

## **THE STATE OF ENERGY IN THE OIC MEMBER COUNTRIES**

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This paper first examines the trends in primary energy production and consumption in the OIC member countries between 1980 and 2000 and compares them with those observed in the world and in geographical regions. Next, it takes a detailed look at the reserves, production, consumption and trade of fossil fuels (coal, oil and gas) and renewables (hydropower and biomass) in the OIC member countries during this period. It then examines the trends in electricity and the share of energy sources in its generation. Finally, it examines the relation between energy and the environment in those countries, making use of data on carbon dioxide emissions and energy efficiency.

### **1. INTRODUCTION**

Energy is commonly defined as the ability to do work. Needless to say, a country's growth and development rest on its ability to do work. There is a close relationship between the supply of and demand for energy sources on the one hand and economic growth on the other.

This paper first examines the trends in energy production and consumption in the OIC member countries and compares them with those observed in the world and in geographical groupings. It then takes a closer look at each of the main sources of energy in those countries. The first related sub-section deals with fossil fuels, while the following one deals with renewables. Specifically, these two sub-sections examine how the reserves, production, consumption and trade of the energy sources of the OIC member countries compare to the rest of the world and how the trends have changed over the last two decades. World oil market and oil price developments from 1970 onwards are also examined, as oil prices play a crucial role in the world economy.

Next, in section four, the paper examines the role of energy sources in electricity generation, which is the most important product of

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commercial energy. The last section examines energy efficiency indicators and carbon dioxide emission data to assess the impact of energy sources on the environment.

The data used in this paper are, in general, based on the energy statistics obtained from the Energy Information Administration website and the *World Development Indicators 2002* publication of the World Bank. For a better analysis of their performances, the paper divides the OIC member countries into four groups.

The first group, called the OIC-LDC group, includes the member countries of the OIC which are designated as least-developed countries by the United Nations. These countries are Afghanistan, Bangladesh, Benin, Burkina Faso, Chad, Comoros, Djibouti, Gambia, Guinea, Guinea-Bissau, Maldives, Mali, Mauritania, Mozambique, Niger, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda and Yemen.

The second group includes, generally, the middle-income OIC countries and will be referred to as the OIC-MIC group. These are Cameroon, Côte d'Ivoire, Egypt, Guyana, Indonesia, Jordan, Lebanon, Malaysia, Morocco, Pakistan, Surinam, Syria, Tunisia and Turkey.

The third group comprises the oil-exporting members of the OIC, which will be called the OIC-OEC countries throughout the paper. These countries are Algeria, Bahrain, Brunei, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

The final group comprises the member countries in transition. This group, referred to as OIC-TC within the paper, is made up of Albania, Azerbaijan, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan.

## **2. PRIMARY ENERGY PRODUCTION AND CONSUMPTION**

This section makes use of the concept of "primary energy", which is all energy consumed by end users excluding electricity but including the energy consumed at electric utilities to generate electricity. In other words, primary energy is energy used directly without undergoing intermediate processes such as refining. On the other hand, secondary

energy refers to energy produced from materials that have undergone transformation from other energy products. For example, a thermal power station produces energy (secondary energy) using coal (primary energy). Similarly, petroleum products are acquired from crude oil.

## 2.1. Energy Production

Table 1 summarises the primary energy production data given in Table A.1 in the Annex by showing the shares of the OIC country groupings in the OIC total, the share of the OIC group in the world total, and the related growth rates.

In 1980, the OIC as a whole produced 23.2 percent of the primary energy in the world. During 1980-1990, OIC consistency in style production increased by 1.2 percent per annum compared to 2.0 percent per annum in the world. As a result, in 1990, the share of the OIC in world energy production fell to 21.4 percent. However, during the 1990s, OIC consistency in style energy production grew by 2.7 percent per annum as compared to an increase of 1.2 percent per annum in the world. In 2000, the OIC's energy production formed 24.9 percent of the world total.

**Table 1. Primary Energy Production, 1980-2000**

	Shares (in percentages)			Growth Rates (Annual Average, %)	
	1980	1990	2000	1980-1990	1990-2000
OIC-LDC	0.4	1.0	1.8	9.7	9.2
OIC-MIC	12.0	17.2	18.0	5.0	3.2
OIC-OEC	81.0	69.8	71.6	-0.3	3.0
OIC-TC	6.6	12.0	8.7	7.4	-0.6
OIC Total	100.0	100.0	100.0	1.2	2.7
% of world	23.2	21.4	24.9		
World				2.0	1.2

Source: Calculated using Table A.1 in the Annex.

Within the OIC, the OIC-OEC group dominated the OIC energy production, forming 71.6 percent of the total in 2000. The OIC-MIC group produced 18 percent of the OIC's energy production in 2000. Thus, the OIC-OEC and the OIC-MIC groups together accounted for nearly 90 percent of the total energy production of the OIC in the same year. On the other hand, the OIC-LDC group was able to produce only

1.8 percent of the total energy production.

Saudi Arabia is the largest energy producing country within the OIC. In 2000, the country witnessed only a slight fall in its production in comparison to 1980, while most other OIC member countries experienced increases. As a result, Saudi Arabia's share in the total OIC production fell from 33.4 percent in 1980 to 21.3 percent in 2000 (Table A.1). The next two largest OIC energy producers in 2000 were Iran and Indonesia. In 2000, both countries produced 10.5 and 7.7 percent of the OIC total, respectively (Table A.1).

## 2.2. Energy Consumption

Table 2 summarises the primary energy consumption data given in Table A.1 in the Annex by showing the shares of the OIC sub-groups in the OIC total, the share of the OIC group in the world total, and the consumption growth rates.

The energy consumption growth rates of both the OIC and the world were lower during the 1990s than during the 1980s. The average growth rate in the world fell from 2.1 to 1.3 percent per annum, while the OIC growth rate fell from 5.8 to 2.8 percent per annum during the two decades.

In 2000, the share of OIC energy consumption in the world total was 9.7 percent, in comparison to 5.8 percent in 1980.

**Table 2. Primary Energy Consumption, 1980-2000**

	Shares (in percentages)			Growth Rates (Annual Average, %)	
	1980	1990	2000	1980-1990	1990-2000
OIC-LDC	3.9	2.8	2.7	2.2	2.7
OIC-MIC	29.3	31.9	39.2	6.8	4.9
OIC-OEC	40.1	41.5	44.7	6.2	3.5
OIC-TC	26.7	23.8	13.4	4.6	-3.0
OIC Total	100.0	100.0	100.0	5.8	2.8
% of world	5.8	8.4	9.7		
World				2.1	1.3

Source: Calculated using Table A.1 in the Annex.

In 2000, the largest energy consuming OIC member countries were Iran (4716.3 trillion British thermal units [BTU]<sup>1</sup>), Saudi Arabia (4567.0), Indonesia (3854.8), Turkey (3203.4), Egypt (2036.6), Uzbekistan (1922.4), Pakistan (1914.2), Malaysia (1855.5), Kazakhstan (1786.7), and the United Arab Emirates (1736.2) (Table A.1).

Table 3 introduces the per capita primary energy consumption to account for the differences in size among the groups. It can be seen that the OIC group's average per capita consumption was relatively lower compared to most country groupings and the world as a whole in the last two decades. However, the OIC group witnessed a growth rate of 1.9 percent per annum in this period, which was substantially higher than the world average of 0.1 percent per annum and the third highest growth rate among the groups examined (Table 3).

**Table 3. Per Capita Energy Consumption (Million BTU)**

	1980	1990	2000	Growth Rate 1980-2000
OIC-LDC	3.1	3.1	3.1	0.0
OIC-MIC	12.5	18.8	24.9	3.5
OIC-OEC	39.6	57.5	64.0	2.4
OIC-TC	88.6	114.2	76.4	-0.7
OIC	20.4	28.4	30.0	1.9
World Total	64.3	66.5	65.4	0.1
Africa	14.2	16.9	14.8	0.2
Far East and Oceania	20.0	25.4	31.4	2.3
Central and South America	39.4	40.7	50.4	1.2
E. Europe & Former USSR	170.0	190.3	131.6	-1.3
Middle East	63.6	85.5	101.8	2.4
Western Europe	135.5	140.1	148.9	0.5
North America	285.2	278.9	287.1	0.03

Source: Table A.2 in the Annex.

Within the OIC, the OIC-LDC group had the lowest average per capita energy consumption with 3.1 million BTU, and no change was observed during the period under consideration. On the other hand, per

<sup>1</sup> The quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39 degrees Fahrenheit). 1 barrel of crude oil = 5,800,000 BTU; 1 short ton of coal = 20,681,000 BTU; 1 cubic foot of natural gas = 1,026 BTU.

capita energy consumption nearly doubled in the OIC-MIC group, increasing from 12.5 million BTU in 1980 to 24.9 million BTU in 2000. Moreover, the OIC-OEC group experienced a growth rate of 2.4 percent per annum and reached almost the same per capita energy consumption as the world average in 2000. After an increase in 1990 as compared to 1980, the per capita energy consumption of the OIC-TC group decreased in the following decade. Nevertheless, the group still had the highest per capita consumption within the OIC in 2000, with 76.4 million BTU.

### **3. SOURCES OF ENERGY**

Energy sources are divided into two groups: fossil fuels and renewables. Fossil fuels are energy sources such as coal, petroleum and natural gas, formed in the earth's crust from the remains of earlier organisms. Such energy sources are in finite supply. Renewables, on the other hand, are sources that are essentially inexhaustible either for all practical purposes (solar power, wind) or are routinely renewed by natural processes (hydropower, geothermal, biomass). Nuclear power, which is also essentially inexhaustible, is categorised as a renewable in this study.

#### **3.1. Fossil Fuels**

##### *3.1.1. Coal*

Coal is the most abundant fossil fuel on earth. Its predominant use has always been for producing heat energy. It was the basic energy source that fuelled the Industrial Revolution of the 18<sup>th</sup> and 19<sup>th</sup> centuries, and the industrial growth of that era, in turn, supported large-scale exploitation of coal deposits. Though petroleum gained importance over the 20<sup>th</sup> century and continues to do so, coal remains essential for the industrial sector.

##### *Coal Reserves*

World coal resources, that is the total amount of coal available in the world, are approximately 11 trillion tons (Encyclopaedia Britannica 2003A). Distinct from coal resources are coal reserves, which are only those resources that are technically and economically recoverable (i.e. mined) at a particular time. The current recoverable coal reserves of the world are estimated at 1,083 billion tons (Table 4). This is estimated to

last approximately 210 years at current consumption levels.

**Table 4. Recoverable Coal, Coal Production and Consumption, 2000**  
(million short tons)

	Estimated Recoverable Coal	Coal Production	Coal Consumption
North America	282,444	1,160.71	1,161.28
C. & South Amer.	23,977	58.93	37.35
Western Europe	101,343	489.97	701.60
Eastern Europe	290,183	789.89	795.07
Middle East	1,885	1.39	12.41
Africa	61,032	333.30	189.90
Asia & Oceania	322,394	2,224.98	2,248.51
World Total	1,083,259	5,059.16	5,146.12
OIC Total	57,816	240.93	193.88
% of World Total	5.3	4.8	3.8

Source: Table A.3 in the annex.

Most OIC member countries have neither large coal resources nor reserves. OIC member countries as a whole possess 5.3 percent of the world recoverable coal with 57.8 billion tons (Table 4). The total recoverable coal reserve of Kazakhstan forms 64.8 percent of the OIC total. Reserves of five other member countries (Indonesia, Uzbekistan, Turkey, Pakistan and Iran) form another 32.5 percent of the OIC total (Table A.3).

#### *Coal Production and Consumption*

OIC coal production forms only 4.8 percent of the world total, with approximately 241 million tons (Table 4). Turkey, Kazakhstan and Indonesia together produce 95.7 percent of the OIC's coal production (Table A.3). While coal production increased in Turkey and Indonesia between 1980-2000, the same trend was not observed in Kazakhstan. In this country, coal production declined by 54 percent between 1992-1999, mainly due to nonpayment by customers and the lack of incentives to export to Russia, as well as due to the collapse of domestic demand. As a result, many of the country's high-cost underground coal mines have been closed, and its more competitive surface mines have been purchased and are now operated by international energy companies. Kazakh coal production was finally able to increase in 2000 (EIA 2002D).

OIC consumption forms 3.8 percent of the world total, with approximately 194 million tons (Table 4). The coal consumption in Turkey amounts to 46.8 percent of total OIC consumption, while that of Kazakhstan is 34.9 percent (Table A.3).

### *3.1.2. Oil*

Crude oil is a mixture of hydrocarbons that exists in a liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Crude oil and other hydrocarbons are refined through a complex series of processes to manufacture what are called finished (refined) petroleum products. These products include motor gasoline, jet fuel, kerosene, distillate fuel oil, liquefied petroleum gases and other products.

#### *Crude Oil Reserves and Resources*

Since the exploration for oil began during the early 1860s, some 50,000 oil fields have been discovered in the world. More than 90 percent of those fields are insignificant in their impact on world oil production. The two largest classes of fields are the supergiants (fields with 5 billion or more barrels of ultimately recoverable oil<sup>2</sup>) and world-class giants (fields with five hundred million to five billion barrels of ultimately recoverable oil). The Arabian-Iranian sedimentary basin in the Persian Gulf region contains two-thirds of the forty supergiant fields discovered worldwide. Of the remaining eleven, one is in Algeria and one in Libya. The nearly 280 world-class fields thus far discovered, plus the supergiants, account for about 80 percent of the world's known recoverable oil (Encyclopaedia Britannica 2003B).

OIC member countries hold three-fourths (770 billion barrels) of the 1,028 billion barrels of crude oil reserves that form the world's proven reserves<sup>3</sup>. Saudi Arabia, Iraq, United Arab Emirates, Kuwait and Iran together hold 85.5 percent of the OIC total (Table A.4).

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<sup>2</sup> Ultimately recoverable oil: Oil that is infeasible to recover for reasons that are either economic or technical. It also includes oil yet to be found.

<sup>3</sup> Proven reserves: The estimated quantities of oil which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under current economic and operating conditions.



Saudi Arabia has around 262 billion barrels of proven oil reserves and up to 1 trillion of ultimately recoverable oil. Although the country has around 80 oil and gas fields, more than half of its oil reserves are contained in only eight fields, including Ghawar (the world's largest onshore oil field, with estimated remaining reserves of 70 billion barrels) and Safaniya (the world's largest offshore oilfield, with estimated reserves of 19 billion barrels) (Table A.4 and EIA 2002G).

Iraq has 112.5 billion barrels of proven oil reserves, the second largest in the world, along with roughly 220 billion barrels of probable and possible resources (Table A.4).

The United Arab Emirates has crude oil reserves of approximately 98 billion barrels. Abu Dhabi holds 94 percent of this amount, or about 92.2 billion barrels. Proven oil reserves in Abu Dhabi have doubled in the last decade, mainly due to significant increases in rates of recovery. It has continued to identify new finds, especially offshore, and to discover new oil-rich structures in existing fields (Table A.4 and EIA 2002H).

Kuwait has an estimated 96.5 billion barrels of proven oil reserves, including its share of the Neutral Zone area, which holds 5 billion barrels of reserves and is shared equally by Kuwait and Saudi Arabia. Most of Kuwait's oil reserves are located in the 70-billion barrel Greater Burgan area, which is widely considered the world's second largest oil field, surpassed only by Saudi Arabia's Ghawar field, and has been producing oil since 1938. Kuwait's Rawdhatain, Sabriya and Minagish fields have large proven reserves as well and have been producing since the 1950s (Table A.4 and EIA 2002E).

Iran holds approximately 90 billion barrels of oil reserves. The vast majority of Iran's crude oil reserves are located in giant onshore fields in the southwestern Khuzestan region near the Iraqi border and the Persian Gulf. In October 1999, Iran announced that it had made its biggest oil discovery in 30 years, a giant onshore field called Azedegan located in the southwestern province of Khuzestan, a few miles east of the border with Iraq (Table A.4 and EIA 2002A).

#### *Crude Oil Production and Trade*

10 OIC member countries—Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia and United Arab Emirates<sup>4</sup>—and one non-

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<sup>4</sup> Under UAE's constitution, each emirate controls its own oil production and resource development. Dubai does not consider itself part of OPEC or bound by its quotas (EIA 2002H).

member country (Venezuela) form the Organization of the Petroleum Exporting Countries (OPEC). For comparison, the following subsections contain calculations both for the OIC group and for the OIC member countries that are part of OPEC (OPEC-OIC).

