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SOME CONTEMPORARY ENERGY ISSUES AND THE OIC COUNTRIES

El-Waleed A. Hamour*

Energy per se is among the basics of socio-economic activity. Commercial energy is one of the pillars of modern life. The production and consumption of commercial energy give rise to a number of important contemporary issues. In that regard, the OIC region has a strategic global importance for both current and future energy prospects. Many OIC Member Countries (MCs) are blessed with ample energy potential, while other MCs are not so fortunate. Yet, for both, energy issues pose serious challenges. Accordingly, energy-related issues hold a very special position for OIC MCs and hence the paper.

1. INTRODUCTION

Since times immemorial, energy has been a vital component for human life, in particular for economic activity. The link between energy and economic growth and development is beyond doubt. Close association has been confirmed between energy production and consumption levels on the one hand and between economic growth and economic development on the other (World Bank, 2000). The strength of the link is such that energy indicators have been used as a proxy for levels of economic activity.

Production and demand-related energy problems are among the main issues facing developed and developing countries alike. In subsistence life styles, sources of energy are products of the local environment and, in that sense, are not full market commodities. More complex settings depend primarily on commercial energy. The more developed an economy becomes, the more it is dependent on commercial energy. In the words of the OIC Strategy and Plan of Action,

> "The importance of energy has increased with the development of economic life and diversification of economic activity. Today it is a vital input to every aspect of life, especially in production activity, and energy usage has become a basic indicator of economic growth and development" (OIC 1997, p.9).

* Senior Economist, Chief of Economic Research Section, SESRTCIC.

In today's world, there are five main (conventional) and some other (alternative) sources of commercial energy. The conventional sources still dominate the commercial energy market scene with coal taking the highest market share. While having the least share among conventional sources, oil seems the most important.

Rates and movements of oil prices are among the most closely followed variables in the world. Oil variables continue to be at the centre of world international relations and policymaking debates. This is so, at a time when oil shares as a source of energy have declined significantly. Oil had the second largest market share worldwide in 1980 but the least share by 1997. With such a diminished contribution and weight, the interest and attention on oil should have dwindled. The reality is the contrary; they have risen and intensified. This represents an irony which this paper is trying to understand and illuminate. In due course, the paper will review the energy production, use, and energy balance issues with particular reference to OIC countries. It will also consider some of the environmental aspects of energy in these countries.

The data, and the policy section of the paper are based on the energy section of the World Bank Development Indicators (WBDI 2000). Energy data from different sources is converted to a standard unit metric tons of oil equivalents (TOE). Conversion factors are used to standardise countries' data[1]. Data was unavailable for 10 OIC member countries (MCs), all of which belong to the low-income group. To ensure consistency, OIC MCs' income data is also obtained from the same source.

Using available data, MCs are classed by income and energy endowment. Income-wise, MCs are divided into two groups: (I) low-income group and (II) middle-and-high income group. On energy basis, they are classed into two classes: class A, the net energy importers, and class B, the net energy exporters (Tables 2, 3, 4). Based upon that, each of the four quadrants of the above tables represents a separate subclass of countries, (I-A) low-income net energy importers, (II-A) middle-income energy-importers, (I-B) low-income energy exporters and (II-B) middle-income energy exporters. Of the 34 MCs for which data was available, 16 were net energy importers (NEIs) and 18 were net exporters (NEXs).

[1] For notes on these conversion methods, see UN 1996, p. XXV.

The term 1980 to 1997 is the study period. The paper compares data variables of these two years, and the average annual change calculated from them. The paper also uses totals, weighted averages and percentage shares of the four subgroups (described above) in relation to the OIC totals and averages as basis for its analysis.

Section 2 includes a general analysis of energy supply and demand and their environmental implications. Section 3 deals with the same issues in the context of the OIC countries. Section 4 discusses the important issue of oil prices. Section 5 includes sector policy issues and Section 6 concludes the paper.

2. ENERGY PRODUCTION AND ENERGY USE

2.1. Uses and Sources of Commercial Energy

Electricity generation is presumably the most important product of commercial energy. Presently electricity is a common input in almost all fields of human life and activities. That is why access to energy in general and electricity in particular, is important for growth and for improving people's standards of living (WBDI 2000). In addition to generation of electricity, primary fuels are also used directly in other important economic activities such as transport, agriculture, heating and other household and domestic uses. In some of these activities, in transport for instance, the use of primary fuels dominates that of secondary fuels such as electricity.

