russian output. Production in the former USSR fell from 12 mb/d in 1988 to 10 mb/d in 1991. Russian production fell from 7.6 mb/d in 1992 to 5.9 mb/d in 1997.<sup>64</sup> There was also a fall in US production from 9.6 mb/d in 1970 to 6.4 mb/d in 1997.

### **Oil and Gas in the Caspian Sea Region**

This section examines the outlook for oil and gas exports from areas bordering on, or close to, the Caspian Sea. The countries concerned are Russia, Georgia, Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Although Uzbekistan does not border the Caspian Sea, it shares the region's hydrocarbon basin and the proposed routes through which its gas and oil may be exported. Although Iran borders the Caspian, it has been dealt with in a previous section.

The EIA's *International Energy Outlook 1998*, provides estimates of proven and potential oil reserves in the Caspian Sea region. These are given in Table 13, which shows that the potential reserves are over five times the level of proven reserves, and that over half of all total oil reserves are in Kazakhstan. The total of proven reserves equaled 3.1 percent of world proven reserves in 1997, similar in size to those of the North Sea or the United States.<sup>65</sup> Potential reserves, estimated at 171 billion barrels, equal about 25 percent of proven Middle East reserves.

In its reference case forecast, the EIA suggested that oil production in the former Soviet Union (FSU) that includes all the countries listed in Table 12 will increase from 7.1 mb/d in 1996 to 13.2 mb/d in 2020. As a share of world production, it will increase from 9.9 percent in 1996 to 11.4 percent in 2020. As oil consumption in the FSU is forecast to increase from 4.4 mb/d to 7.5 mb/d, an additional 3 mb/d will be available for

**Table 12**  
**Oil and Gas Reserves in the Caspian Sea Region, 1998**  
**(oil in billion barrels, gas in tcf)**

|              | <b>Proven<br/>Oil</b> | <b>Potential<br/>Oil</b> | <b>Total<br/>Oil</b> | <b>Proven<br/>Gas</b> | <b>Potential<br/>Gas</b> | <b>Total<br/>Gas</b> |
|--------------|-----------------------|--------------------------|----------------------|-----------------------|--------------------------|----------------------|
| Azerbaijan   | 12.5                  | 32                       | 45                   | 11                    | 35                       | 46                   |
| Kazakhstan   | 17.6                  | 92                       | 110                  | 53-83                 | 88                       | 141-171              |
| Russia*      | 0.3                   | 7                        | 7                    | -                     | -                        | -                    |
| Turkmenistan | 1.7                   | 38                       | 40                   | 98-155                | 159                      | 257-314              |
| Uzbekistan   | 0.3                   | 2                        | 2                    | 74-88                 | 35                       | 109-123              |
| <b>TOTAL</b> | <b>32.4</b>           | <b>171</b>               | <b>204</b>           | <b>236-337</b>        | <b>317</b>               | <b>553-654</b>       |

\* Caspian Sea Region only

Source: EIA, "The Caspian Sea Region", October 1998 Internet Note

export, provided the means of delivery are available. These figures should be put into the perspective of global trends. According to the EIA's oil production forecast for the year 2020, world production will come to 115.9 mb/d, that of the former FSU will equal 11.4 mb/d, compared with 47.3 mb/d for the Gulf and 55.4 mb/d for non-OPEC countries (see Table 16). The former FSU will therefore be a significant, but not major, producer. The EIA assumed that international oil companies would have incentives to invest in the region. The most important part of this assumption is that costs would not be too high relative to those in other regions. Much will depend on the relative attractiveness of Middle East oil to potential investors.

Azerbaijan had the largest oil production in the region when USSR broke up in 1990, but Soviet regime historically directed the resources to other regions. As a result, much of the oil and gas in the Caspian Sea region have not been developed.

Proven gas reserves in the region, however, are much larger. In terms of proven reserves alone, Kazakhstan, Turkmenistan and Uzbekistan each rank among the world's 20 largest reserve holders. The EIA estimates the proven reserves at between 236 and 337 tcf, similar to those of North America. Possible gas reserves could be equal to 328 tcf, but

these are located in more remote regions of Kazakhstan, Turkmenistan and Uzbekistan. World proven reserves in 1997 were estimated at 5,112 tcf, of which 1,726 tcf (33.7 percent) was in the Middle East and 349 tcf (6.8 percent) in North Africa.

A number of problems exist in the exploitation of these resources. First, the countries of the region have experienced severe economic difficulties since they gained their independence from the Soviet Union. Between 1989 and 1997, GDP declined in all of countries in the Caspian Sea region. The fall ranged from almost 14 percent in Uzbekistan to 71 percent in Georgia. In the Russian Federation it declined by 42.5 percent and in Kazakhstan by nearly 38 percent.<sup>66</sup> These large drops were due to military conflicts within and between some of the countries of the region and the immense difficulties that they had in restructuring following the collapse of the Soviet Union.

The region faces serious political instability. Conflicts exist between Armenia and Azerbaijan as a result of the separatist struggle of the Armenian population in Nagorno-Karabakh, which is part of Azerbaijan. These conflicts resulted in thousands of deaths and the displacement of more than one million people. In Georgia, separatist struggles in Abkhazia and South Ossetia resulted in near civil war and massive population displacement. Russia has faced political and economic crisis as well as a separatist war in Chechniya. Uzbekistan is concerned about the involvement of native Uzbeks in the conflict in Afghanistan. Tajikistan has been subject to Islamic insurgency launched from Afghanistan. Kazakhstan faces tensions between its ethnic Russia minority and the majority, who are Muslims. In addition to these ethno-political conflicts, Russia believes the Caspian should be developed under a common program rather than separately by each littoral state.

The neighboring non-FSU countries are Turkey, Iran, Afghanistan and China. In order to export their oil and gas resources, pipelines have to cross the territory of some of these neighbors and this, under the current geopolitical circumstances, presents a serious challenge. Existing routes go through Russian territory and had their origins in the Soviet period when links within the Soviet Union were the priority. Caspian Sea countries are linked to each other by pipelines, but only the Kazakhstan to Russia route links the region to European and world

markets. Most of the existing pipelines terminate at Novorossisk on the Russian Black Sea coast and oil is then transported by tanker through the Bosphorus before reaching the Mediterranean, which is ecologically and politically sensitive. Given that oil markets in Asia were forecast to grow faster than those in Europe, it may make sense to route the oil east rather than west. The options are therefore pipelines through Turkey, Russia, Iran or China, each presenting a different challenge.

The United States is strongly opposed to the development of pipelines across Iranian territory because of Tehran's support for international terrorism. The 1996 Iran and Libya Sanctions Act restricts the amount that a company can invest in either of those countries and subjects those interested in investments in Iranian or part-Iranian pipelines to US sanctions. Countries in the region do not want to rely on the Russian route for fear that it could be closed for political or economic reasons.

Turkey has been in dispute with the oil companies British Petroleum and Amoco (which have merged) because of their unwillingness to back the development of a pipeline between Baku, Azerbaijan and Ceyhan, on Turkey's Mediterranean coast. BP stated that it did not want to rush a decision given the uncertainties in the region.<sup>67</sup> A shorter and cheaper alternative route had been suggested: the oil would be piped to Georgia's Black Sea port of Supsa and then go by tanker through the Bosphorus to the Mediterranean. The chairman of Chevron, the US oil company, which is a leading participant in Caspian oil development, said that because of recent uncertainty about the size of reserves in the region, the shorter and cheaper route was more desirable.