World crude oil production grew by 0.7 percent per annum between 1980-2000, compared to 0.8 percent per annum for the OIC as a whole and 0.3 percent per annum for the OPEC-OIC group. It should be noted that crude oil production of both the OIC and the OPEC-OIC decreased between 1980-1990 but increased to amounts higher than their 1980 values by 2000. In 2000, the OIC's crude oil production made up 46.4 percent of the world total, which was one percentage point higher than the share observed in 1980. Thus, although the OIC holds three-fourths of the world's proven oil reserves, it does not produce to its full potential. The share of the OPEC-OIC group in the OIC total fell from 90.3 percent to 82.6 percent between 1980-2000 (Table A.5).

The OIC's crude oil imports formed only 3.7 percent of the world total in 1999. On the other hand, the OIC's exports of crude oil, amounting to 22.2 million barrels per day, formed 58.5 percent of the world total. The OPEC-OIC group alone exported 19.2 million barrels per day, which made up 50.5 percent of the world total and 86.2 percent of the OIC total (Table A.6).

### *Refining Capacity*

Historically, refining developed in consuming areas because it was less expensive to transport crude oil than to transport finished products. Thus, while the Middle East is the largest crude oil producing region, the bulk of refining takes place in the United States, Europe or Asia. Similarly, the OIC member countries as a whole form much less of the world total in terms of the production of refined products in comparison to that of crude oil. As of 2001, there were a total of 749 refineries in the world. Of these, 113 were situated in the OIC member countries.

The core refining process is distillation. Crude oil distillation is the process aimed at separating the crude oil into its fractions, the broad categories of its component hydrocarbons. In 2001, crude oil distillation capacity in the OIC amounted to 12.1 million barrels per day compared to 20 million barrels per day in North America and 14.9 million barrels

per day in Western Europe. The OIC formed 14.9 percent of the world crude oil distillation capacity. The OPEC-OIC group's capacity was 7.2 million barrels of crude oil per day, which formed 59.4 percent of the OIC total (Table A.7).

Downstream (or closer to the refinery gate and the consumer) processing follows crude distillation in the refining process. It encompasses a variety of highly complex units designed for very different upgrading processes. These change the molecular structure of the input: some with chemical reactions, some in the presence of a catalyst, some with thermal reactions (EIA 2003G). Again in 2001, the OIC group's catalytic cracking capacity was 0.59 million barrels per day (4.2 percent of world total), compared to 6.5 million barrels in North America and 2.2 million barrels in Western Europe. Similarly, the OIC had a thermal cracking capacity of 0.48 million barrels per day (8.3 percent of world total), in comparison to 2.4 million barrels in North America and 1.6 million barrels in Western Europe (Table A.7).

In downstream processing, there is also a process called reforming in which hydrogen is removed from low-octane gasoline, thus giving it high octane and enabling it to burn well in cars. In the OIC, reforming capacity was 1.2 million barrels per day (10.9 percent of world total), in comparison to 4.2 million barrels in North America and 2.2 million barrels in Western Europe for the year 2001. Within the OIC group, Indonesia, Iran, and Saudi Arabia are the three countries in which the highest crude oil distillation, cracking, and reforming capacity is observed (Table A.7).

As mentioned earlier, in 2000 the OIC produced 46.4 percent of the world's crude oil. However, as we have seen in this sub-section, the OIC has only around 15 percent of the world's refineries and has low capacity to refine crude oil in the refining processes mentioned. Similarly, while the OPEC-OICs form 82.6 percent of the OIC's crude oil production, they have 46 percent of OIC's refineries. The OIC and OPEC-OIC groups are able to refine only 32.7 percent and 26.2 percent of their crude oil, respectively.

On the other hand, North America produces around 15.9 percent of the world's crude oil, but has 24.3 percent of the world's refineries. Similarly, while Western Europe produces only around 9.1 percent of

the world crude oil total production, it has around 15 percent of the world's refineries. The North America and Western Europe groups are able to refine 1.92 and 2.40 times what they produce.

#### *Output and Consumption of Refined Products*

In 2000, the world as a whole had an output of 75.1 million barrels of refined petroleum products per day. 10.3 million barrels per day (13.8 percent of the world total) were produced by the OIC member countries. Furthermore, 66.2 percent of the OIC total was produced by the OPEC-OIC group (Table A.8).

In the world and the OIC, distillate fuel oil had the greatest share in this output with around 28 percent in both. While motor gasoline had the second highest share in the world (26.8 percent), it had the third highest share (14.9 percent) in the OIC total. In the OIC, it was residual fuel oil that had the second highest share (26.3) in the total (Table A.8).

The OIC's highest shares in world output were observed in kerosene and residual fuel output. The kerosene output of 643 thousand barrels per day formed 32 percent of the world total. Iran (183 thousand barrels per day), Indonesia (165), Saudi Arabia (85) and Kuwait (74) together formed 78.8 percent of the OIC kerosene output. Residual fuel oil output of 2.7 million barrels per day observed in the OIC formed 24 percent of the world total. Among the OIC member countries, Saudi Arabia and Iran had relatively high amounts of residual fuel oil output with 470 and 433 thousand barrels per day, respectively (Table A.8).

Similar trends were observed in terms of refined petroleum product consumption. The OIC's consumption of 9.2 million barrels per day formed 11.9 percent of the world's consumption. The OPEC-OIC group's consumption formed 59.3 percent of the OIC total. The OIC group's motor gasoline and liquefied petroleum gas (LPG) consumption was higher than its output in 2000. In Nigeria and Malaysia, consumption of motor gasoline was significantly higher than its production. Most of the gap between the OIC's LPG consumption and production can be attributed to Egypt, Saudi Arabia and Turkey which, together, consumed 361 thousand barrels per day more than they produced (Table A.9).

Nevertheless, it can be seen that the OIC produces around 1,186 thousand barrels per day of refined petroleum products more than it consumes. Similarly, the OPEC-OICs produce 1,415 thousand barrels more than they consume. This situation provides a good reason to examine the trade of refined petroleum products more closely in the next sub-section.

#### *Trade of Refined Products*

In 2000, the OIC group's refined petroleum product imports formed 9.5 percent of the world total, while its exports formed 26 percent. Of the 4.59 million barrels of OIC exports observed per day, 3.7 million barrels (80.6 percent) belonged to the OPEC-OIC group. This amount was larger than the exports observed in all regional groupings except for Western Europe (4.78 million) (Tables A.10 and A.11).

In the same year, Saudi Arabia was the OIC's largest exporter of refined petroleum products with 1.26 million barrels per day. Algeria, Kuwait and the United Arab Emirates were three other OIC member countries that exported over 400 thousand barrels of refined petroleum products per day. Bahrain, Indonesia and Iran were able to export over 200 thousand and Libya and Malaysia over 100 thousand of barrels per day. While Indonesia and Turkey were the only OIC member countries to import more than 200 thousand barrels per day, Lebanon, Malaysia, Nigeria and Pakistan imported more than 100 thousand barrels of refined petroleum products per day (Tables A.10 and A.11).

On examination of the refined petroleum exports by type, we see that the OIC's LPG exports formed 52.5 percent and its kerosene exports 52 percent of the respective world totals. The OIC group also exported 28.8 percent of residual fuel oil and 28.5 percent of the jet fuel. In terms of imports, the highest share of the OIC was observed in kerosene, which formed 20.2 percent of the world total (Tables A.10 and A.11).

#### *Oil Prices*

The behaviour of the oil markets has a notable direct impact on the world economy at large as well as on individual economies. Directly, the current influences of oil prices on international trade and finance and on

the budgets of oil exporters bear witness to that impact. Indirectly, oil prices affect domestic inflationary dynamics and cross-border relative prices.

The first price rise was observed as a result of the oil embargo that started in October 19-20, 1973 and lasted until March 18, 1974. In 2002 constant prices, the price of oil rose from USD 10.49 to USD 42.51 per barrel.

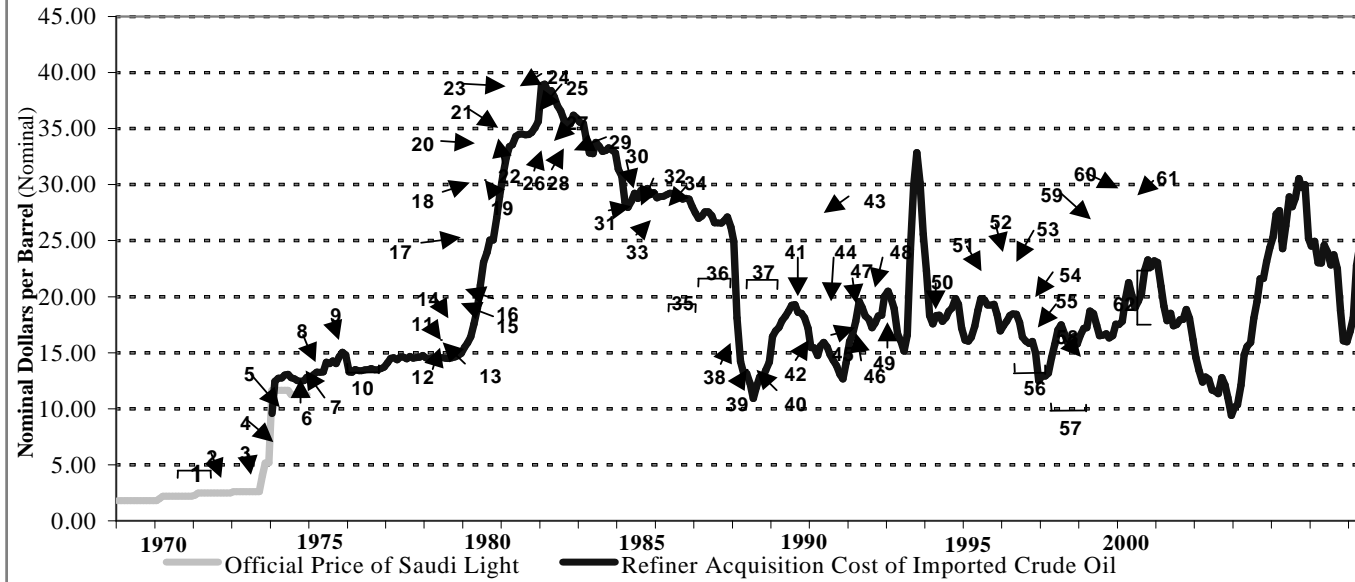
The second shock came as a result of the Iranian Revolution in 1979 and the first Gulf War that followed. Prices, in 2002 constant terms, rose from USD 38.41 at the beginning of 1979 to USD 77.79 at the end of 1980. A downward price spiral started in 1981 and continued until mid-1986 when it reached its lowest point with USD 17.91 per barrel. Price per barrel was USD 40.92 at the beginning of 1986.

The third price rise came with the second Gulf War. Constant prices rose from USD 20.85 in mid-1990 to reach a peak of USD 45.26 in the second half of that year. However, prices dropped fast and sharp to USD 23.22 in the first half of 1991. From that point on, prices remained rather stable until 1997 when they started to plummet as increased production from Iraq coincided with lack of growth in Asian oil demand due to the Asian economic crisis and increases in world oil inventories. Between January 1997 and December 1998, prices fell from USD 25.84 to USD 10.36 per barrel.

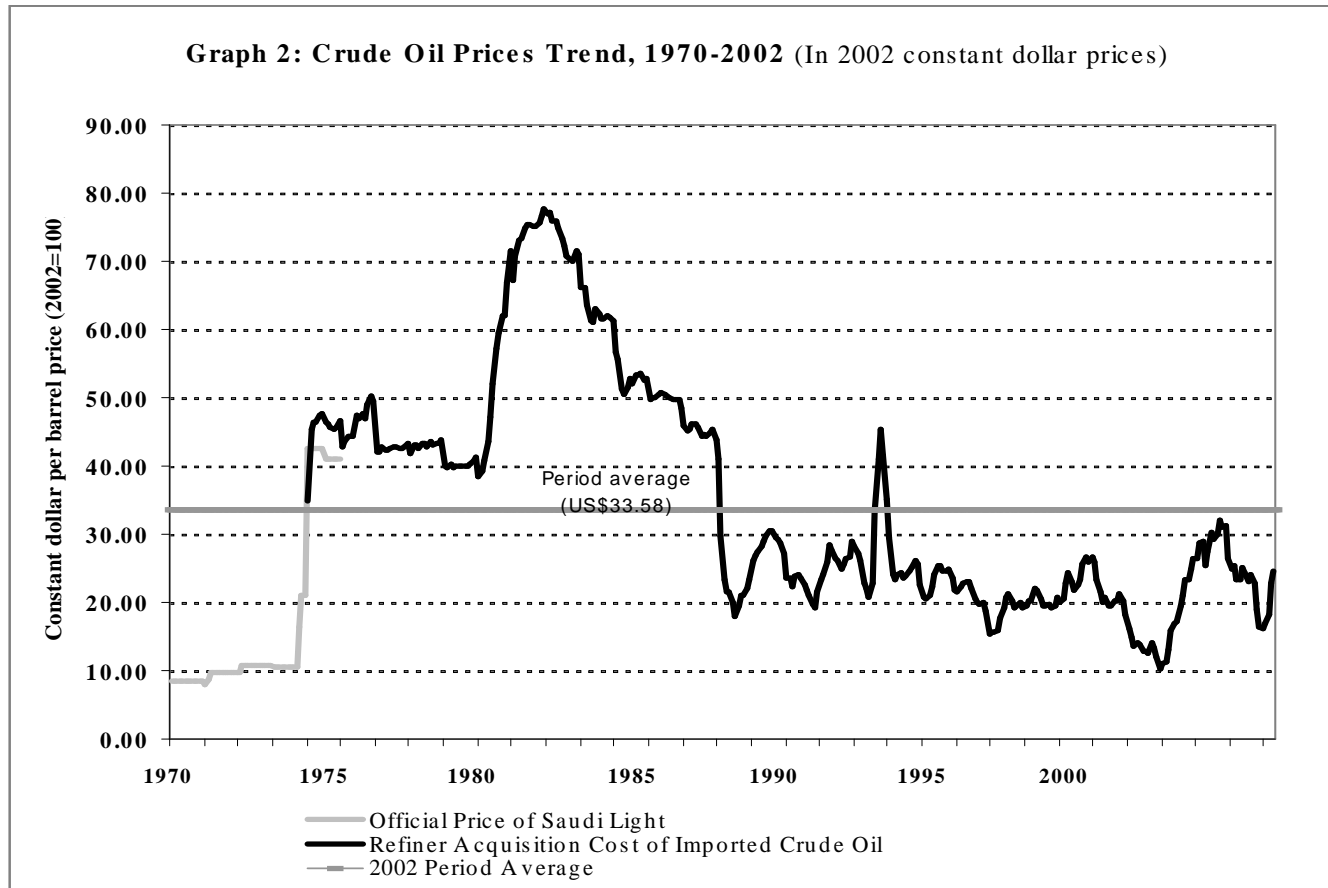
Oil prices nearly tripled in constant 2002 prices between January 1999 (USD 10.97) and September 2000 (USD 31.93) due to strong world oil demand, OPEC oil production cutbacks and other factors, including the weather and low oil stock levels.

The average price per barrel during 1970-2002 in constant 2002 prices was USD 33.58. It can be seen from Graph 2 that following the increase in 1974, the price stayed above the average until early 1986. Since then, prices have always been lower than that average price with only one exception realised in the second half of 1990.

**Graph 1: Crude Oil Prices Trend, 1970-2002 (In nominal dollar prices)**



Source: Energy Information Administration (2003F).



Source: Energy Information Administration (2003F).