In today's world, there exist five main conventional sources of producing electricity commercially. Listed in a descending order according to their world shares in 1997, these are coal, hydropower, nuclear power, gas and oil (see Graph and Table 1).

On the world scale, coal is the most important energy source. It had the highest share in 1980, 33.1 per cent, which rose to 38.4 per cent by 1997. As a matter of fact, coal shares rose in all the subgroups including the OIC, but particularly in the low-income group with a staggering 64 per cent share. Coal is probably the oldest source of producing commercial energy and is also the widest in use today. Coal is bulky and, until recently, was considered a relatively less clean source. Because of its relative advantages in these respects, oil took over as the

prime energy source around the middle of the 20th century. However, due to oil prices' volatility and with the development of cleaner technology, in addition to other non-economic factors, coal has resumed the prime position.

Hydropower shares slightly declined worldwide from 20.4 to 18.2 per cent in 1980 and 1997 respectively. However, the decline was not uniform across all groups. Figures show that hydropower share increase in the middle-income group overmatched a decline in the low-income group's share. The OIC group's hydropower share declined by over 7 percentage points between 1980 and 1997.

Nuclear power also represents a growing world energy source (8.7 to 17.3 per cent in 1980 and 1997 respectively). However, for cost, technological and strategic reasons, its growth is concentrated among the middle and higher income groups. Contribution of nuclear power is negligible in the OIC world. Only one of the 56 OIC countries (Pakistan) has utilised this source in energy production. It represents 0.03 per cent of the group's total energy.

Gas is another fast growing energy source both worldwide and across the subgroups. Worldwide and among the OIC group, gas shares have nearly doubled between 1980 and 1997. In both years, the OIC shares were about twice the world shares. The middle-income group registered the fastest rise of gas shares from 4.8 to 25.1 per cent. Despite their three-fold rise, the low-income group gas shares lagged behind all others, including world shares, with only 5.6 per cent in 1997.

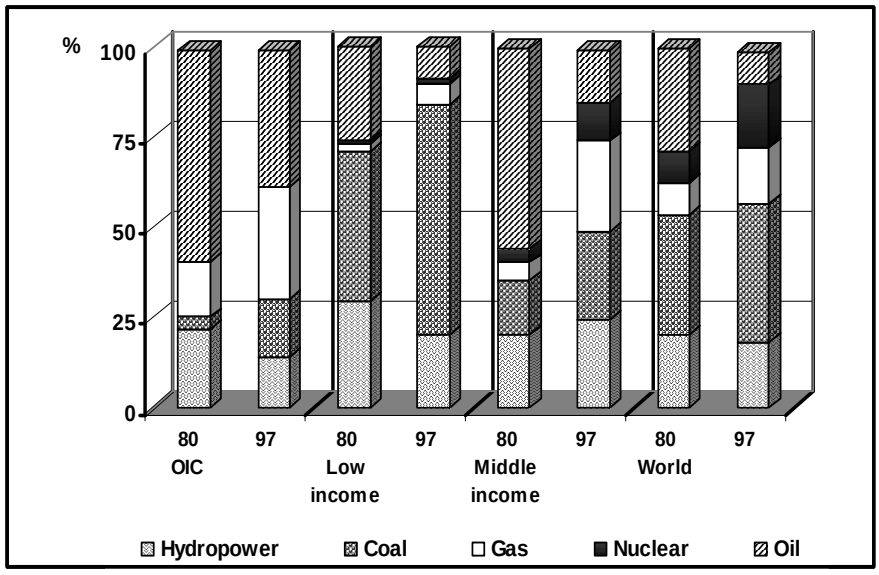
Oil was the second important energy source in 1980 with a 28.5 per cent share. By 1997, it became the least important source with the least share worldwide (only 9.1 per cent). Thus, by 1997, the oil contribution to world energy market had fallen by over three folds. In other words, the market share of oil in 1997 was less than a third of its share in 1980. This is a very significant observation, particularly for the OIC oil exporting countries. Oil shares declined throughout all groups including the OIC. There may be numerous factors behind this wide ebb. This paper suggests that demand control and the search for oil substitutes by main energy importers, particularly in the west, are the prime reasons. Consequently, and for its importance for many OIC countries, oil will be discussed in a separate section later in the paper.

