

## WORLD OIL AND GEOPOLITICS TO THE YEAR 2010

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### *Introduction*

The last 15 years have witnessed international events of historic proportion: the eight-year Iran-Iraq war, the reflagging of tankers in the Arabian/Persian Gulf, the collapse of the Soviet Union, and Desert Storm. All these events have occurred in or around the world's major oil fields. Yet, thus far, the impact of these events on the flow and price of oil has been minimal. Except for short periods, prices have remained low, creating market conditions detrimental to exporters and favorable to buyers. This has led to an atmosphere of complacency in the Organization for Economic Cooperation and Development (OECD), where it is assumed that oil will be readily available in the future at current or even lower prices.<sup>1</sup> Indeed, the watchword among refiners is KILL (keep inventory levels low), as they seek to avert excessive price drops and to reduce carrying costs.<sup>2</sup> However, a deeper look into trends in the world oil market suggests that the future is uncertain for consumers and producers alike.

World oil demand is on a steady rise. In the long run, supply will catch up with demand and oil prices will stabilize at a higher price. Competition, increasingly introduced in the world oil market by the advent of telecommunications and

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futures markets, will play a major role in eventually bringing the price to a competitive level. In the interim, however, capital and capacity constraints will render oil supply uncertain, leading to higher prices in the next decade. Current projections also warn of increasing disparity in oil reserves and production capacity among producing countries. This means that in the next two decades, the Organization of the Petroleum Exporting Countries (OPEC) and Gulf producers in particular will become even more important. However, OPEC's declining per-capita oil revenue may reduce its capacity for sufficient and timely expansion of output and for creating spare capacity for crisis management. Foreign investment in most OPEC members faces institutional and political limitations. Although the market itself and competition therein have had a significant role in determining oil prices in the recent past, in the absence of a new holistic approach emphasizing regional and international cooperation, these constraining forces could cause distortion in the working of oil markets.<sup>3</sup>

This paper assesses the pertinence of these trends in oil markets and offers policy prescriptions. It provides secular trend analyses and explains various enabling and disabling factors that affect both demand and supply. To accomplish its objectives, the paper relies, in part, on the assumptions and projections of the International Energy Agency (IEA), along with forecasts made by other organizations.<sup>4</sup> Unless otherwise noted, data have been drawn from the 1995 edition of the IEA's *World Energy Outlook*. In that 1995 edition, the IEA presents two new models for oil supply and demand forecasts, a capacity constraints case (CC) and an energy-savings case (EC). The CC case assumes rising energy prices while the EC case assumes that production will become more efficient and that more energy conservation will take place than earlier. In the subsequent sections, this study focuses on world oil demand and underlying assumptions, world oil supply and constraining factors, the geopolitics of Middle East oil, and the implications for international cooperation among participants in world oil market.

### *World Oil Demand and Underlying Assumptions*

Despite a worldwide recession in the early 1990s and continued sluggish growth in almost all of the major industrialized nations, global demand for oil has remained strong, and there is considerable consensus in the oil industry about significant growth in demand for oil over the next 20 years. The IEA expects world oil demand to rise at an average rate of 1.5 percent (CC)/1.4 percent (EC) per annum until 2010, when total demand is projected to reach 95.2 million barrels per day (b/d) in the capacity constraints case or 92.0 million b/d in the energy-savings case or 86.0 million b/d if the world economy grows more slowly. It will soar to 77.3 million b/d by the year 2000 from the 1995 level of 70 million b/d. World oil demand in 1992 was 67.4 million b/d. According to the IEA,

world oil demand growth will accelerate as we approach 2010; for every year between 2005 and 2010, that demand will increase by almost 1.9 million b/d on average, compared with an average increase of just over 1 million b/d per annum in the 1990s. The projections by OPEC are much less optimistic. In particular, OPEC predicts a demand level of 73 million b/d by the year 2000, rising gradually to 79 million b/d by 2010, assuming a slow-growing world economy. Taking the various forecasts into account, one may suggest a world demand of some 75 million b/d by 2000 and 85 million b/d by 2010 (see table 1 and figure 1).

The growth in oil demand is uneven geographically. Between 1992 and 2010, oil demand in the rest of the world (ROW) is projected by the IEA to grow at a furious annual average rate of 3.9 percent (CC)/3.6 percent (EC) per annum, considerably faster than that of OECD [0.9 percent (CC)/0.8 percent (EC) annually] and the world as a whole [1.9 percent (CC)/1.7 percent (EC) a year]. Indeed, the OECD share of world oil demand will fall from about 59.2 percent in 1992 to about 49.7 (CC)/50.8 (EC) percent in 2010. Over the same period, the ROW share is expected to rise from 27.7 percent to 39 (CC)/38.5 (EC) percent, while that of the former Soviet Union (FSU) and Central and Eastern European countries (CEE) falls from 12.9 percent to 11.2 percent (CC)/10.6 percent (EC). Sometime between 2005 and 2010, non-OECD oil consumption will exceed that of the OECD (table 1) because of the rapidly growing demand in non-OECD regions. Rapid economic growth, urbanization, and increased transportation needs all contribute to the rising oil usage in the ROW countries. Moreover, as many of these countries lack a gas infrastructure, gas demand is expected to remain relatively low, while the energy demand will have to be met by oil and solid fuels.

Oil demand increases will be especially strong in East Asia, particularly in South Korea, China, and India. South Korea consumed less than 0.6 million b/d in 1985; however, for 1995 and 2000 this figure is expected to be 2.1 million b/d and 2.7 million b/d, respectively. China and India, with their large populations, are also poised for continued strong economic growth. As part of its rapid industrialization program, and with a population of 1.2 billion, China plans to build a "people's car" by the end of the decade, which will significantly increase energy consumption there.<sup>5</sup> China will become a major importer of Gulf oil by the turn of the century. It will pay for a large portion of this by more vigorously marketing weapons systems including to countries surrounding the Gulf. To appreciate the long-term significance of China and India, consider the following:

Presently, South Korea's annual per capita energy consumption is 16.9 barrels per head. In China and India they use less than a barrel a head, though their usage is up 33 percent and 50 percent, respectively, since 1985. Assuming that their per capita consumption rose to that of South Korea, and that their populations increased at currently projected rates, these two countries alone would need a total 119 million barrels of oil a day. That's almost double the world's entire demand today.<sup>6</sup>

Table 1

OIL OUTLOOK TO 2010<sup>a</sup>  
(in million barrels per day)

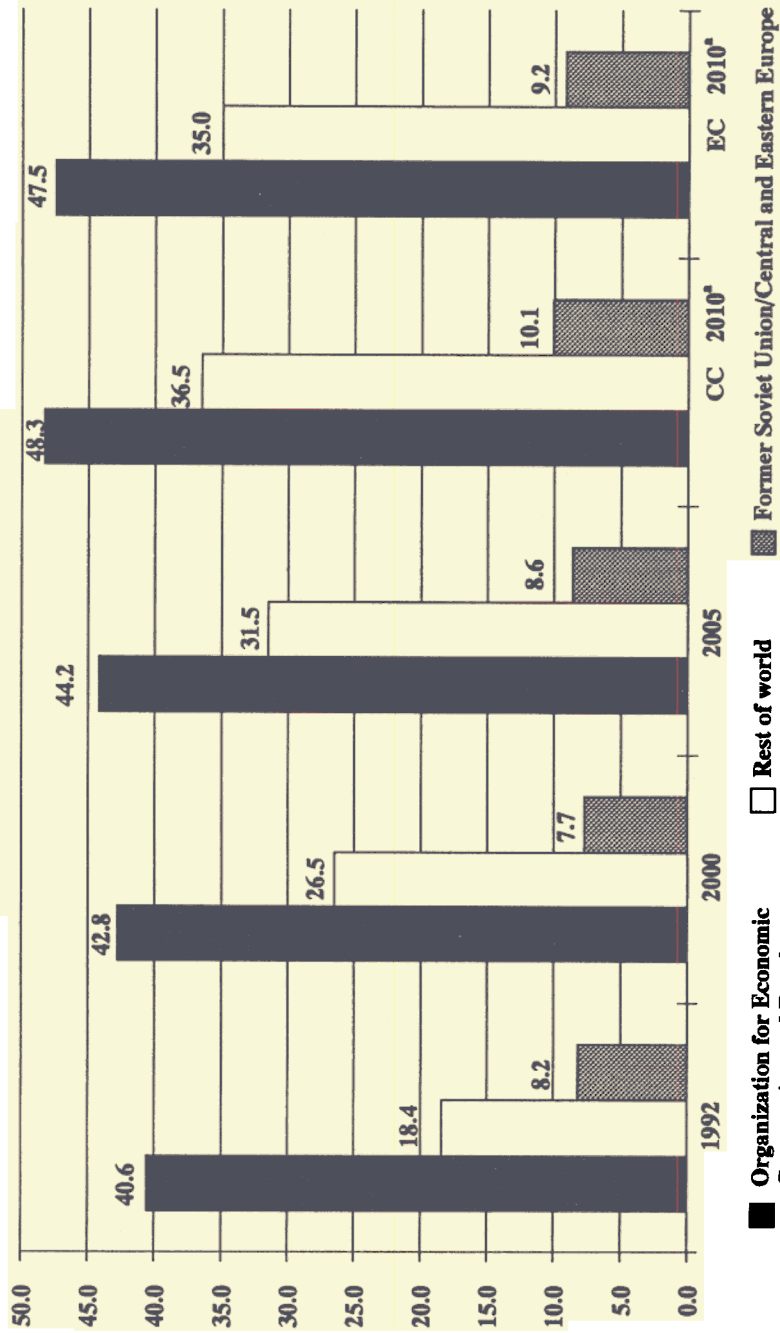
	1992	2000	2005	2010		2010 Scenarios		
		Reference Case		CC	EC	High Growth	Low Growth	Low Price
Oil demand	67.4	77.3	84.6	95.2	92.0	105.1	86.0	102.0
OECD	40.6	42.8	44.2	48.3	47.5	50.6	45.7	52.5
FSU/CEE	8.2	7.7	8.6	10.1	9.2	11.9	8.8	10.2
ROW	18.4	26.5	31.5	36.5	35.0	42.3	31.2	39.0
Stock change	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Oil supply	67.4	77.3	84.6	95.2	92.0	105.1	86.0	102.0
OECD	19.8	15.2	14.5	21.0	17.5	21.0	21.0	17.5
FSU/CEE	9.2	8.3	9.3	10.7	10.0	10.7	10.7	10.0
ROW	10.6	21.1	21.5	14.9	13.2	14.9	14.9	13.2
OPEC	26.3	31.0	37.5	46.7	49.4	56.6	37.5	59.4
Processing gains	1.5	1.7	1.8	1.9	1.9	1.9	1.9	1.9
OPEC share in total supply (%)	39.0	40.1	44.3	49.1	53.7	53.9	43.6	58.2
Net OECD imports (as % of demand)	20.8	27.3	28.9	27.3	30.0	29.6	24.7	35.0
Crude oil price (per barrel in 1993\$)	21.2	23.0	28.0	28.0	28.0			

<sup>a</sup>OECD = Organization for Economic Cooperation and Development; FSU/CEE = former Soviet Union/Central and Eastern Europe; ROW = rest of world; OPEC = Organization of the Petroleum Exporting Countries; CC = capacity constraints case; EC = energy-savings case.

Sources: Organization for Economic Cooperation and Development (OECD), International Energy Agency, *World Energy Outlook* (Paris: OECD, 1994 and 1995).