Turkey was not to be dissuaded, however, and pressed very hard for the pipeline to Ceyhan. It called on the American government to support it and stated that it would not allow the Bosphorus to become a pipeline for Caspian crude. Ankara's efforts gained support when Washington announced tax incentives for companies investing in the Turkish route and the Turkish government. On October 29, 1998, a 30-year agreement was signed between Turkey and Turkmenistan for the construction of a gas pipeline from Baku to Ceyhan that will have an eventual capacity of 30 bcm. Turkey undertook to buy and transport 16 bcm of Turkmen gas to Europe. The deal was part of the United States sponsored East-West Energy Corridor and has been the subject of intense debate both in the

United States and in the Caspian region. Commercial interests have tended to favor pipelines through Russia and/or Iran on the grounds that they are cheaper and therefore less risky, especially given the uncertainties associated with the Caspian fields. The US government has been accused of taking a political approach in favoring the pipeline through Turkey, favoring an ally for political, rather than economic, reasons. The eastern option also poses a challenge. A feasibility study on the construction of a pipeline to Japan through Uzbekistan, Kazakhstan and China estimated the cost would be \$8-\$11 bn and span some 8000 km.<sup>68</sup>

### ***Azerbaijan***

Azerbaijan's oil resources are both onshore and offshore and they have been exploited longer than anywhere else in the Caspian region. Production has fallen in recent years due to a shortage of capital and to conflicts within the country and with its neighbors. Despite this, five foreign consortia are working on projects in the country, all with the state-owned oil company Socar. Azerbaijan has done better than any other Caspian country in attracting foreign investment to its oil industry. Its legal and fiscal codes are attractive and it has managed to cope with the conflicting pressures of Russia, Iran, Turkey and the United States. The fall in output has now stabilized and short-run prospects are good.

As in Kazakhstan, the major issue facing the future development of the oil industry and the smaller gas industry is the question of pipelines and export routes. Conflicts in Abkhazia, in Georgia (close to the Azerbaijan border), the on-off war with Armenia over the Armenian enclave of Nagorno-Karabakh and the Chechnyan struggle for independence from Russia all affect decision-making about export routes.

Socar has decided that in the short term its oil will be exported first through the Russian Black Sea port of Novorossisk and then through Georgia to its Black Sea port of Supsa. These routes are meant to provide for oil that will come onstream until the 2003 or 2004. Thereafter, the options are a pipeline from Baku to Ceyhan in Turkey, to Poti in Georgia and the existing route to Novorossisk in Russia.

### ***Kazakhstan***

There is considerable uncertainty about the size of Kazakhstan's oil reserves with very different estimates available from government and oil company sources. The main oil field is the Tengiz field in the western part of the country, which is considered by many to be the most important discovery since Pruhoe Bay in the 1970s. Tengiz's reserves have been estimated at 10-20 billion barrels. To exploit the field, the former Soviet regime in the late 1980s founded a consortium that includes Chevron. Production began in 1993 and in 1997 output reached 140,000 mb / d with an eventual level of 750,000 mb / d envisaged.

The second source is a condensate field located near Uralsk, close to the Russian border. It has 8-10 billion barrels of light gas liquid. In 1997, another international consortium produced 50,000 b / d of condensates and crude.

The third field is offshore in the Caspian Sea and six foreign companies have shares in it. The complicated geography of the Caspian and legal disputes with Russia are among the factors which have clouded its future. The government claims that there are huge reserves in the realm of 73 billion barrels, but commercial sources are much more cautious.

Kazakhstan's oil industry suffers from a number of weaknesses. Firstly the country's administration is weak and corrupt. The oil industry is short of skilled manpower following the exodus of many ethnic Russians from the country who provided skills and management. Finally, the country's geopolitical position has meant that it is dependent on its neighbors in order to export its oil and gas.

Kazakhstan is placing emphasis on developing its oil rather than gas resources since at present it is important as a transit country for Turkmenistan's gas. The size of reserves is debatable and the size of the gas transmission pipeline network is small, at about 2,000 km.<sup>69</sup>

Russia sees Kazakhstan as within its sphere of influence, and has been pressing for pipelines from Tengiz and elsewhere to cross its territory. The Caspian Pipeline Consortium (CPC, which was established in 1992, is building pipelines through Russia and has the following shareholders: the Russian government (24 percent); the Kazakh government (19 percent); the Kazakh state owned gas company (1.75 percent); the Omani government (7 percent); and the balance owned by

Western oil companies. The CPC project is the closest to fruition, and other plans to build a pipeline through Iran to Kharg Island are just that: plans, and are opposed by the United States.

Kazakhstan's oil and gas resources will only be exploited when pipelines are available to move the product to market. The construction of the pipelines is a political as well as an economic issue. Russia, Turkey and Iran are all interested in Kazakh oil and gas pipelines crossing their territory. The routes chosen for them will largely determine the export destinations for Kazakh products.

### ***Turkmenistan***

Turkmenistan has the largest proven and potential gas reserves in the region. In 1995, gas exports of 26.5 bcm accounted for about 75 percent of total exports. Gas also accounted for 75 percent of total final energy use. About 85-90 percent of gas output has been exported, with 80-85 percent of this going to FSU countries and the rest to Europe. Conflicts with Russia over payment systems and the amount of gas that could be piped through Russian have been reduced.<sup>70</sup> Estimates of the reserve to production ratio for Turkmenistan gas vary from 20-40 years at one end to 300 years at another. The IEA has concluded that the country has enough gas to become an important exporter to Europe.

Turkmenistan's hydrocarbon policies, however, have been far from clear. Its tax and legal systems are underdeveloped and this has led to contracts being cancelled. In 1997, there was some improvement with the announcement of a new legal and fiscal regime, and opinion among oil and gas companies is optimistic.

The development of the hydrocarbon sector is dependent on the construction of pipelines through neighboring countries. One plan is the Central Asian Oil Pipeline Project (CAOPP), which would run from the Turkmenistan-Uzbekistan border into Afghanistan and then to a Pakistani port on the Arabian Sea, covering 1,667 kms. Among the problems facing CAOPP are that Turkmen and Uzbek oil resources are not large enough to justify the project and that nearly 700 km would have to go through war-torn and fundamentalist Afghanistan. In November 1998, the American oil company Unical withdrew from the project, seriously threatening its feasibility.

Another possibility is that Turkmenistan would be linked to the proposed Kazakhstan-Azerbaijan network. While this would be much cheaper than CAOPP, Turkmenistan is in dispute with Azerbaijan over offshore exploitation of the Caspian fields. It has reached compromises with Kazakhstan and Iran and may be willing to do so with Azerbaijan. How the network develops will naturally determine Turkmenistan's ultimate markets.

### ***Uzbekistan***

In 1997, Uzbekistan produced 185,000 b/d of oil and consumed 170,000 b/d. In 1989, it signed its first joint venture with a foreign company. Discussions are underway with other foreign groups and a surplus for export of 60,000-70,000 b/d is likely. This would make it feasible for the country to be linked with CAOPP, if developed, or another Central Asian export network.

Gas is much more important than oil to Uzbekistan. It is the only country in the region which has increased gas production since independence. Output rose from 1.5 tcf in 1992 to 1.7 tcf in 1996, making it the eighth largest producer in the world. Gas exports have been constrained by the success of programs to increase domestic use of gas in order to reduce oil consumption. They have also been affected by the lack of alternatives to the Central Asia-Central Russia pipeline. As a result Uzbekistan does not have options for exports that are independent of Russia.