Table 1
Conventional Sources of Energy by Different Groups, 1980 and 1997

	World		OIC		Low income		Middle income		Low & middle	
	1980	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**
Hydropower	20.4	18.2	21.6	13.8	29.7	20.3	20.3	24.3	22.3	22.9
Coal	33.1	38.4	3.5	16.1	41.5	63.8	15.1	24.4	20.6	38.3
Oil	28.5	9.1	58.6	37.7	25.8	8.8	55.5	14.6	49.3	12.6
Gas	8.8	15.5	15.3	31.1	1.8	5.6	4.8	25.1	4.2	18.2
Nuclear p.	8.7	17.3	0	0.1	1.3	1.4	3.8	10.5	3.3	7.3
	99.5	**98.5**	**99**	**98.8**	**100.1**	**99.9**	**99.5**	**98.9**	**99.7**	**99.3**

Source: Extracted from Annex Table A3.

Graph 1
Conventional Sources of Energy by Different Groups, 1980 and 1997



2.2. Energy Production

"Commercial energy production refers to commercial forms of primary energy—petroleum (crude oil, natural gas liquids, and oil from non-conventional sources), natural gas, and solid fuels (coal, lignite, and other derived fuels)—and primary electricity, all converted into oil equivalents" (WBDI 2000, p.141).

Unlike subsistence energy[2], commercial energy is always mass-produced to meet growing energy demand. The distribution of commercial energy, however, is not often carried out on market basis and through market channels. This is particularly the case in developing countries and that is a source of many of the sector's problems in them. Like traditional fuels, the production of commercial energy also depends on the availability of natural resource potential. While primary factor availability is both necessary and sufficient for the production of subsistence energy, it is necessary but not sufficient for the production of commercial energy. As an economic good, the production of commercial energy requires the availability of the other factors of production, in addition to the natural resource. These other inputs typically include financial, technical and human resource inputs, all of which may be secured locally or otherwise imported. Shortages of any of these factors pose serious constraints to the production of commercial energy. Thus, on the supply side, only the production of commercial energy forms an economic problem and is thus considered by the paper.

Developing countries in general experience shortages in all of the factors required for energy production and thus suffer from all types of constraints. This is true for many OIC MCs, particularly, but not exclusively, the MCs located in sub-Saharan Africa. However, other OIC MCs are blessed with ample supply and reserves of exhaustible (non-renewable) and regenerative (renewable) energy resources. In addition, many OIC countries have large alternative energy potential, for instance solar, wind, and bio sources. The group's supply of energy exceeds its demand (Annex Table A1). As a whole, the OIC group represents the largest bloc exporter of energy in the world. Nonetheless, many OIC MCs still face financial and/or technical know-how constraints, which impede them from fully exploiting their energy potential. To bridge these and other constraints, OIC MCs depend mainly on attracting international resources, the thing that draws notable sums of MCs' earnings. In addition, dependence on external resources causes other socio economic and strategic problems for some OIC MCs.

2.3. Energy Use

On the demand side, both traditional fuel use as well as commercial energy satisfy the basic human need for energy, with some consequent

[2] The paper uses the terms 'subsistence energy' and 'traditional fuel use' interchangeably. Some sources use the term 'simple energy' instead.

opportunity costs. In addition, the consumption of both levies external costs on the local and the global environments. Accordingly, the consumption of both types of energy produces relevant economic problems and thus both should be considered in the analysis of demand. However, data availability limits the full inclusion of subsistence energy and thus the demand analysis will be based mainly on commercial energy use data (Annex Table A1).

> "Commercial energy use refers to apparent consumption, which is equal to indigenous production plus imports and stock changes, minus exports and fuel supplied to ships and aircrafts engaged in international transport. It is the use of domestic primary energy before transformation to other end use fuels"(WBDI 2000, p.141).

The demand for energy is a function of the level of economic activity and of living standards. Shifts in the demand for energy may be both consequences as well as causes of shifts in levels of economic activity and to changes in standards of living. The demand for energy is met either by domestic production or through imports. Thus, while some countries are net exporters of energy (NEXs), i.e., negative energy importers, others are net importers (NEIs).

> "Net energy imports are calculated as energy use less production, both measured in oil equivalents. A negative value indicates that the country is a net exporter" (WBDI 2000, p.141).

On the world scale, commercial energy use is very skewed in favour of the rich western countries. The G7 countries, with about 15 per cent of world population and about 75 per cent of world GDP, consume half of the world's commercial energy. Adding the commercial energy use of Russia, China and India to that of the G7 makes up 73 per cent of the world's total commercial energy use. That leaves 27 per cent of total energy use for the rest of the world including the OIC countries (WB, ibid.).