The OECD's import dependence will also grow from 51.2 percent in 1992 to 56.5 (CC)/63.2 (EC) percent in 2010. In the FSU/CEE, consumption and production will both rise, but the net effect is likely to be that FSU exports will not reach their 1988 peak of 2 million b/d before the turn of the century. As consumption of heavy fuel oil has declined, less room is now left for fuel switching and further conservation. The surge in nuclear power capacity during the last

Figure 1  
WORLD OIL DEMAND OUTLOOK, 1992-2010  
(in million barrels per day)



two decades has also stalled. As one energy analyst put it: "The wave of conservation and substitution is largely over."<sup>7</sup>

Future growth in oil consumption will be in such light fuel products as gasoline, diesel, and heating oil. The transport sector is expected to lead the way in almost all of the world's regions; in the OECD, it will grow at an average rate of 1.6 percent (CC)/1.4 percent (EC) per annum over the 1992-2010 period. In the United States alone, an estimated 50 million more cars and trucks were on the roads in 1995 than in 1979, and Americans were driving 750 million more miles in 1995 than they did in 1979. Meanwhile, we are witnessing the return of gasoline guzzlers: sport vehicles and light trucks accounted for some 40 percent of vehicles sales in the United States in 1994, compared to only 20 percent in 1980. To get an even more dramatic picture for increased demand for gasoline in the OECD, one also must consider the jump in demand for mini-vans and vans.

In Asia, too, the transport sector leads the demand for oil: in China, by the year 2000, some 3 million vehicles will cruise the roads. The growing demand for lighter oil, together with enacted fuel quality legislation, implies the necessity of large investments in the refining sector globally. In the building sector, oil demand is expected to decline over the 1992-2010 period in both the CC and the EC cases, largely because of increased interfuel competition, where gas now provides the major competition for space-heating requirements. In the OECD industrial sector, oil demand will increase slightly between 1992 and 2010, rising by 0.1 percent (CC)/0.3 percent (EC). In other world regions, however, industry demand for oil is expected to increase rapidly as industrialization advances.

These projections for the long-term outlook of world oil demand and its regional distribution are based upon a number of assumptions about growth trends in the world economy and population, technological advances in the use of possible oil substitutes and interfuel competition, energy and fuel efficiency, environmental and energy taxation policies in major oil-consuming countries, and public policies designed to conserve energy. Note that these assumptions are not inclusive or mutually exclusive, a fact that makes demand projections very complex and capricious. Nor do the various factors underlying oil demand have equal influence. For example, projections of oil demand and supply in the long term are particularly sensitive to real price assumptions. While lower prices tend to stimulate demand, they are not very appealing to producers and vice versa. Similarly, environmental movements are changing the world's approach to economic development, while new political-economic forces are redefining environmental safety needs. Finally, changes in the world economic structure or income distribution can have a major impact on oil demand. True, rapidly growing high-tech industries are not energy intensive and can also exacerbate the uneven distribution of income, depressing oil demand even further. Overall, however, because the absolute income of poorer groups will increase—leading to increased energy consumption—the net impact on oil demand will be positive.

**Oil Price Optimists and Pessimists:** Investors must adopt a long-term view of oil prices before making costly fixed investment decisions. The same is true for governments seeking to implement policies that ensure long-term political stability and economic growth. Oil analysts make assumptions about future oil prices and use them to predict demand. These assumptions are deduced from historical trends, available excess capacity, and forecasters' subjective perspectives on how various participants in the oil market will behave in the forecast period. Projected demand and supply are then used to affirm the reasonableness of price assumptions. In more dynamic models, forecasters alternate between different price-demand assumptions to arrive at reasonable figures for both variables. In other words, it is not always correct to assume one a dependent variable and the other an independent variable. Excess capacity is usually considered among the most important factors in the projection of oil prices. Table 2 gives an indication of the relationship between output capacity and prices over the 1985-1995 period.

Of the six published forecasts (reference cases) reviewed by John Lichtblau for the periods 1991-2000 and 2000-2010, five indicate increases for both periods in real prices, ranging from moderate to steep; one predicts flat real prices.<sup>8</sup> In 1992 dollars, the average of the six forecasts is \$23 per barrel for 2000 and \$29 per barrel for 2010.<sup>9</sup>

These price optimists base their forecasts on trends in growing demand for world oil and are pessimistic about OPEC's ability or drive to expand output and build the required spare capacity in the medium term. They argue that as demand for oil increases, OPEC will aim to collect the high rents it reaped in the early 1980s; otherwise, OPEC will be short of capital to expand capacity, while the outlook for foreign investment remains limited in the medium term.

In sharp contrast to these "capacity pessimists," the Washington-based Energy Security Analysis, Inc. (ESAI) assumes real prices (in 1993 dollars) to fall, averaging below \$15 a barrel in 2000-2010 period. This price pessimism is also shared by other "capacity optimists" who maintain that oil prices will slowly decline in real terms between 2005 and 2010 as OPEC's expansion projects begin operation.<sup>10</sup> Among them is the American Petroleum Institute, which maintains that there will always be enough oil for the rising demand. One relatively new theory even suggests that depleting reservoirs are replenishing themselves from hitherto unknown deeper reserves. That is beside the point; what counts is whether and how rapidly the reserves could be brought on stream to meet demand. Even at lower prices, capacity optimists argue, OPEC will respond to the call on its oil because of huge reserves, lower production costs, increasing need for revenue, and the diminished expectation of OPEC members for high rents.

The analyses in this paper are based on a somewhat optimistic price outlook, close, but not identical, to the assumptions made in IEA's 1995 *World Energy Outlook* (CC and EC cases). Real oil prices (in 1993 dollars) are assumed to

Table 2

## WORLD EXCESS CAPACITY AND OIL PRICE, 1985-1995

Year	Excess Capacity (million barrels per day)	Price (U.S.\$ per barrel)
1985	10.2	27.99
1986	9.2	15.05
1987	8.5	19.19
1988	6.8	15.98
1989	5.5	19.68
1990	2.1	24.52
1991	0.6	21.54
1992	1.4	20.57
1993	4.2	18.60
1994	4.3	16.50
1995	4.5	17.50

Source: B. Tippee, "Questions Cloud Outlook for Oil Production Capacity Growth in the Middle East," *Oil and Gas Journal*, July 11, 1994, p. 35.

rise from \$17 per barrel in 1994 to \$25 per barrel by 2005, less than the IEA figure of \$28 per barrel for the year (CC case), and then remain flat to 2010 (table 3 and figure 2). To compare, in real terms, the assumed price of \$25 per barrel is less than half the level of the 1981 price peak and slightly below the average real price between 1970 and 1990. Indeed, in real terms, oil has not been this cheap since 1973. This situation cannot be sustained. The IEA figure for the EC case assumes real oil prices to rise to \$18 per barrel by 2000 and remain constant through 2010. At a price far below \$18 per barrel, oil demand becomes unsustainable given there will be less enthusiasm for a rapid supply increase, while for a constant price of about \$18 per barrel, given rising demand, a few producers would have to increase output significantly and without an extended time lag. This is unlikely because of the enormous and immediate financial commitment that such a strategy entails. Only a reasonably high price can stimulate investment to rapidly expand production. It must be pointed out that OPEC assumes a position between these two extremes of pessimism and optimism but does not wish to explicitly announce its future price assumptions.

Pressure on prices in the short term will not be significant because major producers, namely, Saudi Arabia and Iran, are more concerned with their market share than with prices levels. In the medium term, upward pressure on prices will increase as the need for additional production grows and OPEC's spare capacity declines in the absence of significant new investments. This price pressure will



Table 3

PRICE ASSUMPTIONS, 1990-2010  
(in 1993 U.S. dollars per barrel)

	1990	1993	2000	2005	2010
Pessimist	27.59	18.48	19.81	15.42	14.11
Optimist — CC case <sup>a</sup>	24.33	16.39	23.00	28.00	28.00
Optimist — EC case <sup>a</sup>	24.33	16.39	18.00	18.00	18.00

<sup>a</sup>CC = capacity constraints case; EC = energy-savings case.

Sources: Energy Security Analysis, Inc. (ESAI), *Oil at the Turn of the Century, ESAI's Long-Term Outlook on the World Oil Market: 1993-2003* (Washington, D.C.: ESAI, 1994) for the pessimist case and Organization for Economic Cooperation and Development (OECD), International Energy Agency, *World Energy Outlook* (Paris: OECD, 1995) for the optimist case.

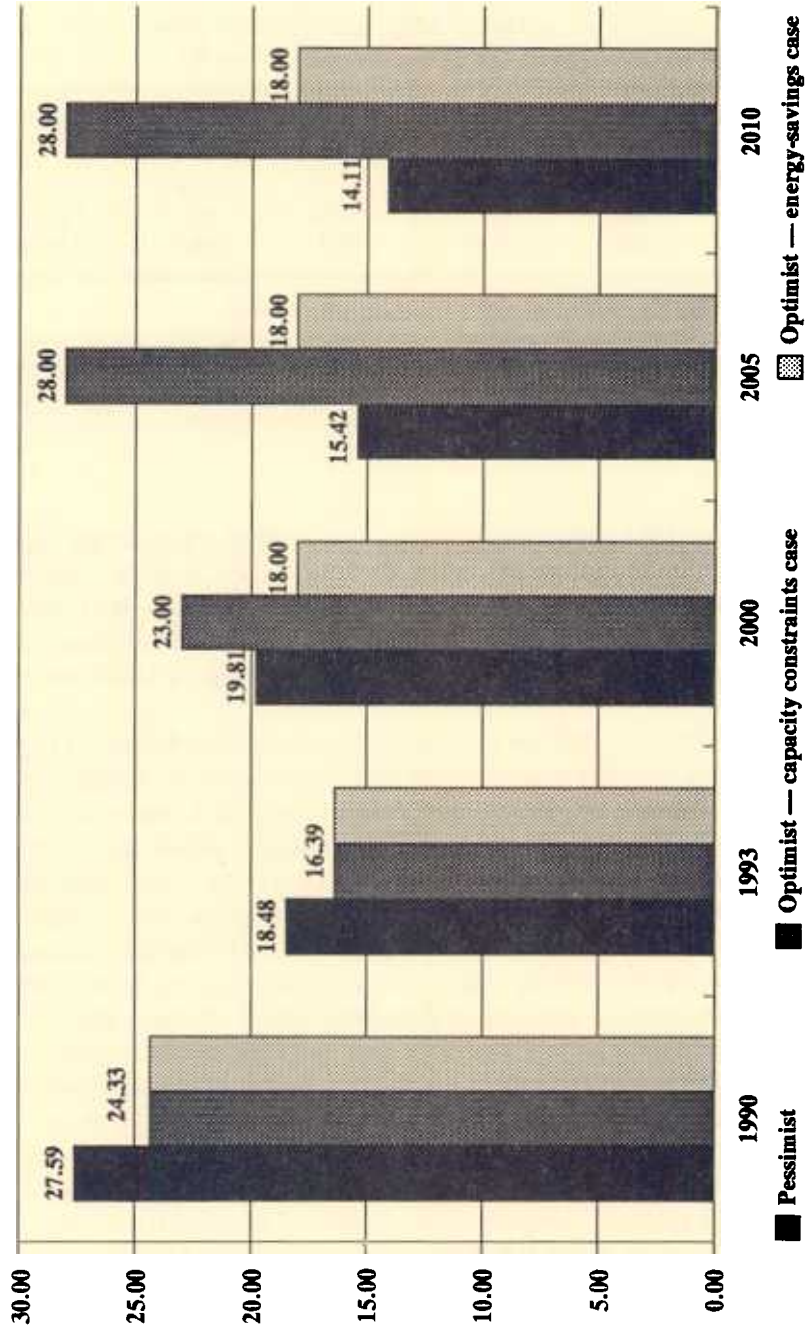
occur even if the required expansion is expected to come mainly from the Middle East and Venezuela, where return on investments is good even at a price of around \$12 a barrel. Oil prices in the past have not been determined by the cost of production in OPEC states; rather, the least efficient producers in the United States and North Sea have determined prices, helping OPEC to reap a super-profit.<sup>11</sup>

The price of oil will rise in the next decade for five reasons: (1) a possible time lag between capacity expansion and growing demand; (2) increased OPEC ability to control members' quotas as a result of excess capacity erosion; (3) Saudi Arabia's declining ability and unwillingness to glut the oil market and thus keep a lid on prices as in the past (the Kingdom's debt is put at \$70 billion); (4) the U.S. use of oil as a weapon against Iraq, Iran, and Libya; and (5) increased vulnerability to unforeseen shocks and disruptions in the absence of excess capacity.