**Graph 1 Notes:**

1. OPEC begins to assert power; raises tax rate and posted prices.
2. OPEC begins nationalisation process; raises prices in response to falling US dollar.
3. Negotiations for gradual transfer of ownership of western assets in OPEC countries.
4. Oil embargo begins (October 19-20, 1973).
5. OPEC freezes posted prices; US begins mandatory oil allocation.
6. Oil embargo ends (March 18, 1974).
7. Saudi Arabia increases tax rates and royalties.
8. US crude oil entitlements programme begins.
9. OPEC announces 15 percent revenue increase effective October 1, 1975.
10. Official Saudi Light price held constant for 1976.
11. Iranian oil production hits a 27-year low.
12. OPEC decides on 14.5 percent price increase for 1979.
13. Iranian revolution.
14. OPEC raises prices by 14.5 percent on April 1, 1979.
15. US phased price decontrol begins.
16. OPEC raises prices by 15 percent.
17. US halts imports from Iran; Iran cancels US contracts; Non-OPEC output hits 17.0 million b/d.
18. Saudi Arabia raises marker crude price from \$19/bbl to \$26/bbl.
19. Windfall Profits Tax enacted.
20. Kuwait, Iran and Libya production cuts drop OPEC oil production to 27 million b/d.
21. Saudi Light raised to \$28/bbl.
22. Saudi Light raised to \$34/bbl.
23. First major fighting in Iran-Iraq War.
24. US abolishes remaining price and allocation controls.
25. Spot prices dominate official OPEC prices.
26. US boycotts Libyan crude; OPEC plans 18 million b/d output.
27. Syria cuts off Iraqi pipeline.
28. Libya initiates discounts; Non-OPEC output reaches 20 million b/d; OPEC output drops to 15 million b/d.
29. OPEC cuts prices by \$5/bbl and agrees to 17.5 million b/d output.
30. Norway, United Kingdom and Nigeria cut prices.
31. OPEC accord cuts Saudi Light price to \$28/bbl.
32. OPEC output falls to 13.7 million b/d.
33. Saudi Arabia links to spot price and begins to raise output.
34. OPEC output reaches 18 million b/d.
35. Wide use of netback pricing.
36. Wide use of fixed prices.

37. Wide use of formula pricing.
38. OPEC/Non-OPEC meeting failure.
39. OPEC production accord; Fulmar/Brent production outages in the North Sea.
40. Exxon's Valdez tanker spills 11 million gallons of crude oil.
41. OPEC raises production ceiling to 19.5 million b/d.
42. Iraq invades Kuwait.
43. Operation Desert Storm begins; 17.3 million barrels of SPR crude oil sales is awarded.
44. Persian Gulf war ends.
45. Dissolution of the Soviet Union; Last Kuwaiti oil fire is extinguished on November 6, 1991.
46. UN threatens to impose sanctions on Libya.
47. Saudi Arabia agrees to support OPEC price increase.
48. OPEC production reaches 25.3 million b/d, the highest in over a decade.
49. Kuwait boosts production by 560,000 b/d in defiance of OPEC quota.
50. Nigerian oil workers' strike.
51. Extremely cold weather in the US and Europe.
52. U.S. launches cruise missile attacks into southern Iraq.
53. Iraq begins exporting oil under United Nations Security Council Resolution 986.
54. Disagreement between Iraq and United Nations over weapons inspection raises tensions in the oil-rich Middle East.
55. OPEC raises its production ceiling by 2.5 million barrels per day to 27.5 million barrels. This is the first increase in 4 years.
56. World oil supply increases by 2.25 million barrels per day in 1997, the largest annual increase since 1988.
57. Oil prices continue to plummet as increased production from Iraq coincides with no growth in Asian oil demand due to the Asian economic crisis and increases in world oil inventories following two unusually warm winters.
58. OPEC pledges additional production cuts for the third time since March 1998. Total pledged cuts amount to about 4.3 million barrels per day.
59. Oil prices triple between January 1999 and September 2000 due to strong world oil demand, OPEC oil production cutbacks and other factors, including weather and low oil stock levels.
60. US President Clinton authorises the release of 30 million barrels of oil from the Strategic Petroleum Reserve (SPR) over 30 days to bolster oil supplies, particularly heating oil in the Northeast.
61. Oil prices fall due to weak world demand (largely as a result of economic recession in the United States) and OPEC overproduction.
62. Oil prices decline sharply following September 11, 2001, largely on increased fears of a sharper worldwide economic downturn (and therefore

sharply lower oil demand). Prices then increase on oil production cuts by OPEC and non-OPEC at the beginning of 2002, plus unrest in the Middle East and the possibility of renewed conflict with Iraq.

### 3.1.3. Natural Gas

Natural gas is a type of hydrocarbon that commonly occurs in association with crude oil. It is often found dissolved in oil at the high pressures existing in a reservoir. It is the cleanest burning fossil fuel. When it is burned, it emits 50 percent less carbon dioxide released by coal and 25 percent less carbon dioxide than oil, for the same amount of energy produced.

**Table 5. OIC Natural Gas Reserves, 2000**

	Natural Gas Reserves			Reserves to Production Ratio (Years)
	Trillion Cubic Feet	% of OIC Total	% of World Total	
Iran	812.3	30.4	15.4	381.8
Qatar	393.8	14.7	7.4	383.2
Saudi Arabia	213.8	8.0	4.0	121.5
U.A.E.	212.1	7.9	4.0	150.8
Algeria	159.7	6.0	3.0	54.3
Nigeria	124.0	4.6	2.3	281.8
Iraq	109.8	4.1	2.1	987.0
Turkmenistan	101.0	3.8	1.9	61.5
Malaysia	81.7	3.1	1.5	54.5
Indonesia	72.3	2.7	1.4	30.6
Uzbekistan	66.2	2.5	1.3	33.2
Kazakhstan	65.0	2.4	1.2	206.8
Kuwait	52.7	2.0	1.0	155.4
Libya	46.4	1.7	0.9	219.0
Egypt	35.2	1.3	0.7	54.4
Oman	29.3	1.1	0.6	91.0
Pakistan	21.6	0.8	0.4	25.2
OIC Other	76.5	2.9	1.4	48.6
OIC Total	2,673.3	100.0	50.5	123.9
World Total	5,288.5			60.1

Source: Calculated using Table A.4 and A.12.

In addition to environmental concerns, the use of natural gas is increasing in the world for reasons including price, fuel diversification, energy security issues and market deregulation. However, in contrast to oil markets, natural gas markets are regional in nature. Since a global

market has not evolved, the market price of natural gas varies greatly from one country to another.

### *Reserves and Resources*

Natural gas fields are categorised as associated and non-associated fields. Associated gas fields contain gas that, in the reservoir, is dissolved in oil or is a gas cover. Production of this gas is established directly by oil production. Non-associated gas fields contain gas in the reservoir that is free of or with very small quantities of oil. The largest occurrences of natural gas in the world are in non-associated gas fields.

Table 5 provides information on the natural gas reserves and reserves to production ratios of the OIC, as a whole, and selected member countries.

The majority (about 73 percent) of the world's natural gas reserves are located in the Middle East and Central Asia. The OIC as a whole accounts for more than half (50.5 percent) of the world's natural gas reserves with 2,673 trillion cubic feet (Tcf).

The Middle East's reserves amount to 1,855 Tcf, equivalent to 35 percent of the world total. The most significant reserves in the Middle East are found in Iran, Qatar, Saudi Arabia and the United Arab Emirates.

Iran holds 812.3 Tcf of natural gas reserves, which make up 30.4 percent of the OIC total. The country's reserves are ranked number two in the world, following Russia (1,700 Tcf). The bulk of Iranian natural gas reserves are located in non-associated fields and have not been developed. Thus, Iran has tremendous potential for expansion of both its internal and export natural gas markets. Additionally, with much territory yet to be explored, Iran continues to make significant new discoveries (EIA 2002A).

Qatar accounts for 14.7 percent of the OIC natural gas reserve total and is the country with the third largest reserves in the world. The country's North Field is the largest non-associated gas field in the world.

Saudi Arabia holds 8 percent of the OIC's natural gas reserves and is ranked fourth in the world. Approximately two-thirds of the country's reserves consist of associated gas. While Saudi Arabia's gas sector has not shown significant growth in recent years, demand increases are anticipated and the country has been promoting foreign investment in its gas sector (EIA 2002G).

The United Arab Emirates holds 7.9 percent of the OIC's natural gas reserves. Over 90 percent of the reserves are located in Abu Dhabi. The country intends to expand its natural gas market and has invested heavily in moving to natural-gas-fired power plants and industry (EIA 2002H).

Africa has 7.5 percent of the world's natural gas reserves. Algeria and Nigeria account for 72.0 percent and Libya and Egypt for 20.7 percent of Africa's reserves. These countries, together with other African OIC members, account for 96 percent of the continent's reserves.

#### *Natural Gas Production and Consumption*

Despite high rates of increase in natural gas consumption, particularly over the past decade, most regional reserves-to-production ratios have remained high. Worldwide, the reserves-to-production ratio is estimated at 60.1 years. Central Asian countries have a reserves-to-production ratio of 77.7, Africa of 89.0, and the Middle East 243.4 years. The OIC's reserves-to-production ratio is 123.9 years.

In 1995, the OIC countries produced 15,651 Billion Cubic Feet (Bcf) of natural gas and formed 20.1 percent of the world total production. In 2000, the group's production increased to 21,568 Bcf, making up 24.5 percent of the world total. This increase in production was equivalent to a growth rate of 6.6 percent per annum, in comparison to a 2.5 percent increase in the world for the same period. In 2000, nine OIC member countries (Algeria, Indonesia, Iran, Uzbekistan, Saudi Arabia, Turkmenistan, Malaysia, United Arab Emirates and Qatar) produced each over 1,000 Bcf of natural gas and together formed 77.7 percent of the OIC total production (Table A.12).

The OIC countries consumed 11,357 Bcf of natural gas and made up 14.6 percent of the world total consumption in 1995. In 2000, the group consumed 14,765 Bcf and made up 16.9 percent of the world total. This

increase was equivalent to a growth rate of 5.4 percent per annum, in comparison to an increase of 2.3 percent in the world. In 2000, four OIC member countries (Iran, Saudi Arabia, Uzbekistan and Indonesia) consumed more than 1,000 Bcf each and together made up 44.5 percent of the OIC total consumption (Table A.12).

### *Natural Gas Trade*

In 2000, the OIC countries together exported 7,630 Bcf and imported 1,051 Bcf of natural gas. While the natural gas import of the OIC only accounted for 4.5 percent of the world total, its export accounted for 32 percent (Table A.13).

One of the difficulties surrounding natural gas trade is transportation. Natural gas, in its normal state, takes up a lot of room and can only be transported through pipelines, which makes it costly to transport over long distances. However, a form of natural gas called liquefied natural gas (LNG) provides natural gas producers and suppliers an alternative method of reaching markets that are normally out of reach because of transportation limitations. In comparison to natural gas in its normal state, LNG is 600 times smaller in volume and can be transported long distances by tankers (Platts Global Energy 2002).

For these reasons, it is important to examine the trade in LNG in the OIC member countries. In 2001, 90.2 percent of the LNG imports of Japan, South Korea and Taiwan; 98.6 percent of those of Western European countries; and 57.8 percent of those of the United States originated from OIC member countries. The exports of the OIC member countries increased by 7.4 percent per annum between 1996-2001. However, the share of OIC exports in the LNG imports of the United States and Western Europe decreased in this period as a consequence of Trinidad and Tobago's entering the LNG market in 1999 (Tables A.14 and A.15).

In 2001, Indonesia was the world's leading LNG exporter with 1,229 billion cubic feet, the importers being Japan, South Korea and Taiwan (Table A.15). The country's Arun LNG facility was the focus of much attention in 2001 as it was shut down for seven months due to security problems. The facility reopened in August 2001 and resumed its supplies to its customers (EIA 2002, p.62).

Algeria is the second largest exporter of LNG in the world, with 884 billion cubic feet. Approximately 93 percent of the country's exports were destined to Western European countries while the rest was to the United States. In fact, around 71 percent of the LNG imports of Western European countries originated from Algeria (Table A.15). The country is the largest exporter of natural gas among OIC member countries when taking into account the fact that around 40 percent of its production is exported by pipeline rather than as LNG (EIA 2002, p.66).

Malaysia exported a total of 774 billion cubic feet of LNG, all of which were destined to Japan, South Korea and Taiwan (Table A.15). The country is moving forth with plans to expand its Bintulu LNG complex located in Sarawak. When the expansion is complete, this facility as a whole will be the largest LNG liquefaction centre in the world, with a total capacity of 1.1 Tcf (Platts Global Energy 2002).

Qatar's LNG exports amounted to 596 billion cubic feet, around 91 percent of which were imported by Japan and South Korea while the rest by the United States and Western European countries (Table A.15). The country is expected to play an increasing role in gas use in the Middle East in the coming years through its "Dolphin Project". This project plans to export gas from Qatar's North Field to the markets in the United Arab Emirates via a new pipeline. Production is scheduled to start in late 2005 (Rigzone 2002).

The majority of the exports of Brunei, Oman and the United Arab Emirates were also destined for Japan and South Korea, while those of Nigeria and Libya were destined for Western Europe.

## **3.2. Renewables**

### *3.2.1. Hydropower*

Hydropower refers to electricity produced from generators driven by water turbines that convert the potential energy in falling or fast-flowing water into mechanical energy. Two important advantages of hydropower are that it is continually renewable owing to the recurring nature of the hydrologic cycle and it produces neither thermal nor particulate pollution.

In 2000, the world as a whole generated 2,649 billion kilowatt hours of hydroelectric power, approximately 1.53 times greater than the

amount generated in 1980. Similarly, the OIC as a whole generated an amount 1.75 times greater than that generated in 1980. Still, the share of hydropower in electricity production declined by 3.6 percentage points in the world and 8 percentage points in the OIC over the last two decades. The OIC was able to generate only 6.6 percent of the world hydroelectric power generation in 2000 (Table A.16).

Turkey was the largest hydroelectric power generating country within the OIC throughout the last decade. Much of this can be attributed to the country's Southeastern Anatolia Project (GAP with its Turkish initials), which involves the construction of a system of 22 dams and 19 hydroelectric power plants on the Euphrates and Tigris rivers and their tributaries. Nevertheless, even though hydroelectric power generation within Turkey steadily increased over the last two decades, the share of hydropower in electricity production decreased from 48 percent in 1980 to 25.7 percent in 2000.

In Tajikistan, hydropower had a share of 98.2 percent of the electricity production in 2000 (Table A.16). This country's electric power comes from seven large hydroelectric plants that have been operating well below capacity due to severe weather and low water levels (EIA 2002C).

The share of hydropower in Kyrgyzstan's electricity production increased from 53.1 percent in 1980 to 92.6 percent in 2000 (Table A.16). This country has a significant hydroelectric potential due to its abundant water resources, especially its mountain rivers. Although the country has excess electricity generation, up to one-third of the power that the country generates is lost due to the deteriorating power infrastructure (EIA 2002B).

In addition to Tajikistan and Kyrgyzstan, three other countries (Albania, Cameroon and Mozambique) had shares of hydropower in electricity production that were above 90 percent (Table A.16).

### 3.2.2. *Biomass*

Biomass energy is derived from plant and animal material, such as wood from forests, residues from agricultural and forestry processes, and industrial, human or animal wastes. Biomass usage is commonly



categorised as 'traditional' and 'modern'. The traditional use of biomass is generally confined to developing countries and small-scale uses. It includes wood, vegetable residues and animal residues. The traditional use is generally viewed as being unhealthy (largely due to the indoor air pollution it causes), environmentally degrading (it brings about ecological damage to forests, woodlands and farmlands) and energy-inefficient.

**Table 6. Traditional Fuel Use, 1980-1999**

	Traditional Fuel Use		
	% of Total Energy Use		Growth Rate (%)
	1980	1999	1980-1999
OIC-LDC	74.2	56.6	-1.3
OIC-MIC	27.0	16.7	-2.9
OIC-OEC	8.8	8.9	0.1
OIC-TC	0.7	0.5	-2.4
OIC	25.3	17.6	-2.0
World	7.4	8.2	0.5
Low Income	43.7	28.6	-2.2
Middle Income	9.7	7.3	-1.5
High Income	1.0	3.4	6.7

Source: Calculated using Table A.19.

Modern biomass usually involves large-scale uses and aims to substitute fossil fuel energy sources. It includes forest wood and agricultural residues, urban wastes, biogas and energy crops. Some argue that with the addition of capital and other resources such as skill and knowledge, biomass can be used efficiently, cleanly and conveniently (Shell Foundation 2001).

In 1999, 8.2 percent of the world energy demand were met by traditional fuel use, against 7.4 in 1980. However, during the same period, the share of traditional fuel use in total energy use of the OIC group decreased from 25.3 to 17.6 percent. Within the OIC, the highest share of traditional fuel use in energy use was observed in the OIC-LDC group with 56.6 percent in 1999, despite a 17.6 percentage point fall since 1980 (Table 6).

Along with improving the efficiency with which biofuels are used and promoting more sustainable ways to supply them, facilitating the transition to the use of modern fuels is viewed as an important policy on

which the developing countries should focus (World Bank 1996, p.67). Table 7 summarises some typical changes in patterns of energy use by households in rural areas in developing countries depending on the household income. It can be observed that as incomes grow, rural people begin to use modern fuels more extensively. The initial dependence on biofuels in homes eventually gives way to the use of electricity for lighting and fossil fuels for cooking. Thus, we can say that the use of modern fuels is closely related to economic well-being.