### ***Oil Supply Forecasts for the Caspian Sea Region***

The International Energy Agency and the Energy Information Agency of the United States Department of Energy are the two organizations that provide forecasts for the period until the year 2020. These forecasts are by their very nature uncertain and much of this is due to the poor state of knowledge about the region's energy resources. Furthermore, forecasts for the Caspian Sea Region are included in those for transition economies, which includes the whole of the FSU, where oil fields are partly depleted after years of exploitation.

Table 13 shows that both the IEA and the EIA forecast a surplus of supply over demand in the region until the year 2020. In both forecasts

**Table 13**  
**The Transition Economies Oil Balance, 1996-2020**

|                                          | 1996 | 2010 | 2020                   | 1996-2020 |
|------------------------------------------|------|------|------------------------|-----------|
|                                          | mb/d |      | Annual growth rate (%) |           |
| <b>The IEA Forecast</b>                  |      |      |                        |           |
| Demand                                   | 5.5  | 7.2  | 8.5                    | 1.8       |
| Supply                                   | 7.3  | 10.2 | 9.4                    | 1.1       |
| Net Imports                              | -1.8 | -3.0 | -0.9                   | -2.8      |
| <b>The EIA Forecast (Reference case)</b> |      |      |                        |           |
| Demand                                   | 5.7  | 7.8  | 10.1                   | 2.4       |
| Supply                                   | 7.4  | 12.5 | 13.6                   | 2.6       |
| Net Imports                              | -1.7 | -4.7 | -3.5                   | -3.1      |

Source: IEA, World Energy Outlook 1998, p. 270.

the surplus available for export increases until the year 2010 and then falls. This is due to increasing demand and, from 2010, declining supply according to the IEA. In the EIA forecast it is due to increasing demand and increasing supply, albeit at a slower rate than demand after 2010. The difference between the IEA and the EIA is that the former is much less optimistic about supply in the region and this is mainly due to its more cautious view about the Caspian.

According to the EIA, the Caspian Sea region accounted for 10.1 percent of world supply in 1996 and will account for 10.8 percent in 2010. In 2020 it will account for 10.1 percent of world supply, or 8.4 percent if unconventional sources of oil are added to supply.<sup>71</sup> According to the IEA's "high case" scenario, Caspian production could reach 6.3 mb/d in the year 2020 with net exports of 3.5 mb/d. In the "low case" scenario, production would be 4.8 mb/d and net exports 3.0 mb/d. The low case scenario would prevail if low oil prices led to the delay of investment projects.<sup>72</sup> Significant oil revenues are forecast for the period after 2005.

#### **Gas Supply Forecasts for the Caspian Sea Region**

The IEA is the only organization to provide forecasts for gas demand

and supply. In 1998, the Caspian group produced 78.2 bcm. The IEA forecasts with a high degree of uncertainty that gas production will reach between 102 and 112 bcm during 2000 and between 228 and 267 bcm in 2020.<sup>73</sup>

#### **d. The Debate about Oil Reserves**

There is a major debate about the size of international oil reserves, the outcome of which will be important in determining the trend in international prices and the speed with which areas with the largest reserves (i.e. the Middle East) regain a dominant role in the market. There are two schools of thought: one which emphasizes the role of geology, and the other the role of technology and economics. The first school is pessimistic about the size of oil reserves that remain for future use; the second is optimistic. The differences are potentially dramatic: if the most pessimistic scenario is accepted then the world supply is almost in a state of decline with reserves beginning to run out. If the most optimistic assessment is accepted, then there will be no problem of supply at least until the second half of the twenty-first century. It is worthwhile briefly examining the two schools because the implications for the strategic balance in the Middle East are serious.

The pessimists believe that world oil reserves are lower than have been disclosed because oil producers in the Gulf have failed to account for the effect of production on reserves and have artificially boosted their declared reserves in order to increase their OPEC quotas. Evidence for this is the rapid increase in reserves announced by Saudi Arabia and other OPEC states between 1986 and 1988, as recorded in the *BP Statistical Review of World Energy*. These increases were not accompanied by rises in gas reserves and are therefore suspect.<sup>74</sup>

Furthermore, the discovery rate of new fields has been falling for the last 20 years and new discoveries are equal to only about 25 percent of annual consumption. The pessimists' view is that oil reserves equal about 1,800 billion barrels and that oil production will peak in the next few years. They also question the higher recovery factors announced by oil companies, which they claim are the result of poor reservoir estimates and distortions of information by the oil companies. Finally, they state

that figures on oil reserves include oil with a very low probability of being discovered and sometimes includes unconventional oil such as part of Venezuela's reserves.

The optimists, on the other hand, concentrate on technological and economic factors and conclude that oil reserves are between 2,300 and 3,000 billion barrels. They reject the implicit assumption of the pessimists that technology is static. They stress the role of higher recovery rate factors, the contribution of cost reductions to improving the profitability of marginal fields, and the role of new technology in finding new reserves and improving recovery from existing ones. Their definition of oil is more widely drawn than that of the pessimists. They allow for the fact that the recoverable life of oil fields increases as they age. Finally, they point out that the discovery of oil in the Middle East has declined (thus affecting the level of total discovery) because of the fall in the demand for OPEC, and especially Middle East OPEC, oil.

The IEA source concludes that the range of reserves of between 1800 and 2300 billion barrels is a small one given the lack of knowledge about new technologies and reserves. It claims that the pessimists' estimates are too low because they exclude deep-water production and high recovery rates. The optimistic estimates include some reserves that may be considered political, others that are possible and thus have a low probability of being discovered, and those that are unconventional. In its 1998 forecast, the IEA states that reserves are between 2,000 and 3,000 billion barrels and that a shortage of liquid fuels is unlikely before the year 2020, as reserves of unconventional oil are sufficient should there be a shortfall in conventional oil.<sup>75</sup>

The *International Energy Outlook 1998* shows how changes in views about reserves occur over a short period. The report contains four important changes in assumptions about non-OPEC oil supply compared with the 1997 report. It forecasts that US production will not decline as much as it previously believed because of, among other things, technological advances. North Sea oil production forecasts were raised for the same reason. Caspian Basin production forecasts became more optimistic as were those for West Africa. These changes added at least 4 mb/d to output.<sup>76</sup>

## 4. FORECASTS FOR THE PERIOD TO 2020

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### **a. The Energy Information Administration: *International Energy Outlook 1998***

This forecasts energy use to the year 2020. It suggests that world energy consumption will have tripled in the 50-year period 1970-2020. The increase between 1995 and 2020 will be 75 percent. Much of this will continue to come from developing countries, which accounted for 26 percent of world demand in 1990, 32 percent in 1995 and are forecast to account for 47 percent in 2020. It should be noted that these forecasts were made after the economic crisis in East and South East Asia developed in the second half of 1997 but did not include the effects of the Kyoto Climate Change Protocol of December 1997.

The long term projections for oil prices in the reference case show a slow rise in real terms. At the end of 1996, the oil price was \$24/barrel. Measured in constant 1996 US dollars, the rise is from \$17/barrel in the spring of 1998 to an estimated \$22/barrel in 2020, a rise of 30 percent in 22 years. Although non-OPEC supply is expected to continue to increase in the short term, OPEC producers are forecast to increase their share from 39 percent in late 1996 to 52 percent in 2020. It is worthwhile quoting one paragraph from the report in full:

"There is now general agreement among many analysts that **resources are not a key constraint in satisfying substantial increases in oil demand through 2020.** [*emphasis added*] Rather more important to the development of oil markets are political, economic and environmental circumstances. Uncertainties with regard to the final settlement of sanctions in Iraq and the development of suitable transportation infrastructure for the marketing of oil from the Caspian region are two obvious examples; the future of OPEC is another. At the end of 1997, OPEC increased its output quota by 10 percent, from 25 million barrels per day to 27.5 million barrels per day. Some argue that the adjustment - led by Saudi Arabia - signaled a determination by the Saudis to improve their share of the world oil production market. Other suggested that it merely reflects an effort by OPEC to develop a path for future production levels that will accommodate the continued expansion of world oil markets".<sup>77</sup>

Oil's share in total energy consumption will fall slightly from 39 percent in 1995 to 37 percent in 2020. Oil demand will rise by 2 percent per annum over the same period, resulting in a rise of 45 mb / d. Oil use in the industrialized countries rises by 1.1 percent annually, mainly because of the transport sector, and by 3.5 percent annually in the developing countries.