As one analyst put it, "Show me a 15-year period where there wasn't an anomalous event in the Middle East that caused prices to rise."<sup>12</sup> In the long term, a cap on oil prices may result from new investments, improvements in technology, development of substitutes, increased competition in the world oil market, demand-dampening environmental pressures, the inevitable return of Iraqi exports, and exports from FSU.

The assumed increase in the oil price should not imply a lack of market volatility. Oil markets have always been erratic as supply and demand fluctuate. Recent growth of telecommunications, permitting improved information transparency, and the emergence of a futures market, allowing a better spread of risk, might help reduce instability to a degree. Nonetheless, as the IEA has aptly observed:

Figure 2  
 PRICE ASSUMPTIONS, 1990-2010  
 (in 1993 dollars per barrel)



The weakened link between crude oil prices and prices of oil products to consumers, caused to a large extent by the high tax component levied on many products in the OECD countries, has led to an oil demand that is rather insensitive to changes in the price of crude oil. This dampens the demand side responsiveness to price changes and, if spare production capacity is reduced, it is possible that volatility will increase over the projection period.<sup>13</sup>

In short, the IEA's assumed upward pressure on oil prices is premised on extrapolating the dynamics of the oil market since 1970 over the outlook period. This may prove a poor basis for future price trends if market forces in the globalized oil industry continue to gain prominence at the expense of politics in the coming years.

**Economic and Population Growth:** While the world economy as a whole was in recession in 1980s and has remained sluggish, there is agreement among oil analysts that over the next 10 years economic growth will average between 2.5 to 3.5 percent per annum. In 1992, world gross domestic product (GDP) was about \$18.5 trillion (in 1987 dollars); it is expected to increase to about \$31.7 trillion by 2010. With a population growth rate of about 1.4 percent, this growth scenario will translate into some per-capita gains (table 4). While a few of the factors contributing to the recent recession will continue to stay with the world economy, including the maturation of most OECD economies and reduced defense spending, others may diminish in influence when the current transitional period of major adjustments ends. In particular, hopes are raised that economies in the FSU and Eastern European countries will normalize, the tight-money, anti-inflationary monetary policies in the Group of Seven (G-7) will end, and deterioration in government, business, and consumer balance sheets will cease.<sup>14</sup>

As the present sluggishness is not worldwide or evenly distributed across various national economies, prospects for future recovery are dissimilar for different parts of the globe (table 4). OECD economic growth has been slow and is unlikely to exceed an average of 2.5 percent per year over the next 15 years. OECD Pacific, which increased at 4.0 percent per year from 1971 to 1992, is assumed to grow at a base-line rate of just 2.7 percent per annum over the 1992-2010 period. In the long term, North America and OECD Europe will also grow slowly, at just over 2.5 percent (base-line case) annually. Notwithstanding these low growth rates and a decline in their share of world GDP (from 68 percent in 1994 to 61 percent in 2010), OECD members will make gains in per-capita income, given their population growth rates, presently less than 1 percent and lower in the future.

Fortunately for producers, growth prospects are bright for a number of countries outside OECD, notably China and East Asian nations. China's current double-digit growth rate is expected to decline, but if domestic conditions remain unchanged, the country would still grow at about 6 to 8 percent per year over the

Table 4

AVERAGE ANNUAL ECONOMIC AND POPULATION GROWTH RATES  
ASSUMPTIONS, 1971-1992 AND 1992-2010<sup>a</sup>  
(in percent)

	1971-1992		1992-2010			
	Economic Growth	Population Growth	Economic Growth			Population Growth
			Reference	High	Low	
OECD	2.8	0.9	2.5	2.8	2.1	0.6
FSU	0.6	0.8	1.3	2.1	0.6	0.6
ROW	4.2	2.1	5.3	6.2	4.3	1.7
World	2.9	1.8	3.1	3.5	2.5	1.4

<sup>a</sup>OECD = Organization for Economic Cooperation and Development; FSU = former Soviet Union; ROW = rest of world.

Sources: Organization for Economic Cooperation and Development (OECD), *Economic Outlook* (Paris: OECD, 1993) and International Energy Agency, *World Energy Outlook* (Paris: OECD, 1995); United Nations, *World Population Prospects 1990* (New York: United Nations, 1992); World Bank, *Global Economic Prospects and the Developing Countries* (Washington, D.C.: World Bank, 1993), *World Tables* (Washington, D.C.: World Bank, 1993), and *Trends in Developing Economies* (Washington, D.C.: World Bank, 1993).

next 15 years. East Asia is also assumed to grow by about 6 percent per annum over the same period. Overall, the Asia-Pacific developing countries are expected to increase their share in world GDP from 11 percent in 1994 to around 17 percent in 2010. Slower population growth rates in these parts of the world (less than 2 percent), given the predicted economic growth, will translate into large per-capita gains. However, this rapid growth may slow if oil prices increase too rapidly. Africa's GDP is expected to rise by 3.7 percent per annum but, given rapid population growth of 2.7 percent, per-capita income is expected to rise only modestly. However, economies and per-capita income in other developing countries are expected to grow at higher rates than in Africa but substantially below the rates for Southeast Asia.

Economic and political prospects for the successor states of the FSU remain largely unpredictable. The available historical data, collected when these economies were centrally planned, provide little information about their likely behavior in a market environment. The substantial changes introduced since 1991 have not always pointed in one direction. The FSU as a whole is expected to grow at a rate of 1.3 percent a year over the 1992-2010 period, and this growth trend is not expected to change the region's share in world GDP (8 percent in 1994). Yet, the FSU is very important for a comprehensive global energy outlook—the Soviet

Union was for many years the single largest producer and the second largest consumer of energy in the world.

**Interfuel Competition—Oil Substitutes:** The required oil production capacity is in part determined by demand for non-fossil-fuel power generation. At present, oil accounts for some 40 percent of world energy demand. Comparable figures for nuclear and hydro energies are 6.6 and 2.5 percent, respectively. OECD non-fossil-fuel power generation and nuclear capacities are projected to increase by average growth rates of 1 percent and 0.7 percent over the 1991-2010 period, respectively. Similar to the OECD, nuclear power in FSU/CEE will remain limited given safety problems, economic restructuring, inadequate investment, and declining trade in nuclear fuel. Overall, nuclear power-generating capacity in the region is assumed to increase by about 0.8 percent per year over the 1991-2010 period. In the rest of the world, nuclear capacity will increase slightly and only in a few countries. Here, the West's concern with nuclear proliferation is a major obstacle to the development of nuclear energy.

The expected growth in hydroelectric capacity in the OECD is 1 percent annually, and the capacity of other renewable sources of electricity generation is assumed to increase by 8 percent a year to 2010. Despite the high growth of the latter electricity source, its overall contribution will remain small. In OECD Europe, Turkey has the most ambitious plans for the development of hydroelectric power, aiming to triple its capacity by 2010. In the rest of the world, hydroelectric capacity is assumed to increase by 5.1 percent annually. Coal has increasingly fallen out of favor because of its low efficiency and environmental consequences. The only real challenge that oil faces in the next century is natural gas, which could replace oil as the dominant energy source sometime in the first half of the next century if no major obstacles hinder its development. It must be noted, however, that the world natural gas reserves are extremely unevenly distributed across the globe with Russia and Iran together accounting for about 50 percent of global reserves (about 34 and 15 percent, respectively). Both countries are short of capital and face impediments to attracting foreign investment. In sum, the trends in growth rates of possible oil substitutes indicate that by 2010, the share of oil in electricity generation will decline but not sufficiently to bring a major change in oil demand.

**Energy and Fuel Efficiency:** New power plants, be they solid-fired, oil-fired, or gas-fired, are more efficient, thus increasing the overall power generation efficiency as they are brought on line during the 1991-2010 span. Electricity distribution losses, which in many regions can be substantial, are also assumed to decline. However, in the final analysis, energy saved from these improvements will not have a major impact on demand for oil. For that to happen, such savings would have to come from a reduced propensity to consume oil and this is better

measured (some say, superficially) by the long-term gross national product (GNP)/oil growth ratio. This ratio, which relates oil demand to economic growth, will improve in many parts of the world as we approach the 21st century. Between 1970 and 1992, the ratio averaged 2:1 in North America, 3:1 in Europe, 2.5:1 in OECD Pacific, close to 1:1 in developing countries, and 2:1 for the world as a whole (weighted average). Over the period 1986-1992, this weighted ratio increased to 3:2 as oil prices declined and conservation measures were relaxed. The ratio is expected to stay in that range over the next decade, after which time it may move back toward 2:1 in response to conservation measures or the introduction of alternative fuels. In OECD members, given their ratios and in the absence of serious supply interruptions, it is unlikely that "command and control" measures to reduce energy consumption in the medium term will be adopted. In the long term, however, as dependency on oil imports grows and pressure for environmental safety increases, legislation aimed at reducing energy consumption will most likely be enacted.

The GNP/oil ratio of newly industrialized countries (NICs), particularly China and India, is the most critical variable affecting the long-term oil demand outlook. These and other developing nations are thirsty for oil due to rising manufacturing activity, population growth, and life-style changes. Most of these countries are unlikely to introduce command and control measures in the medium term because of their plans for rapid economic growth, a relative lack of public concern for the environment, and the high cost of implementing environmental measures. However, some of the high-growth nations are concerned with the balance-of-payments consequences of rising oil imports. For example, both the Chinese and Indian governments have demonstrated a willingness to adopt command and control policies that directly cut oil consumption in the name of fiscal austerity. This phenomenon is likely to be repeated on numerous occasions over the next 30 years in other oil-importing developing countries. Although energy efficiency in these countries will follow the same trajectory as in the major industrialized nations, it will exhibit a considerable amount of gap and time lag.

**Taxation and Environmental Policies:** The most likely factor affecting oil markets in the long term is public policy designed to discourage energy consumption. This objective will be attained by devising measures like energy taxes that will yield a fiscal impact (reduce imports, increase tax income) or an environmental impact (reduce or sanitize end-use consumption). The driving force behind energy taxes in the major industrialized countries through the end of this century is likely to be revenue needs and environmental considerations. Thereafter, the prime reason for imposing these taxes might be concerns over rising dependency on imported oil or the environment. The distinction between these two sets of motives is important because in the latter case, tax increases might be augmented by regulations mandating conservation.

The environmentally inspired regulation of oil consumption is complicated. Governments can tax the consumption of petroleum products, in which case the distinction between revenue-raising taxes and environmental taxes is often blurred by political expediency, or they can use fuel content and emission standards, in which case the cost of compliance passed on to the consumer is hard to quantify in advance.<sup>15</sup> Notwithstanding this difficulty, it is certain that environmental controls on consumption will raise the cost to the consumer and reduce demand for environmentally harmful fuels. A gradual increase in energy taxes, primarily on transportation fuels, is expected in the years ahead. Other forms of energy taxes, such as a carbon tax, are also likely to be adopted. However, the pace of these tax increases can accelerate if the major consuming countries perceive a rising vulnerability to growing import penetration and/or possible supply disruptions.