**Table 7. Rural Energy Use Patterns in Developing Countries by End Uses in Households**

End use	Household income		
	Low	Medium	High
Cooking	Wood, residues and dung	Wood, residues, dung, kerosene and biogas	Wood, kerosene, biogas, LPG and coal
Lighting	Candles and kerosene (sometimes none)	Candles, kerosene and gasoline	Kerosene, electricity and gasoline
Space Heating	Wood, residues and dung (often none)	Wood, residues and dung	Wood, residues, dung and coal

Source: World Bank 1996, p.25.

#### 4. ENERGY AND ELECTRICITY

Electricity production is undoubtedly the most important product of the commercial forms of energy. Lighting, heating and cooling are the first things that come to mind concerning the function of electricity in our lives. It should not be forgotten that access to modern technologies—such as connecting to the Internet, sending or receiving a fax, charging the battery on our cell phones—also requires electricity. Thus, access to electricity is important for development and improving people's standard of living.

Between 1980 and 1990, electricity generation growth in OIC countries was 6.7 percent per annum against 3.5 percent in the world. In the following decade, the growth rate fell to 4.8 percent per annum in the OIC and 2.6 percent in the world. While in 1980 the share of OIC countries in world electricity production was 4.4 percent, this share increased to 6.0 percent in 1990 and 7.4 percent in 2000 (Table A.16).

#### 4.1. Fossil Fuels as a Source of Electricity

While the use of fossil fuels as a source of electricity decreased by 6.4 percentage points between 1980 and 1999 in the world as a whole, it increased in the OIC countries by 11.7 percentage points. Among the groups examined, the OIC group accounted for the highest share of fossil fuels in electricity production (83.6 percent) in 1999 (Table 8).

**Table 8. Sources of Electricity Production (%)**

	World		OIC		Low-income Countries		Middle-income Countries	
	1980	1999	1980	1999	1980	1999	1980	1999
Fossil Fuels								
Coal	33.0	38.2	5.1	11.5	13.1	44.5	22.3	38.5
Oil	28.4	8.4	46.3	27.7	53.7	8.2	48.0	11.2
Gas	8.8	17.2	20.5	44.4	1.6	16.3	4.6	19.6
Total	70.2	63.8	71.9	83.6	68.4	69.0	74.9	69.3
Renewables								
Hydropower	20.6	17.5	28.0	16.0	27.8	22.7	21.6	22.7
Nuclear p.	8.7	17.2	0	0	3.7	7.9	3.2	7.3
Other	0.5	1.5	0.1	0.4	0.1	0.4	0.3	0.7
Total	29.8	36.2	28.1	16.4	31.6	31.0	25.1	30.7

Source: Calculated using Table A.17.

##### 4.1.1. Coal

In today's world, coal is the most important source of electricity production. The share of coal as a source of electricity production rose from 33 to 38.2 percent between 1980 and 1999. Moreover, coal shares rose in all of the groups examined. They also increased in the OIC during the study period, but the share in 1999 (11.5 percent) was the lowest among the groups examined (Table 8).

The share of coal as a source of electricity production was significant in 1999 in 4 OIC member countries (Indonesia, Turkey, Morocco and Kazakhstan). Kazakhstan had the highest share among OIC member countries with 72 percent. The correspondent shares in Morocco, Turkey and Indonesia were 49.7, 31.8 and 30.1 percent, respectively (Table A.17).

#### *4.1.2. Natural Gas*

Between 1980 and 1999, both the low-income and middle-income countries experienced increases in the share of natural gas in electricity generation of around 15 percentage points, while the world as a whole experienced an increase of around 8 percentage points. Just as in the rest of the world, the use of natural gas as a source of electricity has become important for most OIC member countries. In the OIC as a whole, natural gas was used to generate 44.4 percent of the electricity in 1999 compared to 20.5 percent in 1980 (Table 8).

Of the 36 OIC member countries for which data was available, 14 countries used natural gas as their main source of electricity in 1999. In Turkmenistan, Algeria and the United Arab Emirates, natural gas supplied over 90 percent; in Tunisia, Bangladesh and Oman over 80 percent; and in Malaysia, Iran and Uzbekistan over 70 percent of the electricity generated (Table A.17).

#### *4.1.3. Oil*

The role of oil in the world's electricity generation market has been on the decline since the second oil price shock that started in 1979. Oil accounted for 28.4 percent of electricity fuel use in 1980, but in 1999, its share fell to 8.4 percent. More extreme decreases in shares were witnessed in the low and middle-income countries in the same period. The share of oil in electricity fuel use declined from 53.7 to 8.2 percent in the low-income and from 48.0 to 11.2 percent in the middle-income countries. Oil's share in electricity production remained the highest in the OIC group even though it decreased from 46.3 to 27.7 percent (Table 8).

Energy security and economic concerns as well as environmental considerations have led most nations to reduce their use of oil for electricity generation. However, in many OIC countries, oil continues to hold a significant share of the generation fuel market and is expected to continue to play a relatively prominent role. In 1999, the share of oil as a source of electricity generation reached 100 percent in Libya and Yemen; over 95 percent in Benin, Iraq, Lebanon, Senegal and Togo; around 90 percent in Jordan; over 70 percent in Azerbaijan and Kuwait; and over 60 percent in Saudi Arabia (Table A.17).

## **4.2. Renewables as a Source of Electricity**

The use of nuclear power in electricity generation in the world rose from 8.5 percent in 1980 to 16.6 percent in 2000. However, the contribution of nuclear power is insignificant for the OIC. In 2000, Pakistan remained the only OIC member country to benefit from nuclear power, which accounted for 0.6 percent of its electricity generation. In the OIC as a whole, nuclear power accounted for 0.03 percent of electricity generation (Table A.16).

The use of geothermal energy in electricity production rose between 1980 and 2000 both in the world and in the OIC. However, it still accounts for a small share of the generation. Its share rose from 0.4 to 1.6 percent in the world and from 0.04 to 0.45 percent in the OIC group between 1980 and 2000. In 2000, Indonesia and Turkey were the only OIC member countries to generate electricity using geothermal energy, which formed 4.6 and 0.3 percent of their total electricity sources respectively (Table A.16).

## **5. ENERGY AND THE ENVIRONMENT**

### **5.1. Emissions**

Carbon dioxide (CO<sub>2</sub>) emissions account for the largest share of greenhouse gases which are associated with global warming. There are two major human-caused sources of carbon dioxide: the combustion of fossil fuels and changes in land use. In combustion, different fossil fuels emit different amounts of CO<sub>2</sub> for the same level of energy use. Burning oil emits about 50 percent more CO<sub>2</sub> than burning natural gas, and burning coal emits about twice as much.

In 2000, carbon dioxide emissions from the consumption and flaring of fossil fuels amounted to 6,443 million metric tons of carbon equivalent in the world. The two geographical groupings to emit the most carbon dioxide were North America and Asia and Oceania, which emitted 1,970 and 1,833 million metric tons, together forming 59 percent of the world total. Western Europe emitted around 1,000 million metric tons. 663 million metric tons (equivalent to 10.3 percent of the world total) originated in the OIC member countries, of which 531

million metric tons (equivalent to 8.2 percent of the world total) were emitted in 13 member countries (Table A.18).

On per capita terms, the OIC group has a relatively low emission rate compared to the world and geographical groupings. In 2000, the per capita CO<sub>2</sub> emission in the OIC region was 0.5 metric tons equivalent, less than half of the world average of 1.1 metric tons. On the other hand, North America (4.5) and Western Europe (2.1) both had higher per capita CO<sub>2</sub> emissions in comparison to the world average (Table A.18).

## **5.2. Energy Efficiency**

CO<sub>2</sub> emissions are closely related to the concept of “energy efficiency” which encompasses all changes that result in decreasing the amount of energy used to produce one unit of economic activity or to meet the energy requirements for a given level of comfort (World Energy Council 2001, p.2).

If energy were used more efficiently, carbon emissions would decrease. For this purpose, many countries have developed energy efficiency policies. These include all public interventions (policy measures) aiming at improving the energy efficiency of a country, through adequate pricing, institutional setting, regulations and economic or fiscal incentives (World Energy Council 2001, p.3).

In order to analyse the situation of energy efficiency in the OIC member countries, we can use the measurement of GDP per unit of energy use, which is the Purchasing Power Parity (PPP) GDP per kilogram of oil equivalent of commercial energy use. In the OIC group, the ratio of GDP (in \$PPP) to energy use increased from 2.9 to 4.6 between 1980-1999, equivalent to a growth of 2.4 percent per annum. The ratio of the OIC in 1999 was higher than the world average (4.4) and only lower than the ratio of the high income countries (4.8) among the groups examined. Nevertheless, the OIC’s growth rate for this ratio between 1980 and 1999 was the lowest among these groups (Table 9).

**Table 9. Energy Efficiency, 1980-1999**

	GDP per unit of energy use		
	PPP \$ per kg oil equivalent		Growth Rate (%)
	1980	1999	1980-1999
OIC-LDC	3.6	6.9	3.6
OIC-MIC	3.0	5.0	2.8
OIC-OEC	3.1	3.2	0.1
OIC-TC	-	2.3	-
OIC	2.9	4.6	2.4
World	2.2	4.4	3.7
Low Income	1.9	3.6	3.4
Middle Income	2.3	4.0	3.0
High Income	2.2	4.8	4.2

Source: Calculated using Table A.19.

In 1980 and 1999, the OIC-LDC group had the highest ratio of GDP to energy use among the groups examined. The group also witnessed the highest growth in the ratio in this period within the OIC (3.6 percent per annum). On the other hand, the lowest growth rate was observed in the OIC-OEC group (0.1 percent per annum) (Table 9).

## 6. CONCLUSION

The OIC's energy consumption was much lower than its production during the last two decades. The least-developed countries in the OIC accounted for less than 3 percent of the OIC energy consumption in 2000. Moreover, the per capita energy consumption of the least developed OIC countries did not show any improvement in the last two decades and remained the lowest among the groups examined.

OIC member countries do not have significant coal reserves or resources. Moreover, with the exception of Indonesia, Kazakhstan and Turkey, coal production and consumption do not play an important role in the OIC's energy balance. On the other hand, OIC member countries hold three-fourths of the world's proven oil reserves and more than half of the world's natural gas reserves.

In 2000, OIC's crude oil production amounted to 31,626 thousand barrels per day, which formed 46.4 percent of the world production. However, the OIC has 113 refineries, forming 15.1 percent of the world total. Moreover, the OIC's crude oil distillation capacity was 12,092

barrels per day, forming 14.9 percent of the world crude oil distillation capacity. As a result of its insufficient refining capacity, the OIC produced 10,339 thousand barrels per day of refined petroleum products, forming 32.7 percent of its crude oil production. A goal for the oil exporting OIC member countries in the following years could be to develop their refining capacities to increase their share in the world finished petroleum product market.

Similarly, the OIC's natural gas exports make up 32 percent of the world total. However, most of these exports are being exported in the form of liquefied natural gas, as the OIC member countries do not have a developed pipeline to transport them as dry natural gas. The OIC member countries that export natural gas may explore which method of natural gas transportation will benefit them in the long run and may diversify accordingly.

The OIC member countries generated only 6.6 percent of the world's hydroelectric power generation in 2000, which is 8 percentage points less compared to two decades earlier. The main reason for this was that most OIC member countries that depended on hydropower for electricity generation diversified their sources over the past two decades. On the other hand, there were other OIC member countries in which the share of hydropower in electricity generation increased over the last two decades to more than 90 percent in 2000.

Traditional fuel use—which includes using wood, vegetable residues and animal residues—still constitutes an important share of energy use in certain OIC member countries. Most of those countries belong to the OIC-LDC group, in which traditional fuel use makes up around 57 percent of energy use, in comparison to the world average of 8 percent. Those countries need to concentrate more on energy efficiency in order to make the best use of their traditional fuels and intensify the transition to modern fuels to lessen the harmful effects of traditional fuel use. Given that every country in the world once used traditional fuels as its main source of energy, the experience of the developed countries should provide useful examples of the best way to switch to modern fuels.

It was observed that while the share of fossil fuels in electricity generation decreased in the world as a whole in the last two decades, it increased in the OIC group. In the world as a whole, the share of coal



and gas in electricity generation increased while that of oil decreased. The same trend was observed in the OIC as a whole, but the increase in the share of coal and gas was able to offset the nearly 20 percentage point fall in the share of oil in electricity generation. While nuclear power formed around 17 percent of the world's electricity generation in 2000, it formed only 0.03 percent of the OIC total.

In 2000, carbon dioxide emissions from the consumption and flaring of fossil fuels amounted to 6,443 million metric tons of carbon equivalent in the world. The two geographical groupings to emit the most carbon dioxide were North America and Asia and Oceania, together making up 59 percent of the world total. Western Europe emitted around 15.5 percent of the world total. 663 million metric tons (equivalent to 10.3 percent of the world total) originated in the OIC member countries, of which 531 million metric tons (equivalent to 8.2 percent of the world total) were emitted in 13 member countries. On per capita terms, the OIC group had a relatively low emission rate compared to the world and geographical groupings. In 2000, the per capita CO<sub>2</sub> emission in the OIC was 0.5 metric tons equivalent, less than half of the world average of 1.1 metric tons.

Energy consumption or usage is the most important indicator of growth and development. While the OIC member countries have rich natural resources that serve as primary energy sources, they fall behind in terms of energy consumption compared to the world and geographical groupings consisting of developed countries. For this purpose, investments should be encouraged to improve the performance of the OIC member countries in this respect. Additionally, increasing cooperation among OIC member countries in the field of energy could also contribute to the improvement of the current situation.

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**Table A.1: Primary Energy Production and Consumption in the OIC,  
1980-2000**  
(Trillion (10<sup>12</sup>) BTU)

Country	Production			Consumption		
	1980	1990	2000	1980	1990	2000
Afghanistan	73.1	119.3	11.0	27.0	109.0	22.4
Bangladesh	53.5	163.5	351.6	128.0	253.2	495.2
Benin	0.0	9.0	4.3	7.4	8.8	13.4
Burkina Faso	0.0	0.1	0.9	6.1	7.0	11.2
Chad	0.0	0.0	0.0	4.1	5.3	2.5
Comoros	0.0	0.0	0.0	0.6	1.2	1.3
Djibouti	0.0	0.0	0.0	22.1	23.2	24.1
Gambia	0.0	0.0	0.0	2.2	2.7	3.0
Guinea	1.5	1.8	4.3	13.7	21.8	21.4
Guinea-Bissau	0.0	0.0	0.0	1.2	3.9	4.2
Maldives	0.0	0.0	0.0	0.2	1.4	4.2
Mali	0.9	1.9	2.7	7.0	8.4	10.9
Mauritania	0.3	0.3	0.2	9.2	13.5	48.0
Mozambique	145.0	4.0	72.6	175.6	22.6	30.5
Niger	0.6	4.8	3.9	9.8	15.8	16.3
Senegal	0.0	0.0	1.3	37.0	35.7	63.7
Sierra Leone	0.0	0.0	0.0	10.6	14.8	12.9
Somalia	0.0	0.0	0.0	16.6	14.0	8.3
Sudan	5.1	9.9	356.5	52.3	63.5	75.4
Togo	0.0	0.1	0.0	10.5	9.0	18.8
Uganda	6.6	7.9	16.5	13.9	18.6	29.0
Yemen	0.0	403.3	922.0	96.1	159.8	139.8
<b>OIC-LDC</b>	286.7	725.7	1,747.9	651.1	813.1	1,056.6
Cameroon	140.3	376.7	221.4	47.1	77.5	81.9
Côte d'Ivoire	16.2	18.0	82.5	73.9	77.7	108.1
Egypt	1,452.6	2,361.3	2,658.3	706.5	1,435.2	2,036.6
Guyana	0.1	0.1	0.1	21.4	9.4	21.3
Indonesia	4,208.8	5,265.9	7,643.7	1,115.0	2,262.2	3,854.8
Jordan	0.0	5.7	11.2	77.0	145.1	222.0
Lebanon	8.7	3.1	2.6	106.4	74.0	241.7
Malaysia	661.0	2,032.6	3,205.9	419.0	978.4	1,855.5
Morocco	42.7	32.5	18.0	226.2	309.1	419.6
Pakistan	427.1	818.4	1,218.7	631.5	1,180.0	1,914.2
Suriname	9.2	21.2	37.2	40.6	36.6	30.6
Syria	411.0	1,032.5	1,466.2	273.6	591.6	823.8
Tunisia	244.5	215.8	247.2	128.1	201.5	293.7
Turkey	417.5	857.0	1,011.1	994.3	1,968.5	3,203.4
<b>OIC-MIC</b>	8,039.7	13,040.6	17,824.0	4,860.7	9,346.9	15,107.2
Algeria	2,803.3	4,733.8	6,206.1	800.9	1,215.2	1,231.3
Bahrain	220.2	312.6	409.6	137.5	256.1	371.7