In the early 1990s, oil demand was fairly flat. It rose by 1 mb / d 1989-1993 and by 7 mb / d 1993-1997, but since 1993 it has been rising. Despite this the price of oil fell in 1997 and the consensus was that prices are more likely to fall than to rise. Price volatility will occur because of political factors rather than economic ones, but these are unlikely to have prolonged effects on the trend.<sup>78</sup>

With regard to supply, the EIA is optimistic about sub-sea technologies increasing offshore oil production. The Caspian basin has an estimated 200 billion barrels of reserves. OPEC members outside the Gulf, particularly in Nigeria, Indonesia, Venezuela and Algeria, are expected to increase production.

Table 14 gives the EIA's forecast for oil supplies to the year 2020. The EIA gives three scenarios: one with high oil prices, one with low oil prices, and the reference case which can be considered as the most likely one in their view. The table shows that if prices are high, then the share of OPEC in total supply is relatively low. Conversely, if prices are low, then OPEC's share is higher. This mirrors what happened in the international oil market over the last 25 years: when OPEC pushed prices up, non-OPEC production was stimulated; when prices fell OPEC began to regain its market share.

According to the reference case, OPEC's share in world oil output will rise from 39 percent in 2000 to 52 percent in 2020 and its output will more than double. Non-OPEC sources will see their share fall from 61 percent in 2000 to 48 percent in 2020, reflecting a rise in output of about 27 percent. If the high price option is chosen then OPEC's share rises to 48 percent and non-OPEC to 52 percent. If the low price option is selected, then the shares are 57 percent and 43 percent respectively. This suggests that lower prices favor OPEC's output while higher prices favor non-OPEC output. The reference case implies large investment in capacity expansion in OPEC.

**Table 14**  
**EIA: OPEC and Non-OPEC Oil Supply, 2000-2020**  
**(mb/d)**

| Year | <u>Reference case</u> |          | <u>High oil price scenario</u> |          | <u>Low oil price scenario</u> |          |
|------|-----------------------|----------|--------------------------------|----------|-------------------------------|----------|
|      | OPEC                  | Non-OPEC | OPEC                           | Non-OPEC | OPEC                          | Non-OPEC |
| 2000 | 29.9                  | 47.3     | 28.2                           | 47.9     | 32.1                          | 46.6     |
| 2005 | 34.3                  | 52.0     | 30.9                           | 53.0     | 39.9                          | 50.2     |
| 2010 | 40.6                  | 55.0     | 35.3                           | 56.7     | 48.8                          | 52.6     |
| 2015 | 49.9                  | 55.2     | 42.6                           | 57.6     | 60.2                          | 52.5     |
| 2020 | 60.5                  | 55.3     | 52.5                           | 57.7     | 72.9                          | 52.4     |

**Shares: (in percent)**

| Year | <u>Reference case</u> |          | <u>High oil price scenario</u> |          | <u>Low oil price scenario</u> |          |
|------|-----------------------|----------|--------------------------------|----------|-------------------------------|----------|
|      | OPEC                  | Non-OPEC | OPEC                           | Non-OPEC | OPEC                          | Non-OPEC |
| 2000 | 39                    | 61       | 37                             | 63       | 41                            | 59       |
| 2005 | 40                    | 60       | 37                             | 63       | 44                            | 56       |
| 2010 | 42                    | 58       | 38                             | 62       | 48                            | 52       |
| 2015 | 47                    | 53       | 43                             | 57       | 53                            | 47       |
| 2020 | 52                    | 48       | 48                             | 52       | 57                            | 43       |

Source: EIA, *International Energy Outlook 1998*, pp. 7-8.

Table 15 shows that OPEC accounted for 62 percent of world imports in 1995 and will account for 72 percent in 2020. The Gulf accounted for 42 percent in 1995 and for 59 percent in 2020. This implies a fall in the share of non-OPEC of 20 percent and within OPEC of the non-Gulf states of 7 percent.

To reach this level of production, OPEC and the Gulf states will have to invest large amounts and / or attract foreign investment. Their ability to this will be affected by their financial position, largely a function of oil revenues, but also of spending in the non-oil sector. That, in turn, will depend on the degree of political and socio-economic stability in the region and foreign perceptions.

**Table 15**  
**EIA: World Petroleum Trade, Reference Case, 1995 and 2020**  
**(mb/d)**

| <b>Importers</b> |                       |                           |              |
|------------------|-----------------------|---------------------------|--------------|
|                  | <b>Industrialized</b> | <b>Non-industrialized</b> | <b>Total</b> |
| <b>Exporters</b> |                       |                           |              |
|                  |                       | <b>1995</b>               |              |
| OPEC             | 15.8                  | 7.3                       | 23.1         |
| Gulf             | 9.4                   | 6.0                       | 15.4         |
| Non-OPEC         | 10.9                  | 3.1                       | 14.0         |
| <i>Total</i>     | 26.7                  | 10.4                      | 37.1         |
|                  |                       | <b>2020</b>               |              |
| OPEC             | 21.9                  | 29.5                      | 51.4         |
| Gulf             | 13.8                  | 28.0                      | 41.8         |
| Non-OPEC         | 14.1                  | 5.4                       | 19.5         |
| <i>Total</i>     | 36.0                  | 34.9                      | 70.9         |

Source: EIA, *International Energy Outlook 1998*, Table 13.

Table 16 gives the EIA's reference case forecasts for world oil production. These are the forecasts that it believes are most likely. They show that Gulf oil production will increase sharply in the period 2000-2020 while that in the rest of OPEC and in non-OPEC will rise significantly but more slowly.

**Table 16**  
**EIA: World Oil Production Forecast, Reference Case, 1990 - 2020**  
**(mb/d)**

|                          | <b>1990</b> | <b>1996</b> | <b>2000</b> | <b>2020</b> |
|--------------------------|-------------|-------------|-------------|-------------|
| OPEC                     | 24.5        | 28.3        | 29.9        | 60.5        |
| Gulf                     | 16.2        | 18.5        | 19.4        | 47.3        |
| Total non-OPEC           | 42.1        | 43.5        | 47.3        | 55.4        |
| Total World              | 66.7        | 71.8        | 77.2        | 115.9       |
| Gulf as percent of world | 24.6        | 25.7        | 25.2        | 40.9        |

Source: EIA, *International Energy Outlook 1998*, Table A 44.

The increases in Gulf capacity depends on cost. To produce a barrel of oil in the Gulf, it costs between \$0.99 and \$1.49. The capital investment needed to increase production capacity by one barrel per day is between \$2,525 and \$4,866. On the basis of the low price scenario for mid-sized fields, development and operating costs for the period to 2020 are only between 15 percent and 20 percent of gross revenues. If the reference price or high price variant prevails, then the share is even lower.