As long as these tax increases are gradual, they will have only a small effect on global oil consumption. A significantly large transportation fuel tax is not expected in the United States in this decade. Therefore, consumption of light fuel products is expected to rise in the years ahead in the United States, particularly because of concern for higher efficiency. This is also true in a number of other major consuming countries where taxes are already very high, and small future increases will be marginal. Higher taxes or the elimination of current government subsidies on oil are also likely to exert an upward pressure on energy prices in some developing nations. However, the dampening effect that these measures will have on demand is expected to be more than offset by other factors such as rapid population increases, expanding manufacturing activity, and continued strong economic growth.

Environmental concerns are unlikely to disappear. Indeed, IEA projections show that world carbon dioxide (CO<sub>2</sub>) emissions will increase from 21.6 billion tons in 1990 to 30.7 billion tons (CC)/28.2 billion tons (EC) in 2010. While OECD countries will account for some of the increased emissions, most of the increase will be generated by ROW countries. Significant progress has already been made in sanitizing oil consumption in industrialized nations as the number of environmental regulations has been rapidly expanded. This trend is likely to continue. Developing countries, on the other hand, are caught between rapid industrialization and the goal of sustainable development (clean growth). It is necessary to examine these nations' record of public policy individually. Yet, even in countries where environmental laws are lax, regulation will constrain long-term oil demand growth. However, because public policy evolves slowly, the impact of anti-oil policy will only be marginal in the next 10 years. It will have a greater impact later in the next century, particularly as increased environmental regulations begin to substantially increase investment needed to comply with them and as natural gas begins to assume prominence among alternative energy sources.

*World Oil Supply and Constraining Forces*

There are about 900 billion barrels (some project 1,010 billion barrels) of proven reserves in the ground, of which about 700 billion barrels belong to OPEC (table 1, figures 3, 4, and 5). As proven reserves are determined relative to available technology and economic conditions, their level is being constantly revised upward as the world economy grows and new and more sophisticated production techniques are introduced (the latter largely affecting reserves in the North Sea, Canada, and the United States). Indeed, for the world oil supply to continue expanding, producers must increasingly "go into more unexplored areas, more frontier areas, deeper waters, rougher terrain, weaker political systems."<sup>16</sup>

The crucial difference between the non-OPEC reserves and those of OPEC is that the former are harder to access, especially in the medium term, cost more to produce, or face a shortage of capital. In many non-OPEC producers, the higher output cost is due to a smaller resource base and an already lower average reserve-to-production (R/P) ratio. Capital shortage results because many non-OPEC developing countries are populous; the small volumes of oil produced there are largely or wholly consumed, leaving very little or none for export. Under this condition, foreign investment is the only option, but with the high cost, risk, and regulatory constraints involved, foreign investors have shown increasingly less attraction to these fields.

Not all non-OPEC producers face similar problems. They can be divided into three categories: those with R/P ratios less than 10; those with R/P ratios of 10 to 20; and those with R/P ratios over 20. The first group (e.g., United States, United Kingdom, Canada, Argentina, and Syria) involves oil sites that are very mature (R/P ratios under 10); only the most costly and sophisticated recovery techniques have arrested a major decline in production. U.S. crude oil output has fallen by some 1.8 million b/d in the past eight years while U.S. demand has risen by 1.4 million b/d. The gap between demand and supply in the United States would have been greater had it not been for the introduction of such cost-cutting measures as improved technology and downsizing since the 1980s.

Meanwhile, increased competition has reduced the profit margin, making new investments increasingly risky. In the year 2000, Alaska will produce about 50 percent of its 1988 level as its main fields in Prudhoe Bay have begun to fade. In Canada, the Hibernia Oil Development project, at a total cost of almost U.S.\$ 12 billion, is by no means economical at current prices (\$18-\$19 per barrel): production there is expected to reach 125,000 barrels a day, and may continue for another 10 to 15 years as long as the Canadian government continues to pay subsidies to the U.S.-Canadian joint venture developing the field. Britain's North Sea fields likely will reach their peak production of 2.7 million b/d in 1996. Already the original 12 fields yield only 30 percent of their peak output and the 5 large newer fields that began operation in 1990 have since fallen by 18 percent.



Figure 3  
 WORLD OIL SUPPLY OUTLOOK, 1992-2010  
 (in million barrels per day)

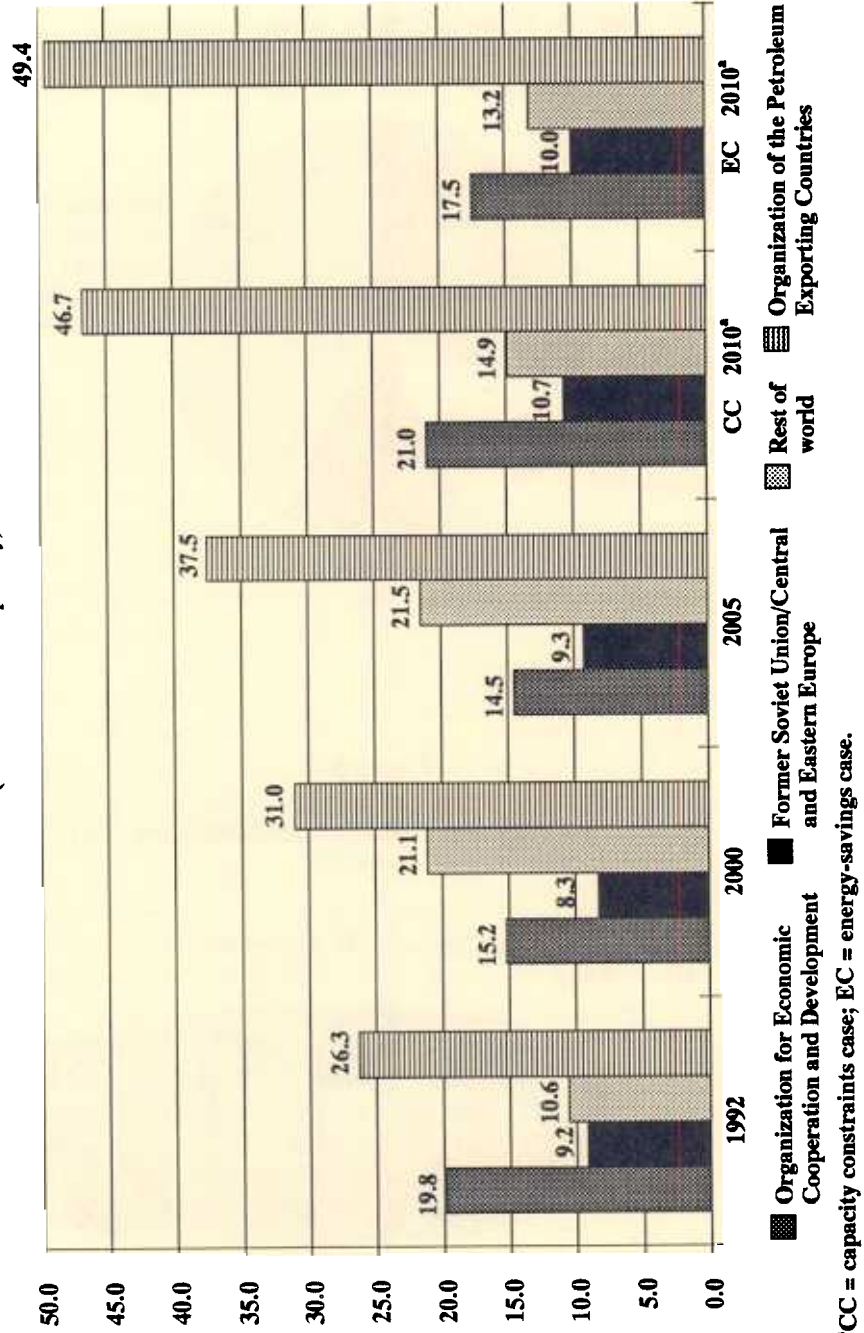


Figure 4

WORLD OIL PRODUCTION DISTRIBUTION, 1993  
(in percent)

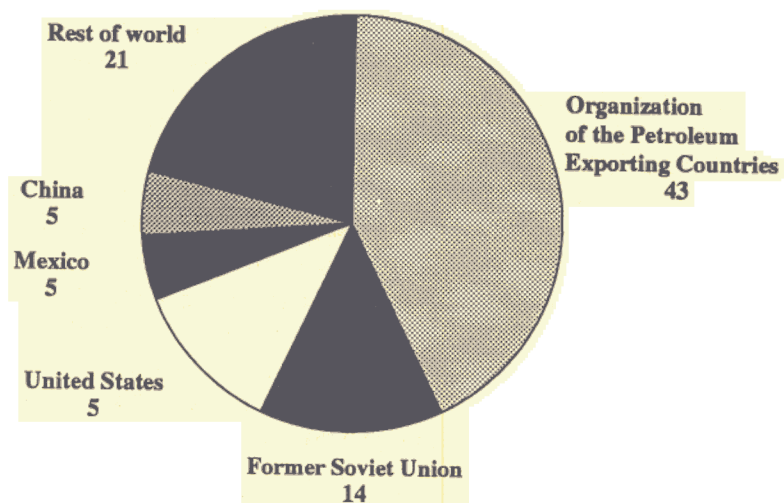
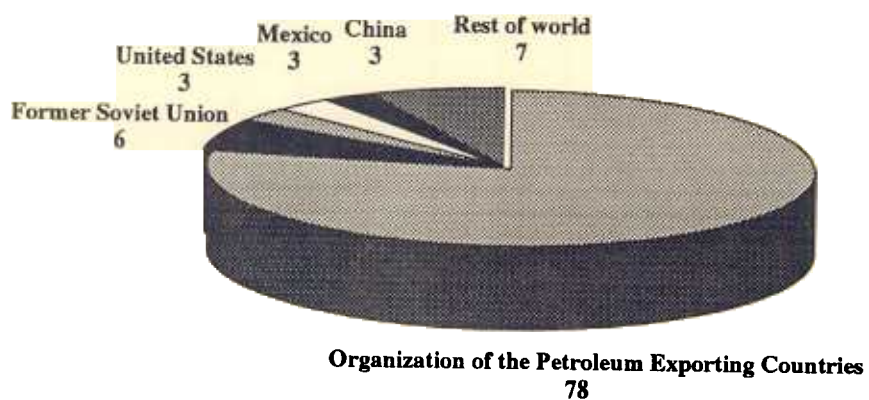


Figure 5

WORLD PROVEN OIL RESERVES DISTRIBUTION, 1993  
(in percent)



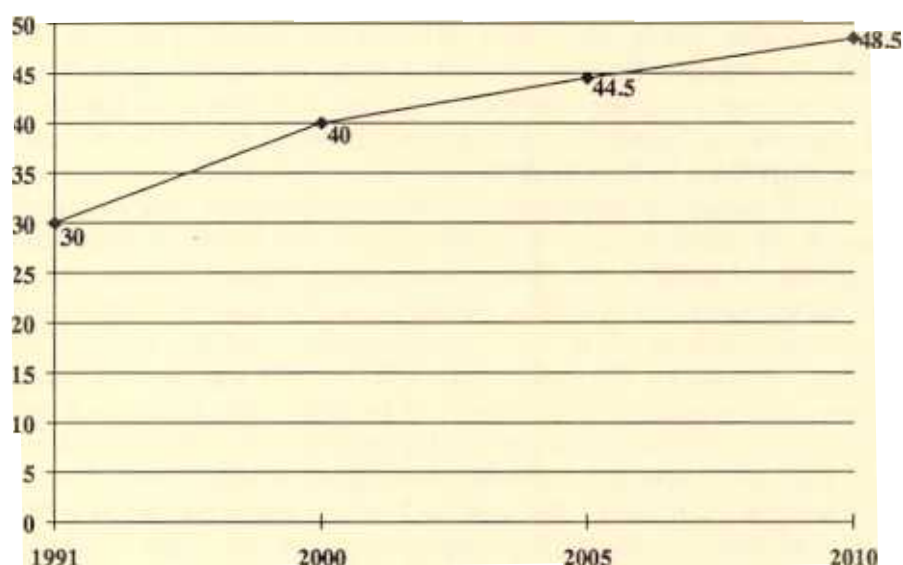
In the second grouping are the countries that are maturing quickly (R/P ratios are between 10 and 20) and may have only a few more years of modest growth in output before their production declines: Norway, Colombia, Brazil, Oman, Malaysia, and Egypt. Although technological development has helped these nations to continue output at an economically reasonable cost, they may soon curtail, if not close, many operations if cost soars and production becomes uneconomical. For example, Norway's North Sea fields will maintain production for the next few years but could experience a decline. Colombia is the best hope in South America; its Cusiana field, which came on stream in 1994, is expected to produce 200,000 b/d by the year 2000.