**Table A.1: Primary Energy Production and Consumption in the OIC,  
1980-2000 (continued)**  
(Trillion (10<sup>12</sup>) BTU)

Brunei	945.8	723.6	853.6	82.0	70.2	75.4
Gabon	382.4	590.7	710.3	28.4	43.2	50.5
Iran	3,943.8	7,670.3	10,435.8	1,582.7	3,106.2	4,716.3
Iraq	5,450.0	4,542.4	5,621.4	524.0	915.4	1,087.4
Kuwait	3,989.8	2,832.5	5,139.5	480.9	445.9	993.6
Libya	4,029.2	3,183.2	3,297.7	397.4	509.2	576.0
Nigeria	4,495.2	4,069.4	5,135.6	421.7	696.5	830.8
Oman	638.4	1,587.8	2,363.8	64.7	183.4	343.7
Qatar	1,199.5	1,200.4	2,819.2	214.3	351.3	660.1
Saudi Arabia	22,434.2	15,920.3	21,120.1	1,663.3	3,148.4	4,567.0
UAE	3,887.8	5,512.4	6,820.8	267.3	1,227.9	1,736.2
<b>OIC-OEC</b>	<b>54,419.7</b>	<b>52,879.3</b>	<b>70,933.6</b>	<b>6,665.2</b>	<b>12,168.9</b>	<b>17,240.1</b>
Albania	155.6	127.1	65.2	151.3	109.3	77.8
Azerbaijan	588.2	779.5	836.8	595.4	988.1	531.2
Kazakhstan	3,048.2	3,771.9	2,940.8	3,048.2	3,370.3	1,786.7
Kyrgyzstan	86.9	133.6	156.1	68.1	278.1	221.3
Tajikistan	78.8	174.1	147.9	65.5	289.8	243.0
Turkmenistan	318.9	2,344.1	2,048.4	315.5	290.6	368.8
Uzbekistan	183.2	1,786.3	2,416.7	191.3	1,658.0	1,922.4
<b>OIC-TC</b>	<b>4,459.8</b>	<b>9,116.6</b>	<b>8,612.0</b>	<b>4,435.3</b>	<b>6,984.2</b>	<b>5,151.1</b>
<b>OIC</b>	<b>67,205.8</b>	<b>75,762.2</b>	<b>99,117.4</b>	<b>16,612.3</b>	<b>29,313.2</b>	<b>38,555.0</b>
<b>World Total</b>	<b>289,262.2</b>	<b>353,471.5</b>	<b>397,479.5</b>	<b>284,869.8</b>	<b>349,315.9</b>	<b>397,404.3</b>
OIC % of world	23.23	21.43	24.94	5.83	8.39	9.70

Source: Energy Information Administration (2003A).

**Table A.2: Per Capita Primary Energy Consumption,  
1980-2000 (Million British Thermal Units)**

<b>Country</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>
Afghanistan	1.7	6.8	0.8
Bangladesh	1.4	2.3	3.6
Benin	2.1	1.9	2.2
Burkina Faso	0.9	0.8	1.0
Chad	0.9	0.9	0.3
Comoros	1.7	2.2	1.8
Djibouti	61.3	44.6	38.3
Gambia	3.7	2.9	2.2
Guinea	2.5	3.8	2.6
Guinea-Bissau	1.6	4.0	3.5
Maldives	1.4	6.2	14.6
Mali	1.0	1.0	1.0
Mauritania	5.9	6.8	18.0
Mozambique	14.5	1.6	1.7
Niger	1.8	2.1	1.5
Senegal	6.5	4.9	6.7
Sierra Leone	3.2	3.7	2.9
Somalia	3.1	1.6	0.8
Sudan	2.8	2.5	2.3
Togo	4.1	2.6	4.2
Uganda	1.1	1.1	1.3
Yemen	12.2	14.2	9.0
<b>OIC-LDC</b>	<b>3.1</b>	<b>3.1</b>	<b>3.1</b>
Cameroon	5.5	6.6	5.5
Côte d'Ivoire	8.9	6.6	6.6
Egypt	17.4	27.2	31.8
Guyana	24.6	11.7	28.0
Indonesia	7.6	12.5	18.3
Jordan	26.4	31.4	33.3
Lebanon	39.8	28.9	69.1
Malaysia	30.6	55.1	79.8
Morocco	11.3	12.8	14.6
Pakistan	7.6	10.5	13.0
Suriname	116.0	91.5	71.2
Syria	31.4	48.8	50.5
Tunisia	20.0	24.7	30.7
Turkey	22.4	34.9	47.5
<b>OIC-MIC</b>	<b>12.5</b>	<b>18.8</b>	<b>24.9</b>

**Table A.2: Per Capita Primary Energy Consumption, 1980-2000** (Million British Thermal Units) (continued)

<b>Country</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>
Algeria	42.9	48.6	39.4
Bahrain	404.5	512.3	538.8
Brunei	431.7	280.9	219.1
Gabon	46.6	46.5	41.7
Iran	40.3	57.0	74.1
Iraq	39.6	50.6	47.4
Kuwait	351.0	208.4	453.7
Libya	144.0	122.7	108.9
Nigeria	5.2	8.0	7.2
Oman	66.0	112.5	135.3
Qatar	931.8	717.0	985.2
Saudi Arabia	177.5	211.7	224.4
United Arab Emirates	264.7	639.5	560.1
<b>OIC-OEC</b>	<b>39.6</b>	<b>57.5</b>	<b>64.0</b>
Albania	56.7	33.5	24.8
Azerbaijan	96.6	137.4	66.0
Kazakhstan	204.3	200.5	120.2
Kyrgyzstan	18.8	63.3	45.2
Tajikistan	16.6	54.7	36.9
Turkmenistan	110.3	79.2	76.0
Uzbekistan	12.0	80.8	76.4
<b>OIC-TC</b>	<b>88.6</b>	<b>114.2</b>	<b>76.4</b>
<b>OIC</b>	<b>20.4</b>	<b>28.4</b>	<b>30.0</b>
<b>World Total</b>	<b>64.3</b>	<b>66.5</b>	<b>65.4</b>
Far East and Oceania	20.0	25.4	31.4
Central and South America	39.4	40.7	50.4
Africa	14.2	16.9	14.8
Eastern Europe & Former U.S.S.R.	170.0	190.3	131.6
Western Europe	135.5	140.1	148.9
North America	285.2	278.9	287.1
Middle East	63.6	85.5	101.8

Source: Energy Information Administration (2003A).

**Table A.3: Recoverable Coal, Coal Production and Consumption, 2000**  
(Million short tons)

	<b>Estimated Recoverable Coal</b>	<b>Coal Production</b>	<b>Coal Consumption</b>
Afghanistan	72.80		
Albania		0.05	0.05
Algeria	44.10	0.02	0.88
Bangladesh			0.10
Egypt	24.30	0.44	2.16
Indonesia	5,919.40	73.88	12.73
Iran	1,885.00	1.39	2.15
Kazakhstan	37,478.60	82.44	67.59
Kyrgyzstan	895.10	0.77	1.66
Lebanon			0.22
Libya			0.01
Malaysia	4.40	0.22	3.34
Morocco	233.70	0.11	3.60
Mozambique		0.02	
Niger	77.20	0.17	0.17
Nigeria	209.40	0.07	0.07
Pakistan	2,496.70	3.86	4.86
Tajikistan		0.02	0.13
Tunisia			0.14
Turkey	4,066.40	74.19	90.82
Uzbekistan	4,409.20	3.27	3.20
<b>OIC Total</b>	<b>57,816.20</b>	<b>240.93</b>	<b>193.88</b>
North America	282,444	1,161.28	1,160.71
C. & South Amer.	23,977	37.35	58.93
Western Europe	101,343	701.60	489.97
Eastern Europe	290,183	795.07	789.89
Middle East	1,885	12.41	1.39
Africa	61,032	189.90	333.30
Asia & Oceania	322,394	2,248.51	2,224.98
<b>World Total</b>	<b>1,083,259.00</b>	<b>5,059.00</b>	<b>5,146.00</b>

Source: Energy Information Administration (2003E).



**Table A.4: Crude Oil and Natural Gas Reserves and Reserves to Production Ratios**

Country/Region	Crude Oil		Natural Gas	
	Reserves (Thousand Barrels)	Reserves to Production Ratio (Years)	Reserves (Billion Cubic Feet)	Reserves to Production Ratio (Years)
Afghanistan	-	-	3,530.0	434.6
Albania	165.0	23.6	100.0	141.6
Algeria	9,200.0	7.4	159,700.0	54.3
Azerbaijan	1,178.0	4.2	4,400.0	22.0
Bahrain	148.1	3.9	3,875.0	12.8
Bangladesh	56.9	22.8	10,615.0	31.0
Benin	8.2	8.2	43.0	-
Brunei	1,350.0	7.0	13,800.0	39.5
Cameroon	400.0	4.7	3,900.0	-
Côte d'Ivoire	100.0	8.7	1,050.0	22.2
Egypt	2,947.6	3.9	35,180.0	54.4
Gabon	2,499.0	7.7	1,200.0	339.8
Indonesia	4,979.7	3.5	72,268.0	30.6
Iran	89,700.0	24.3	812,300.0	381.8
Iraq	112,500.0	43.8	109,800.0	987.0
Jordan	0.9	22.3	230.0	22.5
Kazakhstan	5,417.0	9.0	65,000.0	206.8
Kyrgyzstan	-	-	-	-
Kuwait	96,500.0	45.4	52,700.0	155.4
Libya	29,500.0	20.9	46,400.0	219.0
Malaysia	3,900.0	5.7	81,700.0	54.5
Morocco	1.8	4.5	47.0	26.6
Mozambique	-	-	2,000.0	943.9
Nigeria	22,500.0	10.5	124,000.0	281.8
Oman	5,506.0	5.9	29,280.0	91.0
Pakistan	208.0	3.8	21,600.0	25.2
Qatar	13,157.0	17.8	393,830.0	383.2
Saudi Arabia	261,700.0	31.1	213,800.0	121.5
Senegal	-	-	-	-
Somalia	-	-	200.0	-
Sudan	262.1	1.4	3,000.0	-
Suriname	74.0	6.2	-	-
Syria	2,500.0	4.8	8,500.0	39.5

**Table A.4: Crude Oil and Natural Gas Reserves and Reserves to Production Ratios** (continued)

Country/Region	Crude Oil		Natural Gas	
	Reserves (Thousand Barrels)	Reserves to Production Ratio (Years)	Reserves (Billion Cubic Feet)	Reserves to Production Ratio (Years)
Tajikistan	-	-	0.0	0.0
Tunisia	307.6	3.9	2,750.0	41.4
Turkey	295.8	5.6	310.0	13.7
Turkmenistan	546.0	3.9	101,000.0	61.5
United Arab Emirates	97,800.0	41.3	212,100.0	150.8
Uzbekistan	594.0	6.5	66,200.0	33.2
Yemen	4,000.0	9.1	16,900.0	-
<b>OIC Total</b>	<b>770,002.6</b>	<b>24.3</b>	<b>2,673,308.0</b>	<b>123.9</b>
% of world	74.9		50.5	
<b>World Total</b>	<b>1,028,132.4</b>	<b>15.1</b>	<b>5,288,504.0</b>	<b>60.1</b>
North America	55,011.1	5.1	268,831.0	10.0
Central & South America	94,548.7	14.8	244,616.0	71.4
Western Europe	17,355.1	2.8	161,799.0	16.0
E. Europe & Former Russia	58,854.7	7.5	1,999,170.0	76.2
Asia & Oceania	43,957.5	5.8	365,128.0	38.8
Middle East	683,515.9	31.3	1,854,785.0	243.4
Africa	74,889.4	10.0	394,175.0	89.0

Source: Energy Information Administration (2003B).

**Table A.5: Crude Oil Production**  
(Thousand Barrels per Day)

Country	1980	1990	2000
Albania	44.0	30.0	7.0
Algeria *	1,106.0	1,175.0	1,243.9
Azerbaijan	162.7	213.5	280.0
Bahrain	48.0	42.0	38.0
Bangladesh	0.0	0.8	2.5
Benin	0.0	4.0	1.0
Brunei	235.0	150.0	193.0
Cameroon	58.0	161.0	84.8
Côte d'Ivoire	1.0	2.0	11.5
Egypt	595.0	873.0	748.0
Gabon	175.0	270.0	325.0
Indonesia *	1,577.0	1,462.0	1,423.4
Iran *	1,662.0	3,088.0	3,696.3
Iraq *	2,514.0	2,040.0	2,570.7
Kazakhstan	329.3	444.0	598.6
Kuwait *	1,656.0	1,175.0	2,126.5
Kyrgyzstan	2.3	2.1	2.0
Libya *	1,787.0	1,375.0	1,410.0
Malaysia	283.0	619.0	690.0
Morocco	1.0	0.3	0.4
Nigeria *	2,055.0	1,810.0	2,144.0
Oman	282.0	685.0	940.5
Pakistan	10.0	62.0	54.4
Qatar *	472.0	406.0	737.2
Saudi Arabia *	9,900.0	6,410.0	8,403.8
Sudan	0.0	0.0	186.0
Suriname	0.0	3.9	12.0
Syria	164.0	388.0	522.8
Tajikistan	3.3	1.1	0.4
Tunisia	110.0	93.0	78.7
Turkey	46.0	73.0	52.7
Turkmenistan	67.8	98.0	141.6
United Arab Emirates *	1,709.0	2,117.0	2,367.8
Uzbekistan	13.8	35.5	91.3
Yemen	0.0	193.0	440.0
<b>OIC Total</b>	<b>27,069</b>	<b>25,502</b>	<b>31,626</b>
% of world	45.4	42.1	46.4

**Table A.5: Crude Oil Production**  
(Thousand Barrels per Day) (continued)

<b>Country</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>
<b>OPEC OICs</b>	<b>24,438</b>	<b>21,058</b>	<b>26,124</b>
% of OIC	90.3	82.6	82.6
<b>World Total</b>	<b>59,600</b>	<b>60,566</b>	<b>68,103</b>
Africa	6,125	6,432	7,469
Central and South America	3,647	4,318	6,397
East. Europe and FSU	12,038	11,216	7,888
Middle East	18,442	16,545	21,844
North America	11,968	11,461	10,811
Western Europe	2,531	4,125	6,167
Asia and Oceania	4,848	6,468	7,529

Source: Energy Information Administration (2003B).

\* OPEC-OIC countries.

**Table A.6: Crude Oil Trade, 1999** (Barrels per Day)

<b>Region/Country</b>	<b>Crude Oil Imports</b>	<b>Crude Oil Exports</b>
Albania	100	0
Algeria *	5,320	743,503
Azerbaijan	0	83,862
Bahrain	224,900	0
Bangladesh	23,800	0
Brunei	0	190,558
Cameroon	0	75,000
Côte d'Ivoire	72,240	0
Egypt	0	284,200
Gabon	0	314,151
Indonesia *	230,140	821,400
Iran *	0	2,530,900
Iraq *	0	2,024,900
Jordan	69,940	0
Kazakhstan	14,973	463,206
Kuwait *	0	948,100
Kyrgyzstan	1,300	0
Lebanon	0	0
Libya *	0	1,068,900
Morocco	142,020	0
Nigeria *	0	1,834,200
Oman	0	845,955
Pakistan	89,520	8,918
Qatar *	0	655,500
Saudi Arabia *	0	6,513,700
Senegal	17,075	0
Sudan	0	57,260
Syria	5,670	306,717
Tajikistan	0	118
Tunisia	21,460	68,631
Turkey	463,791	0
Turkmenistan	12,000	39,298
United Arab Emirates *	0	2,009,000
Uzbekistan	1,400	4,814
Yemen	0	319,620
<b>OIC Total</b>	<b>1,395,649</b>	<b>22,212,411</b>
% of world	3.7	58.5
<b>OPEC-OICs</b>	<b>235,460</b>	<b>19,150,103</b>

**Table A.6: Crude Oil Trade, 1999** (Barrels per Day) (continued)

<b>Region/Country</b>	<b>Crude Oil Imports</b>	<b>Crude Oil Exports</b>
% of OIC	16.9	86.2
% of world	0.6	50.5
<b>World Total</b>	<b>37,307,888</b>	<b>37,949,044</b>
Africa	744,459	5,568,750
Asia & Oceania	11,929,926	2,261,444
Central & South America	1,742,907	3,077,624
E. Europe & Former U.S.S.R.	1,447,297	3,254,514
Middle East	542,578	16,154,392
North America	9,566,543	2,756,950
Western Europe	11,334,178	4,875,372

Source: Energy Information Administration (2003B).