The OIC as a group produced 24.1 and 22.9 per cent of world's commercial energy in 1980 and 1997, but consumed only 5.1 and 10.4 per cent in the same years respectively. These make up 40.5 and 37.4 per cent of the low and middle-income group's energy production and 15.6 and 20.9 per cent of its consumption. The large gap between the group's energy production and consumption leaves the group with a large

surplus which is exported. The negative sign of the group's net energy imports reflects exports. Measured as per cent of its energy use, the OIC average energy exports has declined considerably in 1997 compared to its 1980 level (Annex Table A1).

2.4. Energy Efficiency and Emissions

2.4.1. Production Efficiency

As other economic goods, energy has to be efficiently produced and consumed. Efficiency in production is twofold: economic efficiency and commercial efficiency. Economic efficiency is composed of allocative as well as technical or X-efficiency. Thus, economic efficiency is about factor allocation and the suitability of the technology used in that allocation. Commercial efficiency, on the other hand, generally means the running of energy projects on a sound commercial basis. Adhering to these usual economic and commercial principles assures production efficiency in general. Yet, these measures, unless particularly adapted, often neglect some of the peculiar features of the energy sector, which must be considered for productive efficiency to be complete. The diverse nature and sources of energy require close economic, commercial, technical and even social appraisal and scrutiny. Production efficiency often is a micro issue and is usually studied at the micro level.

2.4.2. Use Efficiency

Energy efficiency analysis would be incomplete without considering efficiency on the demand side. Efficiency of energy use is measured by the ratio of GDP to energy use. GDP in both real dollar value and purchasing power parity has been used in calculating this measure. The latter was recently introduced to produce comparable and consistent GDP estimates and thus units of energy use. Differences in this ratio over time and across countries reflect in part structural changes in the economy, changes in energy efficiency of particular sectors of the economy, and differences in fuel mixes. The ratio of GDP (in $PPP) to energy use of the OIC countries as a group increased from 2.6 to 4.0 folds[3] in the years 1980 and 1997 respectively. Over the same years, that ratio measured 2.9 and 5.5 folds for the European Monetary Union (EMU) and 3.3 folds for Middle East and North Africa (MENA) group in 1997 (Annex Table A2).

[3] The GDP measure used is the Purchasing Power Parity divided by energy use.

The above notwithstanding, a portion of the world energy demand is still being met by traditional fuels which include fuelwood, charcoal, bagasse, and animal and vegetation wastes. In 1996, only 7.2 per cent of the world energy demand were met by traditional fuel use against 7.4 per cent in 1980. For the OIC MCs, 14 per cent of their total energy demand was met by subsistence fuel in 1996 compared to 22.6 per cent in 1980. The same was 19.5 and 26.3 per cent in the two years respectively, in low-income countries. Excluding China and India, that group fulfilled a staggering 48.1 per cent of its energy needs from traditional fuels in 1996, which still represented progress over 59.9 per cent in 1980. Such a high ratio shows the urgency for energy sector reform in low-income countries, even if based on environmental consideration alone (Annex Table A2).

2.4.3. Energy Emissions

The release of energy creates toxic wastes and emissions that are harmful to the environment. The extent of the damage depends on the source inputs and the technology used. For instance, coal is twice as much polluting than natural gas to produce an equal amount of electricity. Of all the conventional sources, hydropower produces the least damage[4]. Alternative and greener sources have been invented and used. Geothermal, solar, wind, tide and wave, and combustible and renewable waste are some of these alternative sources. However, per unit cost of most alternative sources is still high compared to conventional sources. That fact still hampers the commercial use of these greener sources.

Burning energy produces a number of emissions the most serious amongst which are carbon dioxide (CO2) emissions. CO2 emissions account for the largest share of greenhouse chlorofluorocarbon (CFC) gases, which are associated with global warming. CO2 is released mainly from the burning of fossil fuels and from the manufacturing of cement. They include the CO2 produced during the consumption of solid, liquid, and gas fuels and gas flaring (WBDI 2000, p145). CO2 emissions vary widely between countries. However, high-income countries account for most of the world's CO2 emissions. The US is on

[4] This is not the case where large dams are constructed to produce hydropower. Such projects are alleged to cause radical environmental damage on the local environment and habitat.

top of the list of CO2 emitters per capita, followed by Australia and Norway and then Saudi Arabia in the fourth place, which is the sole Member State to figure among the top fifteen CO2 emitters in the world.