The third category includes countries where the resource base is still quite large, with R/P ratios over 20, but where economic and political hurdles restrain development, for example, the FSU, Vietnam, India, Mexico, Yemen, and, to a lesser degree, China and Tunisia. Production in the Gulf of Mexico, which reached over 1 million b/d in 1971, is experiencing a gradual decline despite expensive interventions. Oil output in the FSU in 1994 was below 7.5 million b/d, down from a peak of 12.5 million b/d in 1988. This is expected to fall further over the medium term before picking up after 2005. The net effect of a rise in both production and domestic consumption would indicate that FSU exports will not reach their 1988 peak of 2 million b/d before the turn of the century, and that exports from the region may stabilize around that figure between 2005 and 2010. Russia and Kazakhstan are net exporters but production there has suffered as efforts by firms like Chevron have run into political and infrastructural hurdles. The Azerbaijan International Operating Consortium (AIOC) faces a problem finding an efficient transport route; the most viable route is through Iran, but it has been rejected because of opposition from the United States.

Given these limitations, the IEA expects that non-OPEC production between 1992 and 2010 will increase by 7.4 million b/d in the CC case, but only by about 1.5 million b/d in the EC case. Increases in countries such as Kazakhstan, Colombia, or Brazil will offset declines in the United States and eventually in the North Sea. The expectation in the 1980s that China would become a major oil exporter has faded; demand overtook supply (some 3 million b/d) in 1993. By the year 2005, China will need to import some 2 million b/d. During the same 1992-2010 period, however, the call on OPEC crude is expected to rise by 20.4 million b/d (CC)/23.1 million b/d (EC) (see table 1 and figure 6, which gives Venezuela and Middle East). Can OPEC respond to the call on its oil in the medium term? The potential is certainly there when OPEC's proven reserves are considered (table 5 and figure 7). However, its members may fail to respond adequately to the demand given the rapid growth of domestic energy consumption in almost all their economies, the pace of oil demand growth, the size of the call on OPEC oil, the organization's current capacity utilization rate of about 90 percent, and the

Figure 6

OIL SUPPLY OF MIDDLE EAST AND VENEZUELA  
AS PERCENT OF WORLD SUPPLY, 1991-2010



current lukewarm attitude toward new investments in capacity expansion (table 6, figures 8 and 9). As for domestic consumption, Indonesia, for example, now consumes some 65 percent of its oil, compared with 40 percent in 1985; Iran may, indeed, become a net importer of oil products if the current growth rate of domestic energy consumption (about 7 percent a year) persists into the next decade. (Note that all OPEC producers subsidize domestic energy prices substantially).

What is even more alarming is the fact that in the medium term, no remedy is in sight for the high rate of capacity utilization within OPEC; the problem is expected to persist even if Saudi Arabia, Kuwait, and Venezuela were to expand capacity as planned, and if Iraq were to resume exports by 1996. It is thus critical that oil analysts develop a comprehensive prospective about possible capacity expansion by OPEC at the turn of the century.

Saudi Arabia's total capacity is expected to reach 10 million b/d in 1996 and expand to 12 million b/d by 2000, assuming favorable market conditions and Saudi finances. The new Shayba oil field has cost the Kingdom some \$2.5 billion and is expected to yield 500,000 b/d of crude in 1999. The expected slow response by Saudi Arabia is due to prices prevailing through 1995, which are too low to warrant a faster increase. Apart from Saudi Arabia and Iraq, Iran has the most potential to expand production, but it is currently experiencing economic

Table 5

WORLD OIL DISTRIBUTION, 1993  
(in billion barrels)

	Current Production	Proven Reserves	R/P Ratio <sup>a</sup>
OPEC total <sup>b</sup>	8.90	699.7	79
Saudi Arabia	2.98	261.2	88
Iraq <sup>c</sup>	0.16	100.0	625
Iran	1.33	63.0 <sup>d</sup>	47
Venezuela	0.85	63.3	74
Kuwait	0.68	96.5	142
United Arab Emirates	0.80	56.2	70
Libya	0.50	22.8	46
Nigeria	0.69	17.9	26
Indonesia	0.48	5.8	12
Algeria	0.27	9.2	34
Qatar	0.16	3.8	24
Former Soviet Union total	2.87	55.4	19
Russia	2.55	49.0	19
Kazakhstan	0.18	3.3	18
Azerbaijan	0.08	1.3	16
Turkmenistan	0.04	1.5	38
Uzbekistan	0.02	0.3	15
Others total	8.84	135.1	15
United States	2.52	23.7	9
Mexico	0.97	27.4	28
China	1.06	24.0	23
Canada	0.61	5.1	8
Norway	0.82	9.3	11
United Kingdom	0.68	4.6	7
Egypt	0.33	6.3	19
Brazil	0.23	3.6	16
India	0.19	5.9	31
Oman	0.28	4.7	17
Malaysia	0.23	4.3	19
Australia	0.19	1.6	8
Colombia	0.16	1.9	12
Romania	0.05	1.6	32
Tunisia	0.04	1.7	43
Yemen	0.08	4.0	50
Ecuador	0.12	2.0	17
Angola	0.18	1.5	8
Brunei	0.06	1.4	23
Trinidad	0.04	0.5	12
Grand total	20.61	827.2	43

<sup>a</sup>R/P = reserves-to-production ratio (proven reserves divided by current production).

<sup>b</sup>OPEC = Organization of the Petroleum Exporting Countries.

<sup>c</sup>Iraqi production is constrained since 1991 by United Nations sanctions.

<sup>d</sup>The Iranian Oil Ministry puts the figure at 93 billion barrels.

Source: Compiled by the author from various sources including *Geopolitics of Energy*, July 1993 and July 1994; Energy Security Analysis, Inc. (ESAI), *Oil at the Turn of the Century*, *ESAI's Long-Term Outlook on the World Oil Market: 1993-2003* (Washington, D.C.: ESAI, 1994), p. 9; *Oil and Gas Journal*, July 11, 1994.

Figure 7  
 PROVEN OIL RESERVES DISTRIBUTION OF THE ORGANIZATION OF THE  
 PETROLEUM EXPORTING COUNTRIES (OPEC), 1993  
 (in percent)

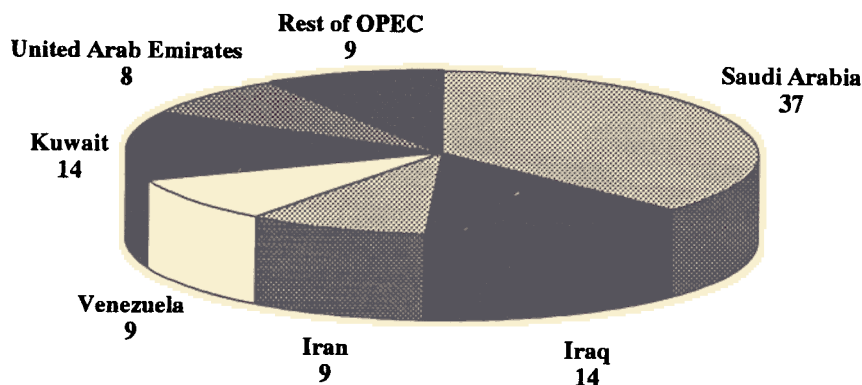


Table 6  
 ORGANIZATION OF THE PETROLEUM EXPORTING COUNTRIES (OPEC)  
 PRODUCTION CAPACITY, 1994-2010  
 (in million barrels per day)

Country	1994	1998	2003	2010 <sup>a</sup>	Spare Capacity 1994
Iran	3.80	4.50	4.80	4.50	0.30
Iraq	0.60	1.50	3.50	5.50	0.05
Kuwait	20.75	2.75	3.10	3.50	0.75
Qatar	0.45	0.45	0.45	0.60	0.06
Saudi Arabia	9.60	10.50	12.00	12.00	1.60
United Arab Emirates	2.50	2.60	2.60	3.50	0.33
Algeria	0.80	0.90	0.90	1.00	0.05
Gabon	0.32	0.35	0.35	0.40	0
Libya	1.40	1.60	1.50	2.00	0.03
Nigeria	2.10	2.20	2.20	2.50	0.15
Venezuela	3.10	3.40	4.00	3.50	0.65
Indonesia	1.35	1.30	1.10	1.00	0.03
Total OPEC	28.77	29.30	36.50	40.00	4.00
Total world	-	-	-	-	4.30

<sup>a</sup>Data in this column may not be comparable to the rest of the table given different assumptions for the projections.

Sources: Energy Security Analysis, Inc. (ESAI), *Oil at the Turn of the Century*, *ESAI's Long-Term Outlook on the World Oil Market: 1993-2003* (Washington, D.C.: ESAI, 1994), and B. Tippee, "Questions Cloud Outlook for Oil Production Capacity Growth in the Middle East," *Oil and Gas Journal*, July 11, 1994, p. 35.

Figure 8

PRODUCTION DISTRIBUTION OF THE ORGANIZATION OF THE PETROLEUM EXPORTING COUNTRIES (OPEC), 1993  
(in percent)

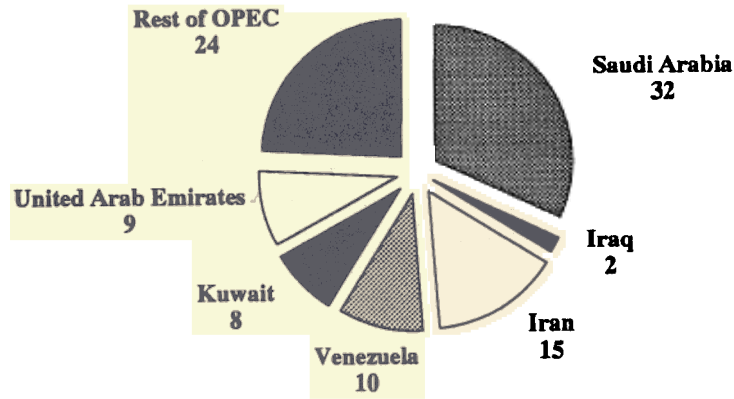
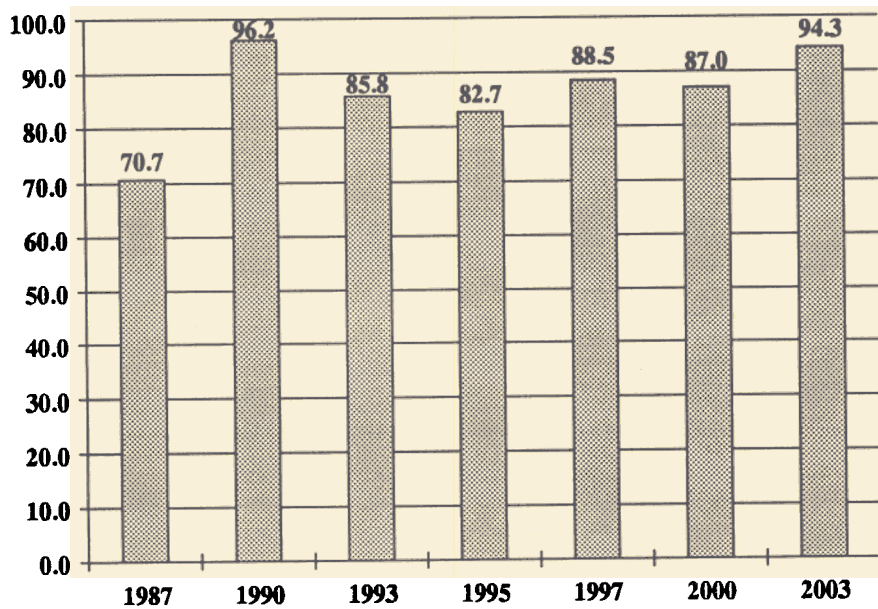


Figure 9

UTILIZATION OF CAPACITY OF THE ORGANIZATION OF THE PETROLEUM EXPORTING COUNTRIES (OPEC), 1987-2003  
(in percent)





woes that, besides Iraq, are the worst in the region. Iran's gas injection program could increase capacity to 5 million b/d before 2000, but new investment has to come from foreign sources as the country's debt burden is substantial at present. Venezuela has huge reserves and can expand capacity if economic conditions allow. The country is likely to increase capacity to 4.5 million b/d by the end of the century. Kuwait has restored production to over 2 million b/d and has great potential for expansion. The country is expected to increase output beyond its prewar level by around 1997. Several other OPEC producers, such as Libya and Nigeria, can eke out more crude, but those increases will be relatively modest given capital shortages.