\* OPEC-OIC countries.

**Table A.7: Crude Oil Refining Capacity, 2001 (Barrels per Day)**

Region/Country	Number of Refineries	Crude Oil Distillation	Catalytic Cracking	Thermal Cracking	Reforming
Albania	2	26,300	0	0	3,500
Algeria *	4	502,665	0	0	88,000
Azerbaijan	2	441,808	57,750	0	24,466
Bahrain	1	248,900	41,400	19,800	15,300
Bangladesh	1	33,000	0	10,000	1,800
Brunei	1	8,600	0	0	5,700
Cameroon	1	42,000	0	0	7,000
Côte d'Ivoire	1	65,200	0	0	12,827
Egypt	9	726,250	0	0	33,540
Gabon	1	17,300	0	7,200	1,400
Indonesia *	8	992,745	101,450	58,860	92,970
Iran *	9	1,484,000	30,000	156,800	160,570
Iraq *	8	417,500	0	0	43,500
Jordan	1	90,400	4,000	0	10,900
Kazakhstan	3	427,093	38,356	30,071	59,452
Kuwait *	3	763,800	41,400	0	13,500
Kyrgyzstan	1	10,000	0	0	0
Lebanon	2	37,500	7,250	0	7,442
Libya *	3	343,400	0	0	20,250
Malaysia	6	513,600	0	0	75,050
Morocco	2	156,630	5,600	0	24,765
Nigeria *	4	438,750	82,700	0	70,070
Oman	1	85,000	0	0	16,000
Pakistan	3	238,850	0	0	11,500
Qatar *	1	57,500	0	0	11,500
Saudi Arabia *	8	1,745,000	103,600	138,100	193,360
Senegal	1	27,000	0	0	2,000
Sierra Leone	1	10,000	0	0	0
Somalia	1	10,000	0	0	0
Sudan	3	121,700	0	0	1,900
Suriname	1	7,000	0	2,800	0
Syria	2	242,140	0	25,000	25,812
Tunisia	1	34,000	0	0	3,300
Turkey	6	694,115	37,740	24,340	64,762
Turkmenistan	2	236,970	15,151	0	52,540
United Arab Emirates *	4	443,500	19,150	0	14,000
Uzbekistan	3	222,271	0	9,585	23,487
Yemen	2	130,000	0	0	14,500
<b>OIC Total</b>	<b>113</b>	<b>12,092,487</b>	<b>585,547</b>	<b>482,556</b>	<b>1,206,663</b>
% of world	15.1	14.9	4.2	8.3	10.9

**Table A.7: Crude Oil Refining Capacity, 2001** (Barrels per Day) (continued)

Region/Country	Number of Refineries	Crude Oil Distillation	Catalytic Cracking	Thermal Cracking	Reforming
<b>OPEC-OICs</b>	<b>52</b>	<b>7,188,860</b>	<b>378,300</b>	<b>353,760</b>	<b>707,720</b>
% of OIC	46.0	59.4	64.6	73.3	58.7
<b>World Total</b>	<b>749</b>	<b>81,316,421</b>	<b>13,852,329</b>	<b>5,836,240</b>	<b>11,100,437</b>
Middle East	45	5,992,240	296,300	405,700	557,984
Africa	46	3,265,092	190,660	87,700	381,214
North America	182	20,026,621	6,534,210	2,394,642	4,173,649
Central & South America	71	6,684,555	1,232,452	434,873	426,208
Western Europe	112	14,946,506	2,221,555	1,576,398	2,234,524
Eastern Europe	88	10,235,637	751,544	513,737	1,352,079
Asia & Oceania	205	20,165,770	2,625,608	423,190	1,974,780

Source: Energy Information Administration (2003B).

\* OPEC-OIC countries.



**Table A.8: Output of Refined Petroleum Products, 2000**  
(Barrels per Day)

Region/Country	Motor Gasoline	Jet Fuel	Kerosene	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Other	Total Output of Refined Petroleum Products
Albania	559	0	1,225	1,469	1,225	8	1,733	6,219
Algeria	49,082	34,038	190	122,542	106,068	17,858	104,537	434,315
Azerbaijan	20,043	12,567	3,696	67,704	48,311	1,953	24,841	179,114
Bahrain	19,000	42,000	8,364	88,052	61,463	1,367	52,612	272,858
Bangladesh	3,146	87	5,935	5,693	1,515	453	13,650	30,478
Brunei	4,615	1,625	63	2,998	157	15	1,492	10,966
Cameroon	7,528	1,235	5,280	9,362	6,910	868	1,407	32,589
Côte d'Ivoire	12,912	2,080	11,320	22,494	8,868	1,227	4,646	63,547
Egypt	52,695	20,648	21,120	117,488	210,204	15,631	108,087	545,874
Gabon	1,468	1,257	486	3,774	5,355	370	3,437	16,147
Indonesia	206,887	24,592	165,371	294,731	206,733	27,479	85,582	1,011,375
Iran	231,400	15,000	183,000	400,000	433,000	55,000	130,763	1,448,163
Iraq	55,000	10,500	17,700	138,687	145,940	32,546	44,222	444,594
Jordan	13,541	5,308	5,238	18,258	28,247	4,704	5,441	80,737
Kazakhstan	37,896	4,940	1,500	56,474	57,366	1,288	20,557	180,020
Kuwait	35,612	37,808	74,216	189,782	162,783	114,144	235,244	849,589
Kyrgyzstan	1,445	0	0	694	710	4	71	2,924
Lebanon	0	0	0	0	0	0	0	0
Libya	47,311	31,482	6,273	95,084	82,820	9,016	45,355	317,341
Malaysia	86,349	55,813	4,879	161,823	52,274	25,021	72,222	458,382
Morocco	8,926	6,110	2,070	47,355	44,799	7,762	21,926	138,947
Nigeria	24,262	3,727	14,151	21,951	26,965	329	11,616	103,000

**Table A.8: Output of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

Region/Country	Motor Gasoline	Jet Fuel	Kerosene	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Other	Total Output of Refined Petroleum Products
Oman	14,000	4,528	63	17,401	37,487	1,943	2,363	77,786
Pakistan	26,546	15,882	9,103	50,503	57,048	6,146	21,228	186,455
Qatar	12,632	8,750	169	14,011	17,850	3,079	2,223	58,715
Saudi Arabia	293,329	97,500	85,136	488,265	469,599	42,866	230,508	1,707,204
Senegal	3,379	1,430	444	7,953	4,551	311	696	18,763
Sudan	14,403	0	760	17,028	6,117	5,195	1,136	44,639
Syria	36,800	4,138	3,633	82,822	97,858	9,408	20,248	254,907
Tajikistan	0	0	0	0	4	0	276	280
Tunisia	8,950	0	3,548	10,953	12,397	435	4,218	40,501
Turkey	63,352	22,047	689	135,462	141,371	22,344	95,430	480,695
Turkmenistan	26,382	6,933	2,323	45,826	44,767	184	10,021	136,436
United Arab Emirates	53,000	105,000	0	100,090	77,931	14,629	116,632	467,282
Uzbekistan	39,830	6,327	2,281	38,755	32,784	513	25,252	145,742
Yemen	25,194	3,000	2,534	19,018	29,437	822	12,729	92,733
<b>OIC Total</b>	<b>1,537,474</b>	<b>586,352</b>	<b>642,759</b>	<b>2,894,502</b>	<b>2,720,911</b>	<b>424,917</b>	<b>1,532,400</b>	<b>10,339,316</b>
% in OIC Total	14.9	5.7	6.2	28.0	26.3	4.1	14.8	100.0
% of World Total	7.6	12.2	32.0	13.8	24.0	13.1	12.1	13.8
<b>OPEC-OICs</b>	<b>1,008,516</b>	<b>368,397</b>	<b>546,206</b>	<b>1,865,143</b>	<b>1,729,687</b>	<b>316,946</b>	<b>1,006,683</b>	<b>6,841,578</b>
% in OPEC-OIC Total	14.7	5.4	8.0	27.3	25.3	4.6	14.7	100.0
% of OIC	65.6	62.8	85.0	64.4	63.6	74.6	65.7	66.2
<b>World Total</b>	<b>20,110,387</b>	<b>4,786,618</b>	<b>2,010,355</b>	<b>20,972,045</b>	<b>11,313,815</b>	<b>3,252,357</b>	<b>12,698,634</b>	<b>75,144,211</b>
% in World Total	26.8	6.4	2.7	27.9	15.1	4.3	16.9	100.0

**Table A.8: Output of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

<b>Region/Country</b>	<b>Motor Gasoline</b>	<b>Jet Fuel</b>	<b>Kerosene</b>	<b>Distillate Fuel Oil</b>	<b>Residual Fuel Oil</b>	<b>Liquefied Petroleum Gases</b>	<b>Other</b>	<b>Total Output of Refined Petroleum Products</b>
Africa	443,048	156,325	105,115	654,037	651,741	73,569	369,793	2,453,628
Asia & Oceania	3,463,178	984,829	1,213,909	5,765,280	2,943,908	892,617	3,713,118	18,976,838
E. Eur & Former USSR	1,176,162	289,050	17,974	1,798,149	1,527,265	288,203	1,014,417	6,111,219
Middle East	844,347	346,923	397,752	1,623,865	1,629,220	296,628	888,715	6,027,449
Central & South America	1,587,131	379,988	49,369	1,659,593	1,196,196	263,896	830,978	5,967,151
North America	9,260,758	1,756,877	97,757	4,420,221	1,241,725	800,237	3,218,154	20,795,731
Western Europe	3,335,764	872,625	128,479	5,050,900	2,123,760	637,208	2,663,459	14,812,196

Source: Energy Information Administration (2003B).

**Table A.9: Consumption of Refined Petroleum Products, 2000**  
(Barrels per Day)

<b>Region/ Country</b>	<b>Motor Gasoline</b>	<b>Jet Fuel</b>	<b>Kerosene</b>	<b>Distillate Fuel Oil</b>	<b>Residual Fuel Oil</b>	<b>Liquefied Petroleum Gases</b>	<b>Other</b>	<b>Total Apparent Consumption</b>
Albania	2,913	498	1,584	8,440	4,355	959	2,287	21,037
Algeria	44,328	7,410	190	74,826	9,043	50,629	19,751	206,177
Azerbaijan	17,713	2,535	3,696	42,838	43,216	2,777	24,114	136,888
Bahrain	7,900	7,800	591	2,752	3,463	367	7,212	30,086
Bangladesh	6,269	2,578	11,151	27,176	5,718	453	15,453	68,799
Brunei	4,778	1,668	63	3,019	157	585	1,776	12,047
Cameroon	6,083	1,235	4,097	7,344	1,542	1,026	1,407	22,734
Côte d'Ivoire	3,915	2,080	1,478	12,160	6,702	1,575	4,989	32,900
Egypt	54,280	9,512	21,120	163,084	187,094	74,423	51,292	560,805
Gabon	816	1,235	486	4,018	2,552	561	2,475	12,143
Indonesia	213,809	12,697	209,238	407,080	133,600	31,300	28,980	1,036,704
Iran	262,938	15,000	150,000	425,978	181,516	66,527	161,357	1,263,317
Iraq	76,000	12,068	21,226	122,156	108,643	21,675	89,222	450,990
Jordan	13,890	5,243	5,111	23,496	38,838	9,078	5,419	101,076
Kazakhstan	45,948	7,497	1,500	58,094	45,784	2,588	27,338	188,748
Kuwait	39,000	8,900	630	11,963	119,436	32,235	52,257	264,422
Kyrgyzstan	4,428	823	0	7,287	5,069	257	205	18,069
Lebanon	32,000	2,708	84	36,000	27,422	5,230	2,087	105,532
Libya	44,678	11,635	4,689	46,024	56,398	15,609	31,251	210,283
Malaysia	141,677	33,020	2,682	156,687	49,399	40,266	41,292	465,024
Morocco	9,346	6,153	1,943	58,953	34,772	35,938	11,375	158,480
Nigeria	117,812	3,943	26,886	49,284	33,479	551	13,610	245,565
Oman	17,200	4,442	63	16,912	9,987	1,309	2,628	52,541
Pakistan	26,500	16,120	9,398	148,160	148,100	2,248	14,488	365,014

**Table A.9: Consumption of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

Region/ Country	Motor Gasoline	Jet Fuel	Kerosene	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Other	Total Apparent Consumption
Qatar	11,117	3,900	127	7,311	763	1,079	3,223	27,521
Saudi Arabia	227,886	50,917	4,351	366,154	182,800	225,868	363,126	1,421,101
Senegal	2,284	4,485	380	10,908	7,335	3,163	996	29,551
Sudan	6,409	2,557	760	21,736	6,299	1,011	4,334	43,106
Syria	29,063	5,677	7,582	105,223	80,535	15,049	17,395	260,524
Tajikistan	15,685	108	0	1,040	404	222	2,473	19,932
Tunisia	9,066	6,002	4,140	33,455	14,180	12,098	5,607	84,548
Turkey	83,345	25,535	797	184,768	142,992	142,305	83,547	663,289
Turkmenistan	11,140	6,933	2,323	14,009	15,215	2,719	10,021	62,361
United Arab Emirates	51,000	21,125	0	54,090	132,931	25,629	15,709	300,484
Uzbekistan	38,921	6,327	2,281	33,516	32,784	1,527	23,263	138,619
Yemen	22,000	4,000	2,534	15,957	10,821	14,007	3,298	72,617
<b>OIC Total</b>	<b>1,702,137</b>	<b>314,367</b>	<b>503,184</b>	<b>2,761,899</b>	<b>1,883,346</b>	<b>842,845</b>	<b>1,145,255</b>	<b>9,153,034</b>
% in OIC Total	18.6	3.4	5.5	30.2	20.6	9.2	12.5	100.0
% of World Total	8.6	6.9	26.2	13.6	18.0	11.3	9.2	11.9
<b>OPEC-OICs</b>	<b>1,088,568</b>	<b>147,595</b>	<b>417,336</b>	<b>1,564,867</b>	<b>958,609</b>	<b>471,102</b>	<b>778,487</b>	<b>5,426,564</b>
% in OPEC-OIC Total	20.1	2.7	7.7	28.8	17.7	8.7	14.3	100.0
% of OIC	64.0	46.9	82.9	56.7	50.9	55.9	68.0	59.3
<b>World Total</b>	<b>19,759,706</b>	<b>4,549,780</b>	<b>1,923,711</b>	<b>20,368,729</b>	<b>10,473,010</b>	<b>7,436,646</b>	<b>12,384,257</b>	<b>76,895,838</b>
% in World Total	25.7	5.9	2.5	26.5	13.6	9.7	16.1	100.0
Africa	582,425	134,510	117,196	749,894	465,090	218,498	241,125	2,508,737
Asia & Oceania	3,449,806	884,306	1,305,867	5,840,403	3,565,670	1,895,641	4,122,043	21,063,735
Central & South America	1,364,989	202,459	56,660	1,421,924	796,896	517,262	830,725	5,190,915
E. Eur & Former USSR	1,118,674	269,847	25,242	1,228,642	1,065,519	261,200	1,016,853	4,985,977

**Table A.9: Consumption of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

<b>Region/ Country</b>	<b>Motor Gasoline</b>	<b>Jet Fuel</b>	<b>Kerosene</b>	<b>Distillate Fuel Oil</b>	<b>Residual Fuel Oil</b>	<b>Liquefied Petroleum Gases</b>	<b>Other</b>	<b>Total Apparent Consumption</b>
Middle East	843,528	158,723	207,190	1,254,819	1,002,940	435,219	767,646	4,670,064
North America	9,660,773	1,896,185	102,823	4,515,007	1,599,431	3,196,656	2,803,203	23,774,078
Western Europe	2,739,512	1,003,750	108,733	5,358,039	1,977,463	912,171	2,602,664	14,702,332

Source: Energy Information Administration (2003B).