The OIC group as a whole discharged 6.1 and 9.4 per cent of the world CO2 in 1980 and 1996 respectively. On per capita terms, the OIC group has a relatively high emission rate compared to the world and other groups' rates. The per capita metric ton averages of the OIC group of carbon dioxide emissions were 3.7 and 4.7 in the years 1980 and 1996 respectively. These were comparable to the world and middle-income group's averages but considerably higher than the low-income group rates. However, using international dollar (PPP$) to compare emission rates per GDP across different groups appears to show a relatively narrower dispersion of emission rates among the different groups. According to this measure, the OIC group's averages were closer to the low-income group excluding China and India in 1980, but matched the world average by 1996. The measure indicates conversion of emission rates across different groups. However, variations of emission rates across countries remain considerable (Annex Table A2).

3. THE ENERGY SECTOR IN OIC COUNTRIES

3.1. Commercial Energy Production

According to Table 2, 7 MCs are classed in I-A (low-income net energy importing member countries). In the years 1980 and 1997, this subgroup produced only 2.1 and 2.0 per cent apiece of the OIC energy production. Over the study period, average energy production of A-I increased from 9 to 15 per cent of the OIC average, which makes a 2.8 per cent annual increase. Similarly II-A houses 9 MCs which together produce 3.8 and 7.3 per cent of the OIC energy with an average rise of 5.6 per cent per annum. II-A average production increased from 12 to 21 per cent of the OIC average with a 4.1 average per year rise. Hence, the OIC NEIs group contributed 5.9 and 9.3 per cent of the OIC total energy production in 1980 and 1997 respectively (Table 2).

Subclass I-B, consisting of 6 MCs, produced 18.4 and 21.7 per cent of the group's energy with an annual average rise of 3.1 per cent. II-B, on the other hand, housed 12 MCs which together produced 75.7 and 69.0 per cent of the OIC total production. II-B energy production increased by 0.2 per cent on average per year over the study period.

Therefore, the OIC NEXs group produced 94 and 90 per cent of OIC energy in the study years.

While the OIC NEIs and NEXs have roughly an equal number of countries, the latter contributes over 90 per cent of the OIC total energy production. Of these, middle-income member countries dominate the picture. Energy production is increasing across the four subgroups. However, for many individual countries, energy production has declined. Understandably, that was the case in the member countries in transition, in Iraq and Libya due to international sanctions, and in Mozambique because of the long civil war. Saudi Arabia claims some 30 per cent of II-B's total production, and about 25 per cent of the OIC group.

Graph 2 compares energy production among OIC MCs. It clearly shows the dominant position of the OIC NEXs, most of which are OPEC members. The prominent position of Saudi Arabia within this group is also very apparent. In 1997, 13 MCs produced over 50000 metric tons of oil equivalent and only 7 of them surpassed the 100000 level.

While not represented in the available data, a number of the OIC NEIs such as Sudan, Chad, Syria and Tunisia have discovered domestic oil reserves in commercial quantities and begun exploiting them for local use and for export. Some of these MCs affirmed attainment of energy self-sufficiency and joined the NEXs group.