The only other significant capacity expansion will be the return of Iraq to the market. Iraq has the potential to increase supply gradually to over 3 million b/d by 2000, if United Nations sanctions are lifted and necessary repairs are made to the infrastructure. However, Iraq's return to prewar levels will be slowed because of the unwillingness of the United Nations to lift the embargo entirely or swiftly, largely because of U.S. policy. Export point constraints in the Gulf and the pipelines through Kurdish/Turkish territories and through Saudi Arabia will further hinder Iraq's recovery. While export capacity in the Gulf is presently limited to 1 million b/d, the pipelines are either in need of repair or vulnerable to political pressures. Saudi Arabia, in particular wanted Iraq to accept Kuwait's sovereignty, a demand Iraq has satisfied. Saudi Arabia and Kuwait also want to see Iraq's capacity for renewed aggression blunted, a demand that is difficult to achieve from a long-term perspective. In short, the pace of Iraq's return will depend on the interplay of decisions by Saddam Hussein, the U.N. Security Council, the U.S. government, the Gulf producers, Turkey, Saudi Arabia, and perhaps even the Kurds in northern Iraq.

While important, these capacity expansions are not enough to place a lid on prices as we approach the next century. The need for additional capacity expansion likely will assert itself strongly in the final years of the 1990s (table 7). The required long-term capacity has to be in place well before 2005 if world demand for oil is to be satisfied and oil prices are to stabilize after 2005. Will OPEC respond to this call for additional capacity expansion? Because of OPEC members' current financial constraints and other priority expenditures, it is hard to see how they can afford or justify investment in spare capacity now or in the foreseeable future. A scrupulous study of OPEC will indicate that most members in the past have shown little inclination to generate grassroots capacity for standby purposes. The huge spare capacity of the 1980s was not planned but spontaneous; it will most probably not occur again or at least not in such magnitude.

Capacity expansion to the level needed for the satisfaction of effective demand will also face serious challenges. Above all, there is the problem of uncertainty about world oil demand and projection of the call on OPEC oil by 2010. Various forecasts give radically different figures and the range of this difference have



Table 7

CONTROL OF PRODUCTION BY GOVERNMENTS OF THE ORGANIZATION OF  
THE PETROLEUM EXPORTING COUNTRIES (OPEC), RANK BASED ON  
PRODUCTION OWNERSHIP, 1992

Rank	Country	Ownership of Operating Company (%)	Ownership of Production (%)	Volume of Production (thousand barrels per day)
12	Indonesia	33.3	6.1	82
11	Gabon	25.0	25.0	74
10	United Arab Emirates	36.3	48.9	1,113
9	Nigeria	62.2	59.9	1,139
8	Libya	56.3	74.5	1,110
7	Kuwait	60.0	85.8	768
6	Saudi Arabia	40.0	98.0	8,072
5	Algeria	53.6	99.2	779
4	Venezuela	100.0	100.0	2,235
3	Iraq	100.0	100.0	450
2	Iran	100.0	100.0	3,412
1	Qatar	100.0	100.0	379

Source: Organization of the Petroleum Exporting Countries (OPEC), *Annual Statistical Bulletin* (Vienna: OPEC, 1992).

increased over time. Thus, the call on OPEC crude in 1995 was projected to range between 24.9 million b/d and 25.9 million b/d; the corresponding figures for 2010 are 29.1 million b/d and 45.4 million b/d. Assuming that the IEA outlook is more accurate, then OPEC's production capacity must expand to about 46.7 million b/d (CC)/49.4 million b/d (EC) (that is, 58.2 percent over the 1993 level) for prices to remain within the projected range and for a slight excess capacity to cover unforeseen circumstances. Yet, OPEC views the higher projections of demand for its oil with suspicion as its market share has declined over the last 15 years, from slightly below 50 percent in 1979 to a little over 40 percent in 1994.

Next is the problem of price uncertainty. Should OPEC plan expansion on the basis of price forecasts offered by the IEA capacity constraints case and other price optimists (\$28 by 2005) or should it listen to price pessimists who insist current prices will fall to about \$15 a barrel around the year 2000? Again, the discrepancy is so great that it could leave even the most ardent advocates of OPEC capacity expansion in a state of indecision. There is another fact: although the current real price of oil in U.S. dollars stands at less than 30 percent of the

1980 level, the non-OPEC producers (excluding the United States and FSU) have continued to increase output. These producers may be basing their decisions on noneconomic motives, including national security, domestic politics, and nationalism. In particular, North Sea production has doubled since the early 1980s, despite sluggish price and increasing cost of production.

Another issue constraining OPEC's capability to meet the future demand is access to sophisticated exploration and production techniques. As current expansion projects focus on development drilling in existing fields or operationalization of fields already discovered, the required capacity expansion in the 2000 to 2010 decade must come from new fields that will have much higher technological and financial requirements. The technology, of course, exists; the problem is financing its purchase, transfer, and operation. According to Dr. Subroto, the former Secretary General of OPEC, some \$500 billion will be needed for investment in the worldwide oil industry by the year 2000; OPEC alone will need \$100 billion if it is to raise its current capacity of about 28 million b/d to 35 million b/d by the year 2000.<sup>17</sup> In 1994, OPEC members were only spending an estimated \$5 billion to \$6 billion a year.

OPEC economies, while remaining largely dependent on oil revenue, have been experiencing a significant decline in their per-capita oil revenue in recent years. In particular, with an oil revenue of \$276 billion in 1981, OPEC members enjoyed a per-capita oil income of approximately \$803 (or \$1,300 in 1994 dollars). By 1994, OPEC's oil income had dropped to about \$140 billion, while its aggregate population had increased to more than 480 million from 344 million in 1981, resulting in a per-capita oil income of about \$290 (table 8 and figure 10). Meanwhile, these countries face huge budget and trade deficits and urgently need to finance projects that result in immediate economic growth. OPEC also requires money for upgrading the oil industry's infrastructure and investing in domestic downstream oil projects to satisfy the rising internal energy consumption.

In addition, the growing and young population of OPEC members, affluent only a few years ago and with a rising expectations, suddenly faces financial hardships and diminished future prospects. Consequently, OPEC governments have found themselves hard pressed to meet public satisfaction in continued social spending. Under these conditions and with stagnant or declining oil revenues (in real terms), the fiscal challenges for OPEC members may grow in the foreseeable future. Unless alternative financing schemes are devised, the financial crisis of the states could translate into a level of domestic agitation, with serious repercussions for the world oil markets.

Political aspects aside, it may be difficult for some OPEC members to generate sufficient capital on their own to make the necessary and timely investments in upstream expansion projects. For example, in 1994 Saudi Arabia postponed planned developments of fields in Abu Hadriya and Khurais. This capital shortage might be mitigated if foreign oil companies return to OPEC members with

Table 8

OUTLOOK FOR PER-CAPITA OIL REVENUE OF THE ORGANIZATION OF THE PETROLEUM EXPORTING COUNTRIES (OPEC), 1980-2010  
(in 1992 dollars)

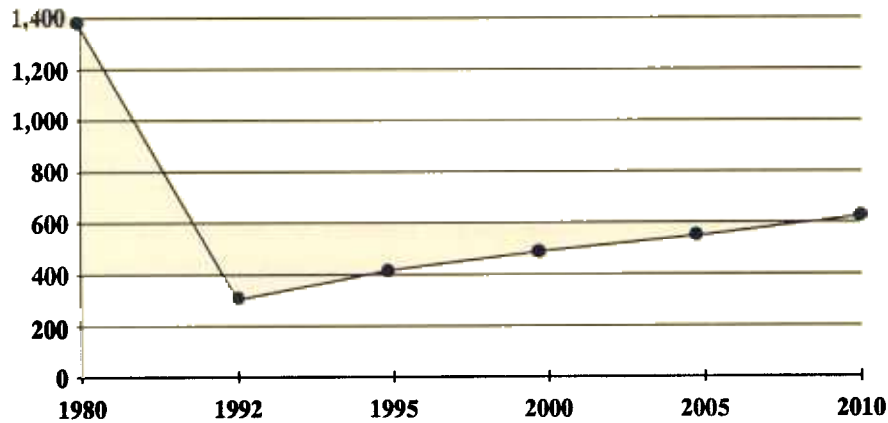
	Assumed Price (\$15/barrel)		Assumed Price (\$20/barrel)	
	Population Growth (1.8%/year)		Population Growth (1.5%/year)	
	Low Demand	High Demand	Low Demand	High Demand
1980 <sup>a</sup>	1,364	1,364	1,364	1,364
1992	304	304	304	304
1995	288	311	387	418
2000	290	360	395	492
2005	245	398	340	552
2010	257	443	362	623

<sup>a</sup>Actual.

Source: B. Tippee, "Questions Cloud Outlook for Oil Production Capacity Growth in the Middle East," *Oil and Gas Journal*, July 11, 1994, p. 36.

Figure 10

OUTLOOK FOR PER-CAPITA OIL REVENUE OF THE ORGANIZATION OF THE PETROLEUM EXPORTING COUNTRIES (OPEC), 1980-2010<sup>a</sup>  
(in 1992 dollars)



<sup>a</sup>Based on assumed price of \$20 per barrel, population growth rate of 1.5 percent per year, and high demand for OPEC oil.

investment and technology. The same oil companies that initially developed OPEC oil production and many new firms seem poised to become heavily involved in required expansion projects. U.S. oil companies, even those traditionally focused on domestic operations, are now eager to make significant investments in overseas upstream and downstream projects. Many have already made commitments in the Middle East, the FSU, and China. For a more certain supply condition, however, investments in upstream projects eventually must increase, including in Iran and Iraq.

The psychology behind nationalization is also changing for both OPEC governments and international oil companies; the former see it now in a less favorable light than in the 1960s and 1970s, while the latter are increasingly less hostile to the idea of host government control of output. As a result, most oil analysts expect the gradual removal of obstacles to foreign investment in OPEC members. Already, a number of joint ventures have been formed in downstream projects. The trend is further encouraged by the prevalence of privatization and free market ideas in countries with major oil reserves. While the 1980s and the early years of the 1990s were characterized by the vertical integration of the national oil companies of the producing countries, the late 1990s and the early part of the next century may focus on horizontal integration of major and smaller oil companies moving back into OPEC's upstream. For the first time in the past 16 years, Iran is welcoming large-scale foreign participation in harnessing its untapped or undertapped reserves (table 9).