### **b. The International Energy Agency: *The World Energy Outlook 1998***

The International Energy Agency's (IEA) *World Energy Outlook 1998* was issued in November 1998 and contains the most up to date forecasts and analysis of the energy and oil markets available at the time of writing. The report projects that world energy demand will increase by 65 percent in the period 1995-2020, assuming that no major changes in policy are made. Two-thirds of this increase is expected to come from China and the developing world. The broad assumption is that the rate of world economic growth that has been experienced will continue. The transition economies of the former USSR and Central and Eastern Europe will recover from recession.

Fossil fuels - coal, oil and gas - are expected to account for 95 percent of the increase in demand. Oil will continue to play the key role in road and air transport, which are forecast to grow strongly. It should be noted that IEA, unlike the EIA, does not include unconventional oil resources in the same category as conventional ones.

According to the IEA, the dependence of oil importing countries on supplies from the Middle East will increase until liquid fuels (from such sources as shale oil, tar sands, conversion from coal, biomass or gas) begin to play a more important role around the year 2020. Until then oil supply disruptions and price shocks could occur. Energy intensity (the amount of energy used per unit of output) is expected to continue to decline, as it has over the last 25 years, and this has been built into the forecast.

No explicit forecasts are given for oil and other energy prices, but it is assumed that fossil fuel prices will rise in the period 2010 to 2015,

reflecting the move from conventional to unconventional oil as the source of marginal supply. The assumed IEA crude oil import price in 1990 prices per barrel is as follows: 1995, \$15; 1996, \$17.5; 1997, \$16.1; 1998-2010, \$17; and 2010-2015, \$25.

If there are policy changes, however, then the forecasts will have to be changed. The most likely change to occur is a worldwide attempt to reduce the emission of greenhouse gases by reducing the use of fossil fuels. According to the IEA forecast given above, growth in energy demand of 65 percent will be accompanied by a 70 percent increase in CO<sub>2</sub> emissions. Under the international accords now being negotiated within the framework of the Kyoto protocol, greenhouse gases are to be reduced. Table 17 gives the IEA forecast for world energy supply to the year 2020. On the basis of unchanged policies, it shows a small decline in the shares of solid fuels and oil and a rise in the share of gas.

**Table 17**  
**IEA: World Primary Energy Supply Forecast, 1971-2020**

|                                                | 1971         | 1995         | 2010          | 2020          | 1971                 | 1995       | 2010       | 2020       |
|------------------------------------------------|--------------|--------------|---------------|---------------|----------------------|------------|------------|------------|
|                                                | mtoe         |              |               |               | shares ( in percent) |            |            |            |
| Solid fuels                                    | 1,503        | 2,347        | 3,269         | 3,947         | 30                   | 28         | 28         | 29         |
| Oil                                            | 2,448        | 3,324        | 4,468         | 5,264         | 49                   | 40         | 39         | 38         |
| Gas                                            | 899          | 1,810        | 2,710         | 3,468         | 18                   | 22         | 24         | 25         |
| Nuclear                                        | 29           | 608          | 670           | 604           | 1                    | 7          | 6          | 4          |
| Hydro                                          | 104          | 215          | 296           | 352           | 2                    | 3          | 3          | 3          |
| Other renewables                               | 4            | 36           | 83            | 113           | 0                    | 0          | 1          | 1          |
| OECD combustible<br>renewables and waste       | -            | 142          | 159           | 172           | -                    | 2          | 1          | 1          |
| <i>Total</i>                                   | <i>4,988</i> | <i>8,341</i> | <i>11,508</i> | <i>13,749</i> | <i>100</i>           | <i>100</i> | <i>100</i> | <i>100</i> |
| Non-OECD combustible -<br>renewables and waste | -            | 904          | 1,108         | 1,246         | -                    | 10         | 9          | 8          |
| <i>Grand total</i>                             | <i>4,988</i> | <i>9,245</i> | <i>12,616</i> | <i>14,995</i> | <i>100</i>           | <i>100</i> | <i>100</i> | <i>100</i> |

(Due to rounding columns do not add to totals given).

Source: IEA, *World Energy Outlook 1998*.

Table 18 gives the IEA forecast for OECD Europe primary energy supply to the year 2020. It shows that the share of solid fuels is expected to decline in the forecast period due to the near saturation of residential space and water heating in much of the region. The share of oil will remain unchanged between 1995 and 2020, but in absolute terms supply rises by about 30 percent mainly to meet increased demand in the transportation sector. The biggest change is the increase in gas supply, both for electricity generation and direct use. It should be noted that these forecasts are based on the assumption of no change in environmental policies. In fact, Europe has been at the center of international attempts to reduce greenhouse gas emission and so it is likely that the use of solid fuels and oil will be lower than these forecasts suggest.

**Table 18**  
**IEA: OECD Europe Primary Energy Supply Forecast,**  
**1971-2020**

|                  | 1971  | 1995  | 2010  | 2020  | 1971                 | 1995 | 2010 | 2020 |
|------------------|-------|-------|-------|-------|----------------------|------|------|------|
|                  | mtoe  |       |       |       | shares ( in percent) |      |      |      |
| Solid fuels      | 370   | 331   | 371   | 310   | 32                   | 21   | 19   | 15   |
| Oil              | 652   | 650   | 779   | 850   | 57                   | 42   | 40   | 42   |
| Gas              | 86    | 301   | 506   | 625   | 7                    | 19   | 26   | 31   |
| Nuclear          | 13    | 225   | 225   | 190   | 1                    | 14   | 12   | 9    |
| Hydro            | 28    | 42    | 50    | 54    | 2                    | 3    | 3    | 3    |
| Other renewables | 2     | 4     | 11    | 16    | 0                    | 0    | 1    | 1    |
| Other primary    | 0     | 1     | 1     | 1     | 0                    | 0    | 0    | 0    |
| Total            | 1,151 | 1,554 | 1,943 | 2,046 | 100                  | 100  | 100  | 100  |

(Due to rounding columns do not add to totals given.)

Source: IEA, *World Energy Outlook 1998*.

Table 19 gives the IEA forecast for OECD North America primary energy supply to the year 2020. The share of solid fuels increases in the period to 2020; that of oil remains little changed. The share of gas also declines. The increase in solid fuel supply is largely due to increased use of coal in power stations as gas and oil prices rise.

**Table 19**  
**IEA: North America Primary Energy Supply Forecast, 1971-2020**

|                  | 1971  | 1995  | 2010  | 2020  | 1971                 | 1995 | 2010 | 2020 |
|------------------|-------|-------|-------|-------|----------------------|------|------|------|
|                  | mtoe  |       |       |       | shares ( in percent) |      |      |      |
| Solid fuels      | 338   | 582   | 737   | 927   | 20                   | 25   | 27   | 33   |
| Oil              | 789   | 873   | 1,025 | 1,050 | 46                   | 38   | 38   | 37   |
| Gas              | 548   | 576   | 705   | 676   | 32                   | 25   | 26   | 24   |
| Nuclear          | 12    | 212   | 182   | 114   | 1                    | 9    | 7    | 4    |
| Hydro            | 37    | 56    | 58    | 60    | 2                    | 2    | 2    | 2    |
| Other renewables | 1     | 13    | 18    | 18    | 0                    | 1    | 1    | 1    |
| Other primary    | 0     | 0     | 0     | 0     | 0                    | 0    | 0    | 0    |
| Total            | 1,724 | 2,312 | 2,724 | 2,846 | 100                  | 100  | 100  | 100  |

(Due to rounding columns do not add to totals given.)

Source: IEA, *World Energy Outlook 1998*.