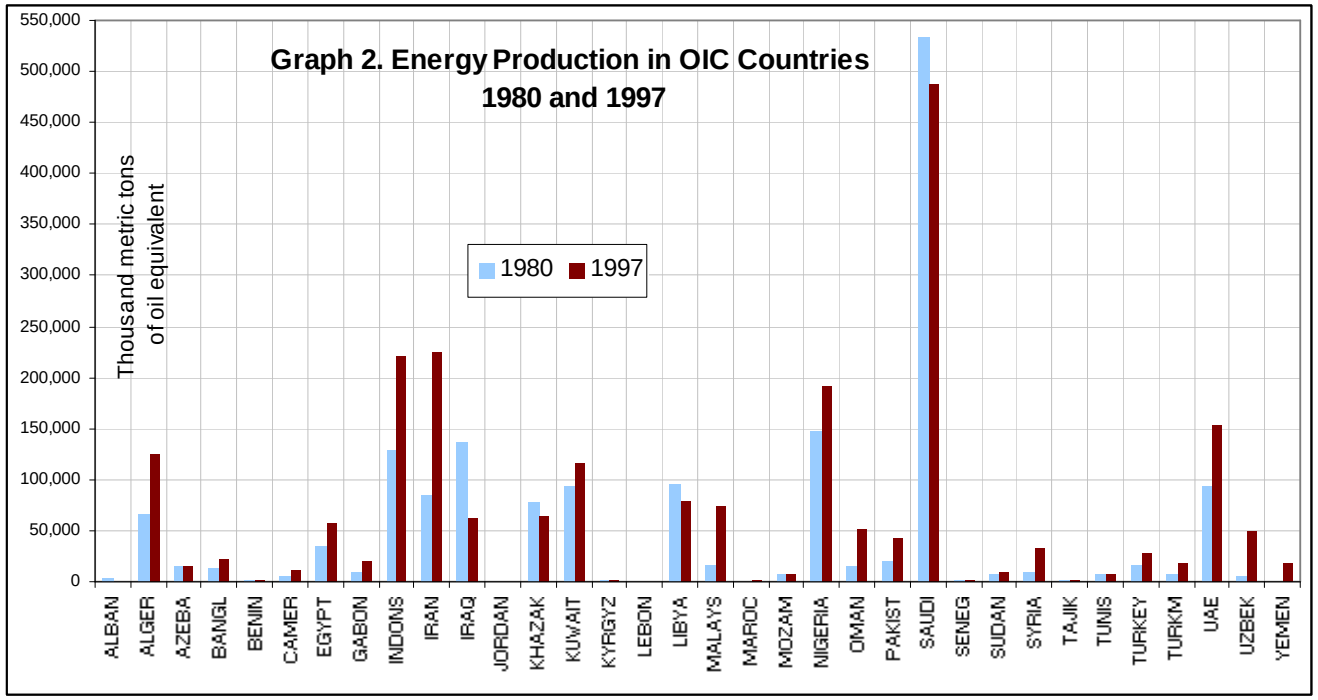
Table 2 also shows the OIC MCs and the subgroups' external energy balances reflected by their net energy import positions. From an energy balance perspective alone, a positive net energy import figure represents an adverse energy balance. However, a net energy import preceded by a minus sign reflects a net export and thus is a favourable balance. Consequently, for the OIC NEIs, negative average growth represents deterioration of energy balance while for the NEXs, it represents an improvement.

Accordingly, of the OIC NEIs group, the energy balance of class I-A deteriorated by 5.5 per cent a year over the study period while that of II-A deteriorated by 9.4 per cent. For the NEXs, the energy balance of the subclass I-B improved by 1.6 per cent over the study period but that of class II-B by 0.2 per cent. This signifies that the energy balance of the

Table 2
Commercial Energy Production in OIC MCs Classed by Income and Net Energy Imports

			SUBCLASSES & OIC WEIGHTED AVERAGES			SUBTOTALS AND % OF OIC TOTAL		
			Thousand MTOE		AAPC	Thousand MTOE		AAPC
			1980	**1997**	**1980-97**	**1980**	**1997**	**80-97**
NET ENERGY IMPORTERS	Class I–A (7 MCs)	Bangladesh	13204	21894	3.0	13204	21894	3.0
		Benin	1212	1897	2.7	1212	1897	2.7
		Kyrgyz Rep.	2190	1408	-2.6	2190	1408	-2.6
		Mozambique	7417	6994	-0.3	7417	6994	-0.3
		Senegal	1046	1654	2.7	1046	1654	2.7
		Sudan	7078	9881	2.0	7078	9881	2.0
		Tajikistan	1986	1253	-2.7	1986	1253	-2.7
		W and T	*9478*	*15038*	*2.8*	*34133*	*44981*	*1.6*
		% of OIC	*9*	*12*		*2.1*	*2.0*	
	Class II–A (9 MCs)	Albania	3428	912	-7.5	3428	912	-7.5
		Jordan	1	193	36.3	1	193	36.3
		Lebanon	178	207	0.9	178	207	0.9
		Morocco	877	1067	1.2	877	1067	1.2
		Pakistan	20998	42048	4.2	20998	42048	4.2
		Syria	9502	32794	7.6	9502	32794	7.6
		Tunisia	6966	6655	-0.3	6966	6655	-0.3
		Turkey	17190	27556	2.8	17190	27556	2.8
		Uzbekistan	4615	49054	14.9	4615	49054	14.9
		W and T	***13419***	***26368***	***4.1***	***63755***	***160486***	***5.6***
		% of OIC	***12***	***21***		***3.8***	***7.3***	
NET ENERGY EXPORTERS	Class I–B (6 MCs)	Azerbaijan	14821	14027	-0.3	14821	14027	-0.3
		Cameroon	5824	11250	3.9	5824	11250	3.9
		Indonesia	128403	221549	3.3	128403	221549	3.3
		Nigeria	148479	191034	1.5	148479	191034	1.5
		Turkmenistan	8034	18739	5.1	8034	18739	5.1
		Yemen	60	19105	40.4	60	19105	40.4
		W and T	***120585***	***201014***	***3.1***	*305621*	*475704*	*2.6*
		% of OIC	***112***	***157***		*18.4*	*21.6*	
	Class II–B (12 MCs)	Algeria	67061	125576	3.8	67061	125576	3.8
		Egypt	34168	57997	3.2	34168	57997	3.2
		Gabon	9441	19786	4.4	9441	19786	4.4
		Iran	84001	224935	6.0	84001	224935	6.0
		Iraq	136643	62088	-4.5	136643	62088	-4.5
		Kazakhastan	76799	64784	-1.0	76799	64784	-1.0
		Kuwait	94085	116087	1.2	94085	116087	1.2
		Libya	96662	78942	-1.2	96662	78942	-1.2
		Malaysia	16644	73979	9.2	16644	73979	9.2
		Oman	15090	51620	7.5	15090	51620	7.5
		Saudi Arabia	533071	487095	-0.5	533071	487095	-0.5
		UAE	93915	153555	2.9	93915	153555	2.9
		W and T	***155876***	***160659***	***0.2***	*1257580*	*1516444*	*1.1*
		% of OIC	***145***	***125***		*75.7*	*69.0*	
OIC Averages (W)			***107546***	***128137***	***1.0***			
OIC TOTALS (T)						***1661089***	***2197615***	***1.7***