If appropriate formulas are found for foreign oil companies' equity participation, capital constraints could be significantly mitigated. Current trends indicate that joint ventures between foreign and national oil companies might become increasingly popular in upstream projects. Venezuela has begun to change its policy of foreign investment in oil output. In early 1994, the Venezuelan Congress debated a new proposal for a production-sharing contract that would govern the participation of foreign firms in the production of Venezuelan oil. Other OPEC members ripe for increased foreign investment include Qatar, Algeria, and Iran. Iran now allows foreign participation in major downstream projects, including petrochemicals, and may privatize gasoline stations in preparation for further similar initiatives in refining and upstream projects.<sup>18</sup> In 1995, Iran granted a billion-dollar offshore production contract to Conoco, but the company withdrew from the deal under pressure from the Clinton Administration, which subsequently banned all investment and trade between U.S. firms and Iran.<sup>19</sup>

Yet, constraints on foreign investments remain and in most cases are institutionalized in nationalistic laws or political cultures; it could take years, in some countries, to change them. For example, while Kuwait does have some joint ventures now, in 1995 the Kuwaiti Supreme Oil Council rejected any revenue-sharing arrangement with foreign oil companies. As economic sanctions against Iran, Iraq, and Libya indicate, such constraints are far from one-sided; the United

Table 9

## PRODUCERS' DOWNSTREAM INTEGRATION

Country	Activity	Company	Region
Kuwait	Acquisition	Gulf Oil, Ultramar	Europe, U.S.
Venezuela	Joint venture	Veba, Nynas, Citgo, Champlin	Europe, U.S.
Saudi Arabia	Joint venture	Texaco	U.S.
Libya	Joint venture	Tamoil, Hollborn	Europe
Nigeria	Contract	Arco, Sun, Mapco, Petromed, ERT	Europe, U.S.
Abu Dhabi	Joint venture	Cespa	Europe

Source: M. Saleh Shaikh Ali, "Need for Refining Capacity Creates Opportunities for Producers in Middle East," *Oil and Gas Journal*, July 11, 1994, p. 38.

States has been increasingly using the oil weapon against Middle Eastern producers in an attempt to extract political concessions. Ironically, however, the political agenda puts pressure on future oil prices, making prospective investors even more determined to seek investment deals in Gulf oil fields. Moreover, the ever-rising number of environmental regulations and taxes in the major consuming markets creates future volume and price uncertainty for the producing countries and oil companies. This uncertainty not only adds to the upstream investment risks, but further drains the capital flow needed to generate new production capacity. Moreover, a number of OPEC producers are not immune to political uncertainties including certain Islamic movements. Finally, the current Arab-Israeli peace process is a welcome development, but it remains vulnerable to grassroots opposition as was demonstrated by the assassination of Israeli Prime Minister Yitzhak Rabin in November 1995. Thus far, the process largely has been restricted to reconciling differences among political leaders; for a lasting peace, a more comprehensive approach needs to be introduced gradually.

### *Geopolitics of Middle East Oil*

Political stability and international political influences are critical for the success of capacity expansion within OPEC. In turn, oil has affected domestic politics and the world order in many ways. Oil politics has, indeed, been responsible for several wars, colonial rivalry and domination, and various foreign policy doctrines. Until the second World War, oil maintained its strategic importance for the military sector, particularly in the West. With the development of ballistic missiles and nuclear weapons in the Cold War period, oil became increasingly

strategic for economic development. With rising oil demand, especially in East Asia, new challenges face OPEC and the Gulf producers. China is among the countries certain to become increasingly dependent on the Gulf, and India will be on the list very soon. The West's preoccupation with international politics around the Gulf and political stability in major oil-producing nations is thus understandable.

Judgment as to present and future sources and volumes of oil production is at the heart of oil geopolitics. Over the next 50 to 100 years, oil-importing countries will increasingly buy their oil from the largest producers, predominantly in the Gulf region (tables 4 and 10). Although in the past 15 years competition and market forces have played a significant role in the oil trade, the future producers will, as in the past, seek political alliances with buyer governments to increase price stability and revenue predictability. Some will also seek to influence prices by other means, including cartel actions, particularly if the membership in OPEC drops (Ecuador has left and Gabon is expected to leave in 1996). Most OPEC producers, however, need to worry about political and economic stability. If they undergo political change, the West will want to control that change. For the West, political stability is most important in the Arabian peninsula states. In Algeria, Libya, Iran, Iraq, and Indonesia, political conditions remain volatile and highly uncertain as to possible ideological orientation.

Beyond that, it is hard to measure the potential impact of political instability on the flow of oil. When the 1979 Islamic Revolution toppled the Shah of Iran, the country turned inward, closing its remarkable resources to foreign investment. Some 16 years later, Iran is inviting the Western press and oil analysts to periodic demonstrations of their growing ability to produce. Moreover, foreign investment in offshore production is already in progress, and Tehran's willingness to allow U.S. firms to participate was demonstrated by the aborted Conoco deal. Meanwhile, the government is propagating a theory of consumer-producer cooperation in the world oil market and has made every attempt to reintegrate Iran's oil sector into world energy markets.<sup>20</sup> Whether a similar Islamic revolution could take place elsewhere in OPEC members is doubtful. But even if it were to happen, it is very improbable that the affected oil would be taken off the market for long. If the Iranian experience is any indication, the dependence on oil revenue and on Western markets for most of their basic needs would force the leadership in OPEC states to quickly return to oil export markets. This brings us to the sensitive and widely misunderstood question of "the Islamic threat" to the political stability and the West's oil interests in the Middle East.

The perceived "Islamic threat" is, in fact, rooted in a set of objective and subjective factors that include both real and imaginary sources.<sup>21</sup> The fictitious side of this perceived threat is largely a product of certain media misconceptions and pundits who explain the present-day tension between the Western and Muslim worlds as partly reflecting an alleged classical Islamic view that regards the two

Table 10

## SUSTAINABILITY OF CURRENT OIL PRODUCTION

Next 10 Years	Next 50 Years	Next 100 Years	Longer
United States	Brazil	Azerbaijan	Turkmenistan
Canada	Russia	Yemen	Uzbekistan
United Kingdom	Malaysia	Mexico	Kazakhstan
Australia	Qatar <sup>a</sup>	Iran <sup>a</sup>	Venezuela <sup>a</sup>
Angola	Algeria <sup>a</sup>	World <sup>b</sup>	Saudi Arabia <sup>a</sup>
Indonesia <sup>a</sup>	Nigeria <sup>a</sup>		United Arab Emirates <sup>a</sup>
Colombia	India		Iraq <sup>a</sup>
Egypt	China		Tunisia
Argentina	Ukraine		Kuwait <sup>a</sup>
Norway	Libya <sup>a</sup>		
Ecuador	Brunei		
Oman	Romania		

<sup>a</sup>Members of the Organization of the Petroleum Exporting Countries.

<sup>b</sup>Aggregate sustainability of total current world production, assuming continuous efficient production.

Source: M. A. Conant, "Geopolitics of Oil," *Geopolitics of Energy*, July 1, 1994, p. 3.

as inherently inimical. One must not, however, underestimate the significance of an objective basis for the West's concern about current Islamic movements in the Middle East in the post-Cold War era: access to oil and maintenance of stability.

Some three-fourths of the world's oil reserves are located in the Muslim world, where the majority of the population has become poorer and lives in a state of spiritual unrest. Some two-thirds of these reserves are in the Gulf region, where regimes face problems ranging from economic malaise to political instability. The Gulf reserves will last from 50 to 150 years—the longest among the known world oil reserves—and cost the least to produce. As the analysis here has shown, the West will continue to depend on this oil for decades to come for a significant portion of its energy needs, making the importing economies potentially vulnerable to disruptions in the supply from the region.

Yet, the West's dependency on the flow of oil from Muslim countries must be viewed in relation to an equally critical dependency of the Muslim producers on oil-generated revenues and on the Western markets for many years to come. Almost all petroleum-exporting states face tremendous economic challenges and many depend on oil revenue for 90 percent or more of their foreign-exchange earnings. Oil revenue is needed to pay for a ballooning imports bill for food, industrial inputs, military purchases, and debt servicing among other foreign obligations. From the more affluent Saudi Arabia and other Arab Gulf states to the

poorer Egypt and Algeria, the war-devastated Iran and Iraq, and to the more radical Libya, this dependency on oil revenue is such that it is impossible for any of these states—even if they were to fall in the hands of so-called Islamic radicals as in Iran—to use oil as a weapon against the West. Ironically, it is now the United States that is using oil as a political weapon, a policy that is evident in its economic embargoes against Iraq, Iran, and Libya.

A closer look at the geographic distribution of Muslim oil reserves shows that there is even less cause for concern on the part of the West. In general, countries in which Islamic movements are strong or radical are also those whose oil production is not critical for the West, such as Egypt, Turkey, Lebanon, Jordan, and the Sudan. In contrast, in the Muslim nations whose oil output is critical for the West, Islamic movements are either weak or follow a moderate ideology, e.g., Saudi Arabia and other, smaller Arab Gulf states. Algeria remains a boiling pot, and it could see radicalism of historic proportion under certain scenarios. Libya is largely neutralized; Iraq is devastated and lives in uncertainty; Syria is becoming increasingly moderate; and Iran is playing a waiting game while the struggle among various political factions continues.

Although no single Muslim state can challenge the West's access to oil, as was well demonstrated during the crisis of Iraq's invasion of Kuwait, the prevailing conditions make the formation of a common Islamic front even more unlikely. Significant differences exist among Persians, Arabs, and Turks or between Shiites and Sunnis. Ideological rivalries among Saudi Arabia, Iran, and Iraq have prevented a unified stance within OPEC that might have influenced oil prices upward; while each is in search of higher oil income, their political and security actions continue to restrain the linking of their otherwise common and long-term interests. None of these geopolitical aspects of world oil demand can be masked by market forces. Equally unlikely in the foreseeable future are such scenarios as external aggressive designs and a local dispute escalating into an open war. The Iraqi blunder here serves as a good lesson to any potential challenger. Thus, unless the political stability in the Middle East is disturbed drastically, the West need not be overly concerned about the Islamic oil threat.

The rub, of course, is that the unexpected can happen, and if it does, the West could experience some shocks in the medium term. From the perspective of oil security, Saudi Arabia is the key country for the West. Kuwait and other Arab Gulf states are also important to the West's well-being when military sales, the Arab-Israeli peace process, and other Western strategic interests are considered. These states are only somewhat vulnerable to the Islamic opposition and external pressures. In the long term, however, no serious threat will exist to the flow of reasonably priced oil to the industrialized nations. In general, Egypt and Turkey are even more important to Western security. Egypt's Islamic movement could become a trend-setter for the Arab world, while the movement in Turkey could influence Muslims in Central Asia.



From the West's perspective, therefore, preserving stability seems logical. However, the status quo is often cited as a source of radicalism and Islamic fundamentalism in the Middle East. While an Islamic alternative would not seem to serve Western interests, any "premature pressure," advises Bernard Lewis, will lead to destabilization, "not by democratic opposition, but by other forces that then proceed to establish a more ferocious and determined dictatorship."<sup>22</sup> Examples include Iran and the Sudan. What, then, does the West need to do? To go slow, to influence events at the margin, recommends Judith Miller.<sup>23</sup>

Given the U.S. foreign policy mindset at present, it is unlikely that the United States will pursue an initiatory path in the medium term but will continue to react to events. Accordingly, and given rivalries among key Gulf producers, the United States will perform as the region's policeman in the foreseeable future. Surprising to those who saw anti-communism as the driving force of all U.S. policy, the end of the Cold War did little to diminish U.S. interest in the stability of the Middle East. With the Soviet menace gone, the focus of U.S. foreign policy is the containment of unfriendly countries. Indeed, U.S. military involvement in the Middle East has been increasing in intensity since the end of the Cold War with the goal of support for Saudi Arabia, Kuwait, the United Arab Emirates, and Oman against regimes in control of Iraq and Iran. Desert Storm showed that so long as U.S. armed forces can be called upon as trouble-shooters, there is no reason to worry about oil dependency. However, the real question is whether this approach is sustainable over the long term.