**Table A.10: Imports of Refined Petroleum Products, 2000**  
(Barrels per Day)

<b>Region/ Country</b>	<b>Motor Gasoline</b>	<b>Jet Fuel</b>	<b>Kerosene</b>	<b>Distillate Fuel Oil</b>	<b>Residual Fuel Oil</b>	<b>Liquefied Petroleum Gases</b>	<b>Other</b>	<b>Total Imports of Refined Petroleum Products</b>
Albania	2,354	498	359	6,971	3,130	1,014	555	14,881
Algeria	0	0	0	0	0	0	116	116
Azerbaijan	0	0	0	204	928	697	96	1,925
Bahrain	0	0	0	0	0	0	0	0
Bangladesh	1,911	2,340	4,942	21,483	4,859	0	1,803	37,338
Brunei	186	0	0	0	0	0	251	437
Cameroon	559	0	1,204	1,549	73	285	0	3,670
Côte d'Ivoire	1,445	0	359	1,631	2,275	539	1,998	8,246
Egypt	979	607	0	45,596	0	26,052	1,919	75,153
Gabon	140	715	275	1,325	0	285	620	3,359
Indonesia	0	0	50,984	128,614	34,792	0	0	214,390
Iran	36,000	0	0	26,000	0	0	0	62,000
Iraq	21,000	1,500	3,500	0	0	0	0	26,000
Jordan	0	0	0	4,871	11,391	4,215	0	20,478
Kazakhstan	10,278	2,687	0	4,362	2,457	1,965	7,037	28,785
Kuwait	10,000	0	0	0	0	0	24	10,024
Kyrgyzstan	3,682	888	0	6,665	4,367	254	134	15,990
Lebanon	32,000	2,708	84	36,000	27,441	5,230	2,087	105,550
Libya	0	0	0	0	0	0	574	574
Malaysia	55,748	1,972	211	43,374	25,585	8,240	2,747	137,877
Morocco	489	0	0	11,210	0	27,479	440	39,618
Nigeria	93,550	0	12,735	27,333	6,514	792	1,993	142,919

**Table A.10: Imports of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

Region/ Country	Motor Gasoline	Jet Fuel	Kerosene	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Other	Total Imports of Refined Petroleum Products
Oman	3,200	0	0	245	0	349	265	4,058
Pakistan	0	0	253	96,226	96,242	158	0	192,880
Qatar	0	0	0	0	0	0	0	0
Saudi Arabia	0	0	0	0	0	0	0	0
Senegal	0	3,098	0	3,057	3,385	2,916	281	12,737
Sudan	2,540	1,278	0	4,831	1,201	824	3,198	13,872
Syria	0	1,538	3,949	22,400	0	5,642	0	33,530
Tajikistan	15,685	108	0	1,040	400	222	2,467	19,922
Tunisia	2,773	5,828	993	21,402	11,846	8,557	4,086	55,485
Turkey	19,347	3,574	0	50,304	12,354	122,877	11,792	220,248
Turkmenistan	0	0	0	0	0	2,536	0	2,536
United Arab Emirates	0	5,000	0	5,000	85,000	0	4,000	99,000
Uzbekistan	0	0	0	0	0	0	0	0
Yemen	0	2,000	0	0	0	0	24	2,024
<b>OIC Total</b>	<b>313,868</b>	<b>36,341</b>	<b>79,850</b>	<b>571,691</b>	<b>334,239</b>	<b>221,128</b>	<b>48,506</b>	<b>1,605,623</b>
% in OIC Total	19.5	2.3	5.0	35.6	20.8	13.8	3.0	100.0
% of World Total	12.8	4.4	20.2	15.9	10.5	9.4	1.2	9.5
<b>OPEC-OICs</b>	<b>160,550</b>	<b>6,500</b>	<b>67,220</b>	<b>186,947</b>	<b>126,307</b>	<b>792</b>	<b>6,707</b>	<b>555,023</b>
% in OPEC-OIC Total	28.9	1.2	12.1	33.7	22.8	0.1	1.2	100.0
% of OIC	51.2	17.9	84.2	32.7	37.8	0.4	13.8	34.6
<b>World Total</b>	<b>2,444,529</b>	<b>823,720</b>	<b>394,493</b>	<b>3,597,439</b>	<b>3,186,463</b>	<b>2,354,816</b>	<b>4,062,415</b>	<b>16,863,876</b>
% in World Total	14.5	4.9	2.3	21.3	18.9	14.0	24.1	100.0



**Table A.10: Imports of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

<b>Region/ Country</b>	<b>Motor Gasoline</b>	<b>Jet Fuel</b>	<b>Kerosene</b>	<b>Distillate Fuel Oil</b>	<b>Residual Fuel Oil</b>	<b>Liquefied Petroleum Gases</b>	<b>Other</b>	<b>Total Imports of Refined Petroleum Products</b>
Africa	192,997	42,990	44,817	238,045	57,567	75,425	41,291	693,133
Asia & Oceania	356,974	173,281	265,913	807,846	1,238,270	960,796	1,267,202	5,070,282
Central & South America	231,891	52,171	24,182	366,142	271,768	176,971	180,838	1,303,964
E. Eur & Former USSR	137,876	14,029	4,965	148,425	103,643	86,776	52,979	548,693
Middle East	114,529	20,720	11,441	110,129	186,993	17,305	22,916	484,033
North America	590,728	185,333	3,155	359,355	518,039	401,470	953,886	3,011,966
Western Europe	819,534	335,195	40,020	1,567,497	810,183	636,073	1,543,302	5,751,805

Source: Energy Information Administration (2003B).



**Table A.11: Exports of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

Region/ Country	Motor Gasoline	Jet Fuel	Kerosene	Distillate Fuel Oil	Residual Fuel Oil	Liquefied Petroleum Gases	Other	Total Exports of Refined Petroleum Products
Oman	0	0	0	876	26,500	0	0	27,376
Pakistan	0	0	0	0	0	0	6,920	6,920
Qatar	2,470	4,225	0	6,420	17,214	62,000	0	92,330
Saudi Arabia	65,443	46,583	80,785	122,112	247,912	509,132	182,569	1,254,537
Senegal	1,095	43	63	102	600	63	19	1,987
Sudan	11,467	0	0	2,629	0	349	0	14,445
Syria	7,738	0	0	0	17,323	0	2,852	27,913
Tajikistan	0	0	0	0	0	0	270	270
Tunisia	0	0	0	0	9,280	0	2,132	11,412
Turkey	0	43	0	550	10,098	0	15,520	26,211
Turkmenistan	15,242	0	0	31,817	29,551	0	0	76,611
United Arab Emirates	2,000	94,000	0	44,500	0	202,000	148,000	490,500
Uzbekistan	909	0	0	5,238	0	0	1,989	8,136
Yemen	3,000	0	0	3,000	17,523	0	9,455	32,979
<b>OIC Total</b>	<b>148,658</b>	<b>295,526</b>	<b>216,112</b>	<b>683,887</b>	<b>1,069,977</b>	<b>1,272,996</b>	<b>903,932</b>	<b>4,591,089</b>
% in OIC Total	3.2	6.4	4.7	14.9	23.3	27.7	19.7	100,000.0
% of World Total	5.6	28.5	52.0	16.4	28.8	52.5	27.8	26.0
<b>OPEC-OICs</b>	<b>80,238</b>	<b>231,995</b>	<b>189,100</b>	<b>463,381</b>	<b>807,423</b>	<b>1,227,706</b>	<b>698,756</b>	<b>3,698,599</b>
% in OPEC-OIC Total	2.2	6.3	5.1	12.5	21.8	33.2	18.9	100,000.0
% of OIC	54.0	78.5	87.5	67.8	75.5	96.4	77.3	80.6
<b>World Total</b>	<b>2,661,023</b>	<b>1,038,054</b>	<b>415,849</b>	<b>4,171,849</b>	<b>3,718,314</b>	<b>2,423,699</b>	<b>3,252,788</b>	<b>17,681,577</b>
% in World Total	14	5	2	21	19	14	24	100,000

**Table A.11: Exports of Refined Petroleum Products, 2000** (continued)  
(Barrels per Day)

<b>Region/ Country</b>	<b>Motor Gasoline</b>	<b>Jet Fuel</b>	<b>Kerosene</b>	<b>Distillate Fuel Oil</b>	<b>Residual Fuel Oil</b>	<b>Liquefied Petroleum Gases</b>	<b>Other</b>	<b>Total Exports of Refined Petroleum Products</b>
Africa	51,856	53,408	32,757	147,794	251,460	259,415	209,696	1,006,387
Asia & Oceania	383,370	266,806	139,239	711,126	587,156	201,086	612,452	2,901,236
Central & South America	534,533	225,872	17,026	583,943	653,668	125,877	147,796	2,288,716
E. Eur & Former USSR	221,889	27,895	3,253	709,617	574,155	52,143	32,487	1,621,437
Middle East	107,896	213,475	202,004	467,935	710,575	940,240	587,365	3,229,490
North America	256,481	39,260	4,454	286,662	166,177	443,462	657,699	1,854,196
Western Europe	1,104,998	211,337	17,116	1,264,773	775,122	401,475	1,005,294	4,780,114

Source: Energy Information Administration (2003B).

**Table A.12: Natural Gas Production and Consumption**  
(Billion Cubic Feet, 1995 and 2000)

Country	Production		Consumption	
	1995	2000	1995	2000
Afghanistan	7	8	7	8
Albania	1	1	1	1
Algeria	2,052	2,940	742	726
Azerbaijan	232	200	318	200
Bahrain	229	303	229	303
Bangladesh	260	343	260	343
Brunei	330	349	34	39
Côte d'Ivoire	1	47	1	47
Egypt	439	646	439	646
Gabon	4	4	4	4
Indonesia	2,238	2,359	1,061	1,081
Iran	1,247	2,127	1,243	2,221
Iraq	112	111	112	111
Jordan	10	10	10	10
Kazakhstan	169	314	383	491
Kuwait	211	339	211	339
Kyrgyzstan	1	0.5	31	67
Libya	224	212	171	184
Malaysia	1,020	1498	485	722
Morocco	1	2	1	2
Mozambique	-	2	-	2
Nigeria	183	440	183	219
Oman	147	322	130	221
Pakistan	646	856	646	856
Qatar	477	1028	477	532
Saudi Arabia	1,343	1,759	1,343	1,759
Senegal	2	1	2	1
Syria	104	215	104	215
Tajikistan	1	1	29	44
Tunisia	12	66	58	109
Turkey	6	23	248	520
Turkmenistan	1,141	1,642	170	261
United Arab Emirates	1,106	1,407	875	970
Uzbekistan	1,695	1,992	1,349	1,511
<b>OIC Total</b>	<b>15,651</b>	<b>21,568</b>	<b>11,357</b>	<b>14,765</b>
% of world	20.1	24.5	14.6	16.9
<b>World Total</b>	<b>77,960</b>	<b>88,030</b>	<b>78,035</b>	<b>87,378</b>

Source: Energy Information Administration (2003C).

**Table A.13: Natural Gas Trade, 2000**  
(Billion Cubic Feet)

<b>Country</b>	<b>Imports</b>	<b>Exports</b>
Algeria	0	2,214
Brunei	0	310
Indonesia	0	1,278
Iran	94	0
Kazakhstan	297	120
Kyrgyzstan	67	0
Libya	0	28
Malaysia	0	776
Nigeria	0	202
Oman	0	100
Qatar	0	496
Tajikistan	43	0
Tunisia	42	0
Turkey	508	0
Turkmenistan	0	1,381
United Arab Emirates	0	245
Uzbekistan	0	480
<b>OIC</b>	<b>1,051</b>	<b>7,630</b>
% of world	4.5	32.0
<b>World</b>	<b>23,480</b>	<b>23,861</b>

Source: Energy Information Administration (2003C).

**Table A.14: World LNG Trade, 1996 (Billion Cubic Feet)**

IMPORTERS	EXPORTERS									
	United States	Algeria	Libya	UAE	Australia	Brunei	Indonesia	Malaysia	Total LNG Imports	OIC Total
<b>United States</b>		<b>35.33</b>		<b>4.95</b>					<b>40.28</b>	40.28
<b>Europe</b>		<b>677.27</b>	<b>41.92</b>	<b>35.17</b>	<b>3.57</b>				<b>757.93</b>	754.36
Belgium		149.52		2.44					151.96	151.96
France		264.76							264.76	264.76
Spain		176.5	41.92	32.74	1.45				252.61	251.16
Turkey		86.49			2.12				88.61	86.49
<b>Asia/Oceania</b>	<b>62.51</b>			<b>222.98</b>	<b>357.03</b>	<b>313.24</b>	<b>1268.56</b>	<b>641.58</b>	<b>2865.9</b>	2446.36
Japan	62.51			222.98	354.46	280.72	905.16	468.7	2294.52	1877.56
South Korea					2.58	32.53	288.84	118.62	442.57	439.99
Taiwan							74.56	54.25	128.81	128.81
<b>Total LNG Exports</b>	<b>62.51</b>	<b>712.6</b>	<b>41.92</b>	<b>263.1</b>	<b>360.6</b>	<b>313.24</b>	<b>1268.56</b>	<b>641.58</b>	<b>3664.11</b>	3241

Source: Energy Information Administration (2003C).

**Table A.15: World LNG Trade, 2001 (Billion Cubic Feet)**

IMPORTERS	EXPORTERS													Total LNG Imports	OIC Total
	United States	Trinidad and Tobago	Algeria	Libya	Nigeria	Qatar	UAE	Oman	Australia	Brunei	Indonesia	Malaysia			
<b>North America</b>	<b>0.47</b>	<b>98.01</b>	<b>64.95</b>		<b>37.97</b>	<b>22.76</b>		<b>12.05</b>	<b>2.39</b>					<b>238.59</b>	137.73
United States		98.01	64.95		37.97	22.76		12.05	2.39					238.12	137.73
Mexico	0.47													0.47	0
<b>Central/South America</b>		<b>20.48</b>						<b>1.77</b>						<b>22.25</b>	1.77
Puerto Rico		20.48						1.77						22.25	1.77
<b>Europe</b>		<b>16.35</b>	<b>818.92</b>	<b>28.32</b>	<b>234.88</b>	<b>32.84</b>	<b>5.16</b>	<b>20.77</b>						<b>1157.24</b>	1140.89
Belgium			81.93											81.93	81.93
France			347.5		36.52	5.3								389.31	389.32
Greece			17.66			0								17.66	17.66
Italy			77.23		89.59	0								166.83	166.82
Portugal					9.99	0								9.99	9.99
Spain		16.35	166.4	28.32	56.4	27.55	5.16	20.77						320.94	304.6
Turkey			128.19		42.38									170.57	170.57
<b>Asia/Oceania</b>	<b>65.75</b>					<b>540.28</b>	<b>260.91</b>	<b>210.48</b>	<b>370.38</b>	<b>325.75</b>	<b>1229.21</b>	<b>773.54</b>	<b>3776.3</b>	3340.17	
Japan	65.75					312.4	255.26	29.31	367.74	298.52	883.44	565.61	2778.02	2344.54	
South Korea						227.89	5.65	181.17	2.65	27.23	197.45	103.86	745.89	743.25	
Taiwan											148.32	104.07	252.4	252.39	
<b>Total LNG Exports</b>	<b>66.22</b>	<b>134.84</b>	<b>883.87</b>	<b>28.32</b>	<b>272.85</b>	<b>595.89</b>	<b>266.06</b>	<b>245.06</b>	<b>372.78</b>	<b>325.75</b>	<b>1229.21</b>	<b>773.54</b>	<b>5194.38</b>	4620.55	

Source: Energy Information Administration (2003C).