Source: Annex Table A1.
MTOE: Metric Tons of Oil Equivalent; AAPC: Annual Average Percentage Change;
W = Weighted Averages and T = Totals.


Graph 2. Energy Production in OIC Countries
1980 and 1997
Thousand metric tons
of oil equivalent
1980
1997
550,000
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
ALBAN
ALGER
AZEBA
BANGL
BENIN
CAMER
EGYPT
GABON
INDONS
IRAN
IRAQ
JORDAN
KHAZAK
KUWAIT
KYRGYZ
LEBON
LIBYA
MALAYS
MAROC
MOZAM
NIGERIA
OMAN
PAKIST
SAUDI
SENEG
SUDAN
SYRIA
TAJIK
TUNIS
TURKEY
TURKM
UAE
UZBEK
YEMEN

OIC NEIs group has regressed while that of the OIC NEXs group has risen slightly. The combined outcome of the two represents a mild slide of 3.2 per cent in the OIC overall energy balance (Table 4).

3.2. Commercial Energy Use

The OIC's total commercial energy use measured 5.1 and 10.4 per cent of world energy use in the years 1980 and 1997 respectively with a 4.2 per cent annual growth. On average, the OIC group's energy use rose from 26206 to 62226 thousand TOE, a rise of 4.5 per cent per annum over the study period (Table 3). In energy per capita terms, the OIC average energy use has risen at a rate of 2.2 per cent a year from 1298 to 1854 kg of oil equivalent. The group's per capita energy use measured 81 per cent of the world's average in 1980 and climbed to 111 per cent by 1997. Those were 145 and 187 per cent of the respective low and middle-income group averages in the same years (Annex Table A1).

Let us consider first the OIC NEIs group; the subclass I-A took 7.7 and 5.5 per cent of the OIC total energy use in 1980 and 1997 respectively. Despite the reduction in share, I-A average energy use grew by 2.8 per cent annually. Average energy per capita use in I-A increased by 0.5 per cent from 284 to 291 kilograms of energy equivalent. Subclass II-A energy use shares increased from 16.9 and 21.6 per cent over the same years and its annual growth average over the period was 4.9 per cent. Per capita energy use rose considerably in II-A from 561 to 950 kilograms of energy equivalent in the two years respectively, which is a rise of 2.7 per cent on average. Thus, the NEIs group consumed some 28 per cent of the OIC total energy use leaving some 72 per cent for the NEXs (Table 3).

Second, in the OIC NEXs, I-B took 28.6 and 26.5 per cent of the OIC total energy use in the two years 1980 and 1997, with a growth rate of 4.7 per annum. Average per capita energy use rates in I-B grew from 499 to 721 kg/oil in 1980 and 1997 respectively. The other subclass, II-B, utilised 46.9 and 46.4 of that over the same years. Per capita energy figures of this group were 2022 and 2823 kg/oil which are about 1,5 times the OIC group overall average (Table 3).