### *Implications for International Cooperation*

World oil demand is rising and this leaves us in the "oil age" not "the beginning of the end of oil," as a 1990 article in *Fortune* claimed.<sup>24</sup> Yet in 1995, *Fortune* published an article that spoke of the "oil bonanza" and "glorious investment opportunities" in the oil sector.<sup>25</sup> Moreover, although world proven reserves continue to expand as technology develops, this does not automatically translate into increased production capacity.

Proven oil reserves now stand at an all-time high, yet the global utilization rate of available production capacity is close to 95 percent. There needs to be increased investment in the right places and with no substantial delay. The market has adjustment mechanisms and, at some point perhaps with long delay, higher oil prices will induce investors to take on major production projects. However, the time factor is critical because it usually takes about seven years to develop new fields. What makes the concern even more critical is the fact that the bulk of growth in world oil demand has to be met by output increases from OPEC, particularly from the Gulf. Because of financial limitations, it is difficult to believe that the OPEC governments can respond adequately to this call without

foreign investment, heavy borrowing, and technology transfer. With oil prices low in real terms, the mutual understanding and cooperation that is needed among major players in the world oil market may not develop automatically. A more conscious effort is needed, one that looks to the well-being of producers, consumers, and oil companies alike. The first requirement would be a complete change of attitude among these players, from a zero-sum game to one of mutual benefits. The emerging multipolar world could encourage this new approach by placing long-term mutual economic considerations above opportunistic political priorities or short-term, one-time economic gains.

To begin, the West's perception of OPEC as a menacing cartel needs greater reality. As one oil analyst has put it: "OPEC is currently the principal institutional factor keeping world oil prices at a high enough level to permit replacement of depleting reserves even in relatively high-cost areas, such as the U.S."<sup>26</sup> If the hypothetical marginal output cost were to set the price of oil, it would most likely be half the 1994 level, hardly profitable for many producers, particularly those outside OPEC. Because OPEC allows the least efficient producers to survive, it makes a "super-profit." Yet, this income is by no means unjustified given the growth effect of OPEC oil revenue on Western economies and the revenue requirements of OPEC members for capacity expansion, infrastructural projects, and welfare spending.

What is needed is a "reciprocal supply-demand security" system. The OPEC producers need "demand security," which means predictable and unimpeded access to stable markets at fair prices. Consuming governments should not attempt to limit this demand, and any indirect intervention in market demand (say, through targeted energy taxation) should be kept to a minimum. A major concern of OPEC members has been Western governments' attempts to impose an additional gasoline tax. In 1990, for example, average excise taxes levied on a barrel of oil in Western Europe was \$49 and \$39 in Japan. Net receipts from taxation of oil products in the West is higher than the export earnings of the oil-exporting countries. Such taxes can have a negative impact on OPEC oil demand. Other demand-limiting measures include export duties, energy conservation policy, investment in alternative fuels, and environmental regulations. Naturally, OPEC producers wish to see such measures handled with a rational and reasoned approach.

An even more troubling factor in producing-consuming countries' relations has been the uncertainty that the lack of "data transparency" causes. This is despite the fact that in recent times, data transparency has increased due to the growth of the futures market and telecommunication networks. In particular, consuming nations often fail to provide timely information on the size and composition of their demand or on the direction of their future energy policy. Building strategic reserves and maintaining secrecy about their size are also part of this communication problem. Oil companies and producing nations contribute as well to the

problem of uncertainty by withholding information about their operations and future plans. Here, closer cooperation between private oil companies in the West and national oil companies in producing nations can be helpful. The recognition of the growing interdependency between the upstream and downstream segments of the oil markets has become critical for maintaining demand security. This latter concern is being addressed increasingly in the debate for reintegration of international oil markets and the need for increased competition.

Demand security should result in a level of price stability and revenue predictability for OPEC governments.<sup>27</sup> While price should not just follow free market forces, revenue needs should reflect reasonable economic requirements and calculations. Saudi Arabia and Iran have moved from pressing for higher prices in return for a larger market share and more stable revenues. For example, Saudi Arabia no longer will accept the "swing producer" role and thus protect its market share, while Iran's entrance into the futures markets and attempts to eliminate intermediaries in favor of direct crude contracts with major oil companies are designed to result in revenue stability. To achieve the desired stability, OPEC members should cooperate among themselves and collaborate with market forces as well. This goal may seem elusive at present but may be "doable." If attained even minimally, it could help eliminate a degree of "spontaneous chaos" at the market place that usually results from competition between short-term and long-term interests of OPEC members. Iran and Saudi Arabia, the largest OPEC producers, would benefit from a modicum of coordination of their policies.

For the consuming nations to provide a level of demand security to the producers, they should receive an element of supply security in return. The concept requires OPEC to guarantee an adequate and steady flow of oil at reasonable prices to its consumers. The idea is already built into OPEC's charter and could be implemented. Data transparency about production and future plans is a major requirement as well. The OPEC states could also refrain from opportunistic moves designed to make very short-term gains in time of major crises. Maintaining an adequate cushion of spare capacity can go a long way to assure consumers of supply security and price stability at reasonable levels. Storing oil close to consumer markets is another means of achieving this objective. Investment in upstream projects is a critical measure for providing supply security to consuming countries and could also ease financing constraints on capacity expansion for OPEC.

Capacity expansion in OPEC will require foreign investment by the global industry. However, unless such investments produce a reasonable return to their investors and have guaranteed profit repatriation, they will not be made. While the rate may be established in competitive terms, the security matter is one that requires particular contractual relations. Oil companies are now asking for equity participation in largely nationalized industries. Some OPEC members have found ways to accommodate such demands in a politically safe manner. Joint ventures

are becoming more common and service contracts and production sharing are also popular. Under the latter arrangement, producing governments put up the oil fields as their contribution to the arrangement, yet maintain control and make reasonable revenues.

However, major obstacles remain. Constraints on foreign investments are institutionalized in most OPEC members, and in some cases it might take years to change them. Moreover, the ever-rising number of environmental regulations and taxes in the major consuming markets creates future uncertainty for the producing countries and oil companies. This uncertainty, difficult to avoid, not only adds to the upstream investment risks and cost but also drains the cash flow needed to generate new production capacity. Current concern with political instability in some OPEC governments has become an additional inhibiting factor. To mitigate this concern, efforts could be made to realize regional peace, controlled political change, and economic justice. Additional measures could include a role for the World Bank in securing foreign investment in OPEC oil similar to the role this organization plays in international borrowing by developing countries.

Gulf oil will remain strategic in the future, and the industrialized countries are expected to take measures necessary to control its flow and prices. Of particular concern is the increasing use of oil as a weapon by the United States, a trend that will be accentuated if the U.S. Congress were to insist on economic sanctions as a foreign policy tool. Therefore, the politics of oil policy will continue to be central in the future of the Gulf. As major producers, Iran and Saudi Arabia are bound to remain vulnerable to global oil politics, and the interstate aspect of the politics will play itself out within OPEC.

#### NOTES

<sup>1</sup>C. H. Tahmassebi, "World Oil Markets: The Long-Term Outlook and Implications for OPEC," *Middle East Executive Reports*, June 1994, pp. 9, 18-21, and Richard S. Teitelbaum, "Your Last Big Play in Oil," *Fortune*, October 1995, pp. 88-104.

<sup>2</sup>Richard S. Teitelbaum, op. cit.

<sup>3</sup>*The Energy Journal*, special issue on "The Changing World Petroleum Market," 1994, and C. H. Tahmassebi, "World Oil Markets: The Long-Term Outlook and Implications for OPEC."

<sup>4</sup>Organization for Economic Cooperation and Development (OECD), International Energy Agency (IEA), *World Energy Outlook* (Paris: OECD, 1994 and 1995); Energy Security Analysis, Inc. (ESAI), *Oil at the Turn of the Century, ESAI's Long-Term Outlook on the World Oil Market: 1993-2003* (Washington, D.C.: ESAI, 1994); M. A. Conant, "Geopolitics of Oil," *Geopolitics of Energy*, July 1994, pp. 1-8; Peter Nutly, "The Beginning of the End for Oil," *Fortune*, September 10, 1990, p. 35.

<sup>5</sup>Patrick E. Tyler, "China Is Planning a People's Car," *New York Times*, September 22, 1994, pp. D1 and D8.

<sup>6</sup>Richard S. Teitelbaum, op. cit.

<sup>7</sup>Charles Ober of T. Towe Price as quoted in Richard S. Teitelbaum, op. cit.

<sup>8</sup>J. H. Lichtblau, "Forecasting Oil Trends: Best-Guesses to 2010," *Middle East Executive Reports*, November 1993, pp. 9 and 20-24.

<sup>9</sup>Richard S. Teitelbaum, op. cit., uses predictions by many industry leaders and energy analysts who conclude that oil prices could reach \$30 a barrel by the year 2000 and even higher by 2010 when world oil demand approaches 95 million b/d.

<sup>10</sup>Energy Security Analysis, Inc., op. cit. Another price pessimist is the American Petroleum Institute; see Richard S. Teitelbaum, op. cit.

<sup>11</sup>Cyrus Bina, "The Internationalization of the Oil Industry: Simple Oil Shocks or Structural Crisis?" *Review*, vol. 11, no. 3 (1988), pp. 329-70.

<sup>12</sup>Ken Hersh in Richard S. Teitelbaum, op. cit., p. 104.

<sup>13</sup>Organization for Economic Cooperation and Development, International Energy Agency, *World Energy Outlook* (1994), p. 20.

<sup>14</sup>C. H. Tahmassebi, "World Oil Markets: The Long-Term Outlook and Implications for OPEC."

<sup>15</sup>*Ibid.*

<sup>16</sup>Ken Hersh in Richard S. Teitelbaum, op. cit., p. 104.

<sup>17</sup>C. H. Tahmassebi, *The Changing Structure of World Oil Markets and OPEC's Financial Needs*, Occasional paper no. 24 (Boulder, Colorado: International Research Center for Energy and Economic Development, 1995).

<sup>18</sup>Islamic Republic of Iran, Plan and Budget Organization, *Second Five-Year Plan of the Islamic Republic of Iran* (Tehran, 1993).

<sup>19</sup>Hooshang Amirahmadi, "U.S. Ban Not Popular among Allies," *Iran Business Monitor*, vol. 4, no. 7 (1995), p. 3 and "U.S.-Iran Relations: Implications for Iran's Oil Policy," *Middle East Insight*, vol. 11, no. 5 (1995), pp. 94-96.

<sup>20</sup>Hooshang Amirahmadi, "The Political Economy of Iran's Oil Policy," in *Oil in the New World Order*, eds. Kate Gillespie and Clement M. Henry (Gainesville, Florida: University Press of Florida, 1995), pp. 185-226.

<sup>21</sup>Hooshang Amirahmadi, "Terrorist Nation or Scapegoat? Taking a Close Look at Iran and the Islamic Threat," *Middle East Insight*, September-October 1994, pp. 23-29.

<sup>22</sup>Bernard Lewis quoted in Judith Miller, "The Challenge of Radical Islam," *Foreign Affairs*, spring 1993, p. 52.

<sup>23</sup>Judith Miller, *op. cit.*, p. 53.

<sup>24</sup>Peter Nutly, *op. cit.*, p. 35.

<sup>25</sup>Richard S. Teitelbaum, *op. cit.*

<sup>26</sup>J. H. Lichtblau, *op. cit.*

<sup>27</sup>Hisham Nazer, "The Need for Stability and Predictability in the Oil Market," *Middle East Economic Survey*, February 20, 1989.

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