**Table A.16: Electricity Generation in the OIC, 1980-2000**  
(Billion kilowatthours)

Country	Total			Hydropower			Thermal		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Afghanistan	0.94	1.10	0.38	0.7	0.8	0.2	0.2	0.3	0.1
Albania	3.64	3.14	4.74	2.9	2.8	4.6	0.7	0.3	0.1
Algeria	6.68	15.15	23.56	0.2	0.1	0.1	6.4	15.0	23.5
Azerbaijan	15.00	18.58	17.56	1.1	1.7	1.5	13.9	16.9	16.0
Bahrain	1.55	3.28	5.77	0.0	0.0	0.0	1.6	3.3	5.8
Bangladesh	2.67	7.62	13.49	0.6	0.9	1.0	2.0	6.7	12.5
Benin	0.01	0.02	0.24	0.0	0.0	0.2	0.0	0.0	0.0
Brunei	0.44	1.16	2.22	0.0	0.0	0.0	0.4	1.2	2.2
Burkina Faso	0.10	0.17	0.28	0.0	0.0	0.1	0.1	0.2	0.2
Cameroon	1.43	2.68	3.62	1.4	2.6	3.5	0.1	0.1	0.1
Chad	0.04	0.09	0.09	0.0	0.0	0.0	0.0	0.1	0.1
Comoros	0.01	0.02	0.02	0.0	0.0	0.0	0.0	0.0	0.0
Côte d'Ivoire	1.71	2.22	5.00	1.3	1.3	1.0	0.4	0.9	4.0
Djibouti	0.11	0.17	0.18	0.0	0.0	0.0	0.1	0.2	0.2
Egypt	18.26	41.41	69.59	9.7	9.9	15.9	8.6	31.5	53.7
Gabon	0.51	0.90	0.85	0.3	0.7	0.6	0.3	0.2	0.3
Gambia	0.04	0.07	0.08	0.0	0.0	0.0	0.0	0.1	0.1
Guinea	0.36	0.50	0.77	0.1	0.2	0.4	0.2	0.3	0.4
Guinea-Bissau	0.01	0.04	0.06	0.0	0.0	0.0	0.0	0.0	0.1
Guyana	0.39	0.29	0.51	0.0	0.0	0.0	0.4	0.3	0.5
Indonesia	13.53	46.49	92.58	3.0	10.1	13.0	10.6	35.3	75.0
Iran	21.26	55.86	120.33	5.6	6.0	6.9	15.7	49.8	113.4
Iraq	10.74	20.72	27.30	0.7	0.6	0.5	10.1	20.1	26.8

**Table A.16: Electricity Generation in the OIC, 1980-2000** (continued)  
(Billion kilowatthours)

Country	Total			Hydropower			Thermal		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Jordan	1.00	3.43	6.93	0.0	0.0	0.0	1.0	3.4	6.9
Kazakhstan	61.50	78.56	48.69	5.7	6.8	6.6	55.8	71.3	42.1
Kuwait	8.82	19.37	31.20	0.0	0.0	0.0	8.8	19.4	31.2
Kyrgyzstan	9.20	11.73	14.68	4.9	9.2	13.6	4.3	2.5	1.1
Lebanon	2.62	1.43	7.95	0.8	0.3	0.3	1.8	1.1	7.7
Libya	4.53	15.79	19.40	0.0	0.0	0.0	4.5	15.8	19.4
Malaysia	10.19	23.95	63.07	1.4	3.9	7.6	8.8	20.0	55.5
Maldives	0.00	0.02	0.11	0.0	0.0	0.0	0.0	0.0	0.1
Mali	0.10	0.24	0.46	0.1	0.2	0.3	0.0	0.1	0.2
Mauritania	0.09	0.13	0.15	0.0	0.0	0.0	0.1	0.1	0.1
Morocco	4.92	9.09	14.24	1.5	1.2	1.2	3.4	7.9	13.0
Mozambique	13.83	0.62	7.02	13.4	0.3	6.8	0.4	0.3	0.3
Niger	0.12	0.16	0.22	0.0	0.0	0.0	0.1	0.2	0.2
Nigeria	6.87	12.03	15.90	2.7	4.3	5.7	4.1	7.7	10.2
Oman	0.90	5.02	8.10	0.0	0.0	0.0	0.9	5.0	8.1
Pakistan	14.51	36.35	62.69	8.6	16.8	22.1	5.9	19.2	40.2
Qatar	2.28	4.53	9.20	0.0	0.0	0.0	2.3	4.5	9.2
Saudi Arabia	20.45	64.90	123.50	0.0	0.0	0.0	20.5	64.9	123.5
Senegal	0.60	0.86	1.32	0.0	0.0	0.0	0.6	0.9	1.3
Sierra Leone	0.19	0.21	0.25	0.0	0.0	0.0	0.2	0.2	0.2
Somalia	0.11	0.25	0.25	0.0	0.0	0.0	0.1	0.2	0.3
Sudan	0.96	1.47	1.97	0.5	0.9	1.0	0.5	0.5	1.0
Suriname	1.52	1.50	1.41	0.9	1.2	0.9	0.6	0.3	0.5

**Table A.16: Electricity Generation in the OIC, 1980-2000** (continued)  
(Billion kilowatthours)

Country	Total			Hydropower			Thermal		
	1980	1990	2000	1980	1990	2000	1980	1990	2000
Syria	3.73	11.20	19.70	2.5	5.6	7.0	1.2	5.6	12.7
Tajikistan	13.60	16.61	14.25	12.7	15.8	14.0	0.9	0.8	0.3
Togo	0.01	0.06	0.10	0.0	0.0	0.0	0.0	0.1	0.1
Tunisia	2.62	5.21	10.30	0.0	0.0	0.1	2.6	5.2	10.2
Turkey	23.32	55.25	119.18	11.2	22.9	30.6	12.0	32.3	88.3
Turkmenistan	6.70	12.39	9.26	0.0	0.0	0.0	6.7	12.4	9.3
Uganda	0.63	0.77	1.60	0.6	0.8	1.6	0.0	0.0	0.0
United Arab Emirates	5.90	16.06	38.70	0.0	0.0	0.0	5.9	16.1	38.7
Uzbekistan	33.90	48.17	44.08	4.9	6.2	5.8	29.0	42.0	38.3
Yemen	0.47	1.56	3.20	0.0	0.0	0.0	0.5	1.6	3.2
<b>OIC Total</b>	<b>355.62</b>	<b>680.54</b>	<b>1,088.26</b>	<b>100.21</b>	<b>134.22</b>	<b>174.73</b>	<b>255.27</b>	<b>544.34</b>	<b>908.26</b>
<b>World Total</b>	<b>8,041.31</b>	<b>11,340.88</b>	<b>14,694.56</b>	<b>1,736.8</b>	<b>2,167.3</b>	<b>2,649.1</b>	<b>5,589.0</b>	<b>7,139.5</b>	<b>9,371.0</b>

**Table A.16: Electricity Generation in the OIC, 1980-2000** (continued)  
(Billion kilowatthours)

Country	Nuclear			Geothermal		
	1980	1990	2000	1980	1990	2000
Indonesia				0.0	1.1	4.6
Kazakhstan	0.0	0.475	0.0			
Pakistan	0.0	0.364	0.38			
Turkey				0.13	0.1	0.3
<b>OIC Total</b>	<b>0.00</b>	<b>0.84</b>	<b>0.38</b>	<b>0.13</b>	<b>1.15</b>	<b>4.89</b>
<b>World Total</b>	<b>684.4</b>	<b>1,905.1</b>	<b>2,434.2</b>	<b>31.1</b>	<b>129.0</b>	<b>240.3</b>

Source: Energy Information Administration (2003D).

Note: 1980 values for Former USSR members were calculated using data in *World Development Indicators 2002*.

1992 values for those countries were substituted for 1990 values.

**Table A.17: Sources of Electricity Production, 1980-1999** (Percentages)

Country/Region	Sources of electricity (percentages)									
	Hydropower		Coal		Oil		Gas		Nuclear power	
	1980	1999	1980	1999	1980	1999	1980	1999	1980	1999
Albania	79.4	97.1			20.6	2.9				
Algeria	3.6	2.9			12.2	2.8	84.1	94.3		
Azerbaijan	7.3	8.3			92.7	72.0		19.8		
Bangladesh	24.8	5.8			26.6	9.3	48.6	85.0		
Benin		4.3			100.0	95.7				
Cameroon	93.9	98.8			6.1	1.2				
Côte d'Ivoire	77.3	24.1			22.7	10.3		65.6		
Egypt	51.8	22.3			27.7	28.6	20.5	49.1		
Gabon	49.1	71.3			50.9	17.8		10.9		
Indonesia	16.0	11.1		30.1	84.0	19.0		36.5		
Iran	25.1	4.4			50.1	19.0	24.8	76.5		
Iraq	6.1	2.0			93.9	98.0				
Jordan		0.2			100.0	89.4		10.4		
Kazakhstan	9.3	12.9		72.0	90.7	6.4		8.7		
Kuwait					20.1	77.3	79.9	22.7		
Kyrgyzstan	53.1	92.3		3.9	46.9			3.9		
Lebanon	30.9	4.1			69.1	95.9				
Libya					100.0	100.0				
Malaysia	13.9	11.5		2.5	84.9	8.3	1.2	77.6		
Morocco	28.9	5.9	19.5	49.7	51.6	44.4				
Mozambique	65.2	99.6	17.5		17.3	0.4		0.0		
Nigeria	39.0	35.0	0.4		45.1	24.2	15.5	40.8		

**Table A.17: Sources of Electricity Production, 1980-1999 (Percentages) (continued)**

Country/Region	Sources of electricity (percentages)									
	Hydropower		Coal		Oil		Gas		Nuclear power	
	1980	1999	1980	1999	1980	1999	1980	1999	1980	1999
Oman					21.5	16.7	78.5	83.3		
Pakistan	58.2	34.3	0.2	0.8	1.1	35.2	40.5	29.3	0.0	0.4
Saudi Arabia					58.5	64.3	41.5	35.7		
Senegal					100.0	98.5		1.5		
Sudan	70.0	53.1			30.0	46.9				
Syria	64.7	41.1			31.9	23.8	3.4	35.1		
Tajikistan	93.4	97.7			6.6			2.3		
Togo	13.3	3.1			86.7	96.9				
Tunisia	0.8	0.9			64.5	13.5	34.7	85.5		
Turkey	48.8	29.8	25.6	31.8	25.1	6.9		31.2		
Turkmenistan	0.1	0.1			99.9			99.9		
UAE					3.7	7.9	96.3	92.1		
Uzbekistan	14.6	12.5		4.8	85.4	11.4		71.3		
Yemen					100.0	100.0				
<b>OIC</b>	<b>28.0</b>	<b>16.0</b>	<b>5.1</b>	<b>11.5</b>	<b>46.3</b>	<b>27.7</b>	<b>20.5</b>	<b>44.4</b>	<b>0.0</b>	<b>0.02</b>
<b>World</b>	<b>20.6</b>	<b>17.5</b>	<b>33</b>	<b>38.2</b>	<b>28.4</b>	<b>8.4</b>	<b>8.8</b>	<b>17.2</b>	<b>8.7</b>	<b>17.2</b>
Low income	27.8	22.7	13.1	44.5	53.7	8.2	1.6	16.3	3.7	7.9
Middle income	21.6	22.7	22.3	38.5	48	11.2	4.6	19.6	3.2	7.3
Low and middle income	22.9	22.7	20.4	39.6	49.2	10.7	4	19	3.3	7.4

Source: World Bank (2002).

**Table A.18: Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 2000**  
(Million Metric Tons of Carbon Equivalent)

Country	Per Capita CO <sub>2</sub> Emission	Total CO <sub>2</sub> Emission
Afghanistan	0.00	0.32
Albania	0.10	0.39
Algeria	0.70	22.73
Azerbaijan	1.60	12.52
Bahrain	8.30	5.73
Bangladesh	0.10	7.73
Benin	0.00	0.16
Brunei	3.30	1.14
Burkina Faso	0.00	0.20
Cameroon	0.10	1.80
Chad	0.00	0.05
Comoros	0.00	0.02
Côte d'Ivoire	0.10	1.86
Djibouti	0.80	0.49
Egypt	0.50	33.18
Gabon	1.40	1.68
Gambia	0.00	0.06
Guinea	0.00	0.34
Guinea-Bissau	0.10	0.08
Guyana	0.60	0.42
Indonesia	0.30	68.68
Iran	1.30	80.82
Iraq	0.90	20.24
Jordan	0.60	4.04
Kazakhstan	2.40	34.95
Kuwait	8.10	17.64
Kyrgyzstan	0.40	2.12
Lebanon	1.30	4.41
Libya	2.10	10.90
Malaysia	1.30	29.90
Maldives	0.30	0.08
Mali	0.00	0.16
Mauritania	0.30	0.85
Morocco	0.30	7.77
Mozambique	0.00	0.35

**Table A.18: Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 2000** (continued)  
(Million Metric Tons of Carbon Equivalent)

Country	Per Capita CO <sub>2</sub> Emission	Total CO <sub>2</sub> Emission
Niger	0.00	0.30
Nigeria	0.20	22.58
Oman	2.40	5.97
Pakistan	0.20	29.53
Qatar	14.10	9.47
Saudi Arabia	3.70	74.89
Senegal	0.10	1.22
Sierra Leone	0.10	0.24
Somalia	0.00	0.16
Sudan	0.00	1.25
Suriname	1.00	0.42
Syria	0.80	13.45
Tajikistan	0.30	1.81
Togo	0.10	0.28
Tunisia	0.50	5.17
Turkey	0.80	54.98
Turkmenistan	1.20	5.99
Uganda	0.00	0.28
United Arab Emirates	9.70	30.16
Uzbekistan	1.10	28.56
Yemen	0.20	2.40
World Total	1.10	6443.38
OIC Total	0.50	662.92
Africa	0.30	240.14
Asia and Oceania	0.60	1970.22
Western Europe	2.10	999.62
North America	4.50	1832.50
Central and South America	0.60	268.65
E. Europe & Former U.S.S.R.	2.20	844.23
Middle East	1.70	288.01

Source: Energy Information Administration (2003A).



**Table A.19: Energy Efficiency and Traditional Fuel Use**

	GDP per unit of energy use		Traditional fuel use	
	PPP \$ per kg oil equivalent		% of total energy use	
	1980	1999	1980	1999
Afghanistan			63.0	75.6
Albania		10.4	13.1	7.3
Algeria	4.9	5.4	1.9	1.5
Azerbaijan		1.6		0.0
Bangladesh	5.7	10.8	81.3	46.0
Benin	1.3	2.9	85.4	89.2
Burkina Faso			91.3	87.1
Cameroon	2.8	3.8	51.7	69.2
Chad			95.9	97.6
Côte d'Ivoire	2.9	4.3	52.8	91.5
Egypt	3.5	4.9	4.7	3.2
Gabon	1.9	4.5	30.8	32.9
Gambia			72.7	78.6
Guinea			71.4	74.2
Guinea-Bissau			80.0	57.1
Indonesia	2.2	4.4	51.5	29.3
Iran	2.9	3.4	0.4	0.7
Iraq			0.3	0.1
Jordan	3.2	3.8	0.0	0.0
Kazakhstan		2.1		0.2
Kuwait	1.3	1.8	0.0	0.0
Kyrgyzstan		5.0		0.0
Lebanon		3.3	2.4	2.5
Libya			2.3	0.9
Malaysia	2.7	4.3	15.7	5.5
Mali			86.7	88.9
Mauritania			0.0	0.0
Morocco	6.8	10.0	5.2	4.0
Mozambique	0.6	2.1	43.7	91.4
Niger			79.5	80.6
Nigeria	0.8	1.2	66.8	67.8
Oman			0.0	
Pakistan	2.2	4.2	24.4	29.5
Saudi Arabia	3.0	2.5	0.0	0.0
Senegal	2.3	4.5	50.8	56.2

**Table A.19: Energy Efficiency and Traditional Fuel Use (continued)**

	<b>GDP per unit of energy use</b>		<b>Traditional fuel use</b>	
	PPP \$ per kg oil equivalent		% of total energy use	
	1980	1999	1980	1999
Sierra Leone			90.0	86.1
Somalia			78.6	
Sudan	1.4	3.2	86.9	75.1
Syria	2.6	3.0	0.0	0.0
Tajikistan		1.9		
Togo	4.3	4.7	35.7	71.9
Tunisia	4.0	7.4	16.1	12.4
Turkey	3.6	5.9	20.5	3.1
Turkmenistan		1.2		
Uganda			93.6	89.7
United Arab Emirates	4.4	1.8	0.0	
Uzbekistan		1.1		0.0
Yemen		4.4	0.0	1.4
OIC-LDC	3.6	6.9	74.2	56.6
OIC-MIC	3.0	5.0	27.0	16.7
OIC-OEC	3.1	3.2	8.8	8.9
OIC-TC	-	2.3	0.7	0.5
<b>OIC</b>	<b>2.9</b>	<b>4.6</b>	<b>25.3</b>	<b>17.6</b>
World	2.2	4.4	7.4	8.2
Low Income Countries	1.9	3.6	43.7	28.6
Middle Income Countries	2.3	4	9.7	7.3
High Income Countries	2.2	4.8	1.0	3.4

Source: World Bank (2002).