According to the IEA, assuming oil reserves of 2,300 billion barrels, Middle East OPEC conventional crude oil supply will increase from 24 percent of world oil supply in 1996 to 48 percent in 2014. It will then decline (see Table 20) The share of the rest of the world will fall from 63 percent of world conventional crude supply in 1996 to 33 percent in 2014 and continue to fall thereafter.

Table 21 gives the IEA's forecast for oil demand to the year 2020. Demand in the OECD is forecast to rise by 1.1 percent per annum between 1995 and 2010 and then to grow by 0.8 percent. Demand in the non-OECD region is forecast to increase by an annual average growth rate of 2.9 percent between 1995 and 2020. Slower demand growth after 2010 will be due to the increase in world prices that is forecast as supply constraints come into play. Strong growth, following a recovery from the current economic crisis, leads to an increase in demand in Asia and is the main reason why demand in the non-OECD region is forecast to surpasses that in the OECD after 2010.

The forecasts given by the EIA and the IEA are for 75 percent and 65 percent increases in energy demand respectively in the period 1995-2020. Both forecasts are based on the assumption of unchanged policies. Both

**Table 20**  
**IEA World Oil Supply Forecast, 1996-2020**

|                                                | 1996   | 2010 | 2020  | 1996-<br>2020                |
|------------------------------------------------|--------|------|-------|------------------------------|
|                                                | mb / d |      |       | annual<br>growth rate<br>(%) |
| <i>Total oil demand</i>                        | 72.0   | 94.8 | 111.5 | 1.8                          |
| Supply:                                        |        |      |       |                              |
| Conventional crude oil                         | 62.7   | 79.0 | 72.2  | 0.6                          |
| Middle East OPEC                               | 17.2   | 40.9 | 45.2  | 4.1                          |
| Rest of World                                  | 45.5   | 38.0 | 27.0  | -2.2                         |
| Natural gas liquids                            | 6.6    | 11.3 | 15.2  | 3.5                          |
| Middle East OPEC                               | 1.3    | 2.8  | 3.7   | 4.5                          |
| Rest of World                                  | 5.3    | 8.5  | 11.5  | 3.3                          |
| Identified unconventional oil                  | 1.2    | 2.4  | 2.4   | 3.0                          |
| Middle East OPEC                               | 0.1    | 0.1  | 0.1   | 1.6                          |
| Rest of World                                  | 1.2    | 2.4  | 2.4   | 3.0                          |
| Unidentified unconventional oil                | 0.0    | 0.0  | 19.1  | —                            |
| Processing gain                                | 1.5    | 2.1  | 2.5   | 2.0                          |
| <i>Total oil supply (exc. processing gain)</i> | 70.5   | 92.7 | 89.9  | 1.0                          |
| Middle East OPEC                               | 18.5   | 43.8 | 49.0  | 4.1                          |
| Rest of World                                  | 52.0   | 48.9 | 40.8  | -1.0                         |

Source: IEA, *World Energy Outlook 1998*.

the EIA and IEA suggest that reliance on oil as a major source of fuel will continue and that the share of total oil supply coming from OPEC, the Middle East and the Gulf will rise. The increased exposure to Middle East supply will, however, be a passing phase: the availability of unconventional sources of oil is the main reason why reliance on conventional oil sources, and thus on Middle East resources, will decline. Most of these unconventional sources are in the IEA's terminology "unidentified", that is they are unknown at present. They are forecast at 19.1 mb / d in 2020 or 18.4 percent of world supply and would require billions of dollars in investment. They would, according to the IEA, be forthcoming at a price of \$17 / b (1990 prices) from 1998 to 2010 and \$25 / b

**Table 21**  
**IEA World Oil Demand Forecast, 1995-2020**

|                                           | 1995    | 2010    | 2020    | 1995-<br>2010                | 1995-<br>2020 |
|-------------------------------------------|---------|---------|---------|------------------------------|---------------|
|                                           | mtoe    |         |         | annual<br>growth rate<br>(%) |               |
| OECD                                      | 1832.0  | 2158.7  | 2,261.5 | 1.1                          | 0.8           |
| North America                             | 873.3   | 1,025.3 | 1,049.9 | 1.1                          | 0.7           |
| Europe                                    | 650.2   | 779.1   | 850.3   | 1.2                          | 1.1           |
| Pacific                                   | 308.7   | 354.3   | 361.3   | 0.9                          | 0.6           |
| Non-OECD                                  | 1,362.9 | 2,135.2 | 2,793.8 | 3.0                          | 2.9           |
| Transition economies                      | 274.6   | 329.0   | 390.5   | 1.2                          | 1.4           |
| Africa                                    | 96.9    | 145.4   | 180.3   | 2.7                          | 2.5           |
| China                                     | 163.9   | 355.5   | 505.7   | 5.3                          | 4.6           |
| East Asia                                 | 263.9   | 471.5   | 639.1   | 3.9                          | 3.6           |
| South Asia                                | 98.7    | 191.1   | 277.5   | 4.5                          | 4.2           |
| Latin America                             | 281.5   | 423.8   | 519.7   | 2.8                          | 2.5           |
| Middle East                               | 183.4   | 218.8   | 280.9   | 1.2                          | 1.7           |
| <i>Total (incl. maritime<br/>bunkers)</i> | 3,324.3 | 4,468.5 | 5,263.9 | 2.0                          | 1.9           |

Source: IEA, *World Energy Outlook 1998*.

from 2015 to 2020. These higher prices, compared with those prevailing when the IEA report was written, have no effect on demand in the forecast. According to a former secretary general of OPEC, this scenario is unfeasible: the rate of growth of production from a source or sources that cannot even be identified does not make sense. What used to be called the energy gap has returned in the form of an energy mismatch, equal to 18.4 percent of world supply in the year 2020.<sup>79</sup>

Much will depend on the behavior of producers in the region. The politics of the Middle East - conflicts between states and internal political and economic arrangements - have been the main factor inhibiting the use of Middle East oil. Sanctions against Libya, Iraq and Iran are one

example of the effects of this instability, but they are not the only ones. The GCC states have not been subject to sanctions or international isolation but their oil capacity has not been used to the fullest potential. International oil companies have invested huge amounts outside the Gulf in areas where costs, in the economic sense are higher, but where political risks are lower. The instability of the state system and the closed nature of the upstream sector have been the main causes.

## 5. CONCLUSIONS: STRATEGIC IMPLICATIONS FOR THE MIDDLE EAST

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The oil prices rises of 1973-74 and 1979 led to huge increases in revenues in Middle East oil producers. Oil revenues in the member states of the Organization of Arab Oil Producing Countries rose from \$37 bn in 1970 to \$297 bn in 1980.<sup>80</sup> As a result, these countries were able to begin large-scale economic development programs, investing in industry, infrastructure, and social services. Much of what they required was imported, mainly from Western countries and Japan. Table 22 shows that in a very short period after 1973 the Arab states and Iran became a huge market.

**Table 22**  
**Middle East Imports, 1970-96**  
**(\$bn)**

|                         | 1970 | 1980 | 1990 | 1997 |
|-------------------------|------|------|------|------|
| Egypt, Jordan and Syria | 1.3  | 11.4 | 14.7 | 20.6 |
| Iran and Iraq           | 2.1  | 19.7 | 24.8 | 15.6 |
| GCC excl. UAE*          | 1.3  | 38.2 | 34.8 | 52.0 |
| Total                   | 4.7  | 69.3 | 74.3 | 88.2 |

\* UAE is excluded because it has become a huge entrepot center in recent years.  
Source: IMF, *International Financial Statistics Yearbook 1990*, p. 998.

The growth of these markets was closely related to changes in the price of oil. Between 1970 and 1980, the imports of the countries listed in Table 22 rose by the incredible annual average rate of 28 percent. In the following decade they rose by 2.5 percent a year and between 1990 and 1997 by only 1.7 percent. As a result of this slowdown, the region lost some of its importance in international trade. In 1981, the GCC (excluding Oman), Iran, Iraq, Syria, and Egypt accounted for 5.2 percent of world imports.<sup>81</sup> In 1997, the same group accounted for only 2.2 percent. UAE

imports grew rapidly in the 1990s, largely as a result of its role as an entrepot center, i.e. importing goods from the US, Europe and South and South East Asia for resale in Iran and countries in the FSU.

The increase in oil prices in 1973-74 and 1979 pushed the industrialized oil importing countries into recession and so their need for export markets increased. The strategic implication was clear: in order to win orders in the Gulf and in other oil producing areas of the Middle East, Western countries would have to adopt a more pro-Arab stance in the political arena. Western firms and banks would have to adhere to the conditions of the Arab boycott of Israel.

One of the most important components of trade was the sale of arms to the Middle East. Tensions in the region (the Six Day War, the Yom Kippur War, the Iran-Iraq War, the 1991 Gulf War and other conflicts) led to increased demand; at the same time finance at the disposal of the oil producing states in the region rose. Military spending and arms imports (measured by deliveries) of the Arab countries and Iran rose throughout the 1970s as oil income increased. A peak in military spending was reached in 1984 and in arms imports in 1987. The 1991 Gulf War resulted in another peak, but this was a temporary increase rather than a break in the downward trend. Figures available for the period since 1991 show lower nominal levels of military spending than for any year since 1974, but arms imports, measured in current dollars, rose by 28 percent in 1995. It is not clear if this is the beginning of a new, upward trend.

The richer Arab states and Iran also extended aid to poorer Arab states and began to import workers from there on a much larger scale. This further increased the supply of foreign currency in the poorer states, including those in direct conflict with Israel. Economic aid made available by Middle Eastern members of OPEC to the poorer Arab states rose from \$1.5 bn in 1973 to \$9.6 bn in 1975 and remained high until 1980. By 1989 it fell to \$.5 bn; the increase in 1990-91 associated with the Gulf War was temporary.<sup>82</sup> Aid from Arab sources combined with the remittances of workers from Egypt, Jordan and Syria who went to work in the Gulf, Iraq and Libya accounted for a rapidly increasing share of GNP in those countries.

Despite the payments for imports, aid to poorer Arab states and the outflow of funds due to remittances, the major oil producers accumulated

huge reserves between 1973 and 1981. Between 1974 and 1982, the Middle Eastern members of OPEC accumulated current account surpluses worth \$352 bn, of which \$160 bn was in Saudi Arabia.<sup>83</sup> Western countries had an interest in attracting their funds to help cover the cost of imported oil. Although the Arab banking system developed at that time in order to provide a home for surplus funds, Arab banks continued to lend to others in the West which had a greater need for them and thus could pay a higher return. The Western financial sector, therefore, joined the industrial and other groups in pushing for more pro-Arab policies.

It could be argued that the increase in military spending and arms imports was partly due to wars in the region, particularly, the six-year long conflict between Iraq and Iran. The 1991 Gulf War cost Saudi Arabia between \$60 bn and \$80 bn and had an overall cost of up to \$180 bn.<sup>83</sup> The question then arises as to whether the war would have even erupted without oil revenues. Saudi Arabia and other Arab states in the Gulf lent Iraq billions of dollars to pay for arms imports and other supplies. Aid to Iraq in the war against Iran and to Syria, Egypt and others, including the Palestine Liberation Organization (PLO), as well as the build-up of GCC armed forces were all funded by oil revenues. As Yahya Sadowski has pointed out, the oil producers of the Middle East have been able to finance their quarrels and wars much more easily than countries in other parts of the world. The fall in oil prices may therefore, in Sadowski's view, reduce purchases of arms and help constrain the arms race in the region.<sup>84</sup>

The evidence shows that a fall in military spending but not necessarily in arms imports occurred. The massive fall in oil income between 1981 and 1986 was accompanied by a gradual increase in arms imports. The increase in oil revenues between 1986 and 1996 was accompanied by a deceleration of arms imports, at least until 1995. Factors other than changes in oil revenues, therefore, explain these trends, most important of which was the 1982-88 Iran-Iraq War. But what of the future? Will oil producers be able to buy the quantity and quality of arms that they bought in the past?

This depends not only on future levels of oil revenues, but also on the political situation in the region. That in turn is related to the socio-economic condition of the oil producers. The massive increase in population, the need to provide employment to the rapidly growing

labor force, and expectations of citizens mean that governments have much less room for maneuver than when oil prices rose in the 1970s. On the other hand, all the Middle Eastern oil producing regimes rely on the military to remain in power. And like all vested interests, the military will fight for its share of national resources, which in this case means weapons, most of which are produced abroad.<sup>85</sup>

The strategic balance in the Middle East was, therefore, seriously affected by the rise in oil revenues in the 1970s and 1980s. The decline in oil revenues and the drop in current account and budget surpluses in the Middle East oil producing states from 1981 resulted in reductions in military spending.

Finally, the nature of the 1991 Gulf War should be considered. This was perhaps, the first major war fought over economic resources in the period since 1945. Iraq invaded Kuwait largely for economic reasons, and the United States and other Western powers sent 500,000 troops half way around the world in order to remove the invading forces from Kuwait and lift the threat to Saudi Arabia. The West made a huge investment, politically, militarily, and economically to maintain the stability of Middle East oil supplies. This basic fact is understood by all those concerned with oil policy in the region and represents a major change from the position in 1973. The US now has a virtually permanent presence in the Gulf to deter Iraq and Iran. Shocks, such as occurred in 1991 (which only led to a temporary jump in prices), are less likely as a result of the US military presence in the Gulf, but they cannot be ruled out.

### **Israeli Policy**

The oil market does not at present pose a threat to Western or Israeli strategic interests, despite the recent rise in prices. This is because Middle East oil producers do not have the ability to use oil as a weapon for political or even for economic purposes. Given the forecasts that have been analyzed here, this situation is likely to continue in the coming years.

Israel's desire to sign a peace treaty with Syria and to conclude a final status agreement with the Palestinians is a key element in its security policy. Negotiating with those parties will be easier in the current

international energy climate than that which prevailed in the 1970s and early 1980s. The main reason is that the West, particularly the United States, is not subject to economic pressure from the Arabs, as it was after 1973. Israel will therefore find it easier to negotiate with the US and the European Union for assistance or agreements that it may want in compensation for territorial concessions to the Palestinians and Syria. Viewed from the perspective of energy markets, the next few years will be a window of opportunity for peacemaking.

Israel also has strategic interests in the Caspian, not only as a source of energy supplies, but also in a broader sense. If Caspian oil and gas can be delivered to market then the role of Middle East supplies will be affected, at least marginally. This margin could be important in the medium term, a period in which the forecast suggests there may be shortages of energy. Any assistance that can be given to countries in the region to develop their economies and find ways for cooperation in which they mutually gain will make it easier to lay pipelines and export oil and gas. As in the Middle East, when there is something to lose economically countries may think twice before blocking projects. Israel, like other technologically advanced countries, can assist in this development effort.

### **Likely Developments in Energy Markets**

The chances of another oil boycott and or massive oil price rises as occurred in 1973-74 are small. The reasons can be grouped into two. The first concerns the circumstances that prevailed in 1973. For years, oil prices had been almost constant despite increasing demand that had even led to shortages, as occurred in the United States in the early 1970s. The 1973-74 price jump was a belated and concentrated reaction to years of stable prices. It was combined with a Middle East war partly in order to give political cover to what was an economic move: an attempt to redistribute international income towards oil producing countries. By introducing it during the Yom Kippur War, Saudi Arabia and other Arab oil producers hoped to change United States policy in the Middle East, but that was to be a by-product of oil policy. The success of Arab oil policy in furthering its aims vis-a-vis Israel was felt in terms of a more pro-Arab policy in Europe and Japan. The United States put pressure on

Israel to reach disengagement agreements with Egypt and Syria, but no more than that. The Arabs failed to turn the United States against Israel. The rise in oil prices caught consumers unaware and it took the Americans years – indeed until after the 1979 price jump – to react and adjust. The fall in Western demand for oil in the late 1970s and early 1980s brought about the collapse of oil prices.

The other set of reasons why those events are unlikely to reoccur is that significant changes have occurred in energy markets since then:

- Since the increase in oil prices in 1973-74 and especially since that of 1979, energy saving, particularly oil saving technologies, have been introduced in developed economies. This resulted in structural changes, including moves away from energy intensive production and continuous improvements in the ratio of energy use per unit of output.
- New technology has been developed for oil exploration which has permitted large-scale exploitation of oil in areas that were previously considered uneconomic, such as the North Sea.
- New technology has also been developed to obtain oil from unconventional sources such as shale. This has increased the supply of oil outside OPEC and the Middle East, but the development of this technology is only at an early stage.
- Concerns about global warming are leading to agreements limiting or reducing the use of fossil fuels. These will mainly affect the use of coal in power generation in developed countries, but it is also likely to affect transport systems, which rely heavily on oil, in the longer term.
- Unlike the situation in 1973, the IEA now is in existence and its membership has grown. It maintains oil stocks designed to prevent boycotts having an effect on its members. The ability and willingness to use strategic oil reserves to combat price rises was demonstrated by the United States in 1990-91.

- Saudi Arabia and other oil producers need oil income and were unwilling, until prices fell below \$10/b in 1998, to agree on measures that would increase prices. The steps taken to increase prices in 1999 were effective but, in real terms, prices remain below their 1974 level.
- Saudi Arabia in particular and other Middle East oil producers see stable prices and supplies plus integration of oil suppliers and consumers through foreign investment as guarantee of their future. They have invested in distribution networks abroad and recently Saudi Arabia has taken the unprecedented step of asking for foreign investment in its upstream.
- The development of export markets for gas means that producers will have to rely on 25-year contracts in order to be able to sell. This ties them into more stable relations with consumers. Gulf producers, especially Iran, Qatar and, in the long run, Iraq have very large gas reserves.
- In order to guarantee their place in international trade, Arab countries, including members of the GCC, are joining the World Trade Organization (WTO). Boycotts will become increasingly difficult, if not impossible, for members of the WTO to implement.
- In the late 1990s, low oil prices reduced profits in the oil industry and this promoted a spate of mergers among major international companies in the industry. The bargaining power of these companies, vis-a-vis Middle East governments, which have up to now excluded them from the upstream, has increased as the latter have also been financially squeezed by low oil revenues. The two sides need each other and a deal in which Western oil companies invest in the Saudi upstream has been hinted at by Saudi officials. By opening their upstream to foreign investment, Saudi Arabia and other Middle East producers could discourage investment in the rest of the world, where exploration and recovery costs are higher.

- The return of Iraq to the oil market had major effects on prices. In 1991, Iraq produced 280,000 b/d; in 1998 it produced 2.165 mb/d, 75 percent of its level in 1989 before the Gulf Crisis and war.<sup>86</sup> This was a considerable achievement given the international restrictions on imports of equipment for the oil industry. Iraq could produce more if it was allowed to import freely, and foreign oil companies are queuing to go into Iraq. The increase in Iraqi production, against of background of weak international demand resulted in lower prices, and in 1999, with prices at \$10/b, Saudi Arabia and other OPEC producers cut output to strengthen prices. Any loosening of international restrictions on Iraq could lead to higher production there and downward pressure on prices in general. The revenues earned are badly needed to repair the Iraqi economy, however, only very effective international sanctions will prevent funds earned being used to buy arms.

- Did low oil prices and revenues threaten Middle East political stability? Iraq's invasion of Kuwait was an act of war based on economic reasoning: Saddam Hussein's desire to take control of Kuwaiti oil fields at a time of low oil prices and revenues. His desperate need for more revenue was in large part due to the disastrous effects of the war against Iraq. Other major Middle East oil producers, with the partial exception of Iran, did not had to take into account the effects of war in determining their policies. Saudi Arabia and other members of the GCC favored stability, as has been argued here. The fall in oil revenues in the mid-1980s was a factor behind reform programs undertaken in many Arab countries. These have led to smaller budget deficits, the rescheduling and reduction of foreign debt and lower inflation. The effect of these changes on rates of economic growth have been mixed, with acceleration in Egypt, stable growth in Tunisia, but less satisfactory performances in Jordan and Morocco.<sup>87</sup> The GCC states have been slower in coming to terms with their predicament.<sup>88</sup> The decline in oil incomes led to a fall in average per capita income in the Arab world and in Iran. The deflationary policies followed as part of the economic reform programs resulted in slow growth in their initial stages and this was a period marked by an upsurge of Islamic fundamentalist violence. In Egypt and Algeria this has largely been brought to an end.<sup>89</sup> Economic policy makers are much

more aware of social problems and a greater emphasis has been placed on social programs.

- Caspian oil in the Caspian region will not replace Middle East oil nor will it have a significant effect on international prices in the near future. It may well have an impact in the medium term - in five years time - if political developments within and between the countries of the region improve. The economic incentive in terms of export revenues from oil and gas already exists and would increase if prices rose in real terms, but the analysis here suggests that this cannot be guaranteed.
- Reliance on Middle East sources of oil in Europe and elsewhere is rising. There will be a period in which oil demand will be rising, non-OPEC supplies will be falling, and technology for converting non-conventional sources of oil may not be available. In this phase, oil prices are likely to rise and consumers could be subject to pressures from Middle Eastern producers.
- Many alternative scenarios for future political developments can be imagined in the Middle East. Iran and Iraq could form an anti-Western alliance, or a coup in Saudi Arabia could bring down the pro-Western regime. Any of these situations could lead to a reduction in Middle East oil production. Major cuts in output introduced rapidly would cause prices on international markets to jump but they would also affect revenues fairly quickly. The producing countries in the Middle East have much bigger populations than they did in 1973 when a boycott was last used. They understand much better the consequences of such action in terms of Western reaction, both economically and even militarily. Such actions, with their effects on international prices, would stimulate production outside the region and outside OPEC and would help promote the production and development of non-oil sources of energy.
- There is a great deal of uncertainty surrounding all forecasts on energy demand. This is due to the fact that estimates about rates of economic growth are far from accurate. Assumptions about technological development affecting supply have tended to be over-cautious in the

past, but more recent optimism, even if based on an element of extrapolation, is only a forecast. Finally, there is the tendency, especially in economic forecasting, to get stuck in the “current mood”: if an economy or the world economy is in recession it is often hard to imagine a way out. Similarly, if growth is strong, there is pressure to forecast a continuation so as not to create self-fulfilling expectations of recession. The failure to anticipate the crisis in South and East Asia and its effect on the world economy in 1997-98 are examples of this. These effects work both ways, causing some estimates to be too optimistic and others to be too pessimistic. Caution and modesty in making statements about the future are therefore essential.

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