Thus, over the study period, total energy use increased in 30 of the 34 MCs for which data is available. Negative annual average rates of

Table 3
Commercial Energy Use: Total and Per Capita, 1980 and 1997

			COMMERCIAL ENERGY USE			COMMERCIAL ENERGY USE PER CAPITA		
			Thousand MTOE		AAPC	KgOE		AAPC
			1980	**1997**	**1980-97**	**1980**	**1997**	**1980-97**
NET ENERGY IMPORTERS	Class I–A (7 MCs)	Bangladesh	14900	24327	2.9	172	197	0.8
		Benin	1363	2182	2.8	393	377	-0.2
		Kyrgyz Rep.	1717	2793	2.9	473	603	1.4
		Mozambique	8079	7664	-0.3	668	461	-2.2
		Senegal	1921	2770	2.2	347	315	-0.6
		Sudan	8406	11480	1.9	450	414	-0.5
		Tajikistan	1650	3384	4.3	416	562	1.8
		W	***10789***	***17004***	*2.7*	***284***	***291***	0.1
		% of OIC	***41** (7.7)*	***27** (5.5)*		***21.9***	***15.7***	
	Class II–A (9 MCs)	Albania	3049	1048	-6.1	1142	317	-7.3
		Jordan	1714	4795	6.2	786	1081	1.9
		Lebanon	2483	5244	4.5	827	1265	2.5
		Morocco	4778	9275	4.0	247	340	1.9
		Pakistan	25479	56818	4.8	308	442	2.1
		Syria	5348	14642	6.1	614	983	2.8
		Tunisia	3900	6805	3.3	611	738	1.1
		Turkey	31314	71273	5.0	704	1140	2.9
		Uzbekistan	4821	42553	13.7	302	1798	11.1
		W	***21319***	***50285***	***5.2***	***561***	***951***	3.2
		% of OIC	***81** (17)*	***81** (22)*		***43.3***	***51.3***	
NET ENERGY EXPORTERS	Class I–B (6 MCs)	Azerbaijan	15001	11987	-1.3	2433	1529	-2.7
		Cameroon	3687	5756	2.7	426	413	-0.2
		Indonesia	59561	138779	5.1	402	693	3.3
		Nigeria	52846	88652	3.1	743	753	0.1
		Turkmenistan	7948	12181	2.5	2778	2615	-0.4
		Yemen	1424	3355	5.2	167	208	1.3
		W	***54343***	***122207***	***4.9***	***499***	***721***	2.2
		% of OIC	***207** (29)*	***196** (27)*		***38.5***	***38.9***	
	Class II–B (12 MCs)	Algeria	12410	26497	4.6	665	904	1.8
		Egypt	15970	39581	5.5	391	656	3.1
		Gabon	1493	1635	0.5	2161	1419	-2.4
		Iran	38918	108289	6.2	995	1777	3.5
		Iraq	12030	27091	4.9	925	1240	1.7
		Kazakhstan	76799	38418	-4.0	5163	2439	-4.3
		Kuwait	9564	16165	3.1	6956	8936	1.5
		Libya	7173	15090	4.5	2357	2909	1.2
		Malaysia	11128	48473	9.0	809	2237	6.2
		Oman	996	6775	11.9	905	3003	7.3
		Saudi Arabia	35357	98449	6.2	3773	4906	1.6
		UAE	8576	30874	7.8	8222	11967	2.2
		W	***20402***	***51578***	***5.6***	***2022***	***2823***	2.0
		% of OIC	***78** (47)*	***83** (46)*		***155.9***	***152.3***	
OIC Averages (W)			26206	62226	4.5	***1298***	***1854***	2.2
OIC TOTALS (T)			491803	985100	4.2			

Source: Annex Table A1.
Notes: KgOE: Kilograms of Oil Equivalent. Numbers in brackets are percentages of subclasses totals to OIC totals. Other notes as in Table 2.

change in energy use were recorded in only four MCs, all of which were countries in transition, namely Albania, Azerbaijan, Kazakhstan and Turkmenistan. In two African MCs, Gabon and Mozambique, annual average change of energy use were zero. Despite that, only seven MCs in 1980 and five in 1997 recorded total rates higher than the group's total average. All of these are among the relatively large economies of the group, of which four are also main oil producers. So, it is rather the size of the economy which dominates this indicator. Thus, total energy may be a good guide for the size of an economy but not for comparing energy consumption across countries (Graph 3).

To neutralise the impact of size, the paper introduces energy use per capita to compare energy use across countries (Graph 4). Here again the group's per capita weighted averages for 1980 and 1997 are used as benchmarks. While the per capita average of 1997 was also higher, the difference between the two years was disproportionately less than the difference between total energy use averages. In 1980, eight countries' per capita energy use rates were higher than the group's weighted average for that year. That number increased to ten countries in 1997. Average annual growth rates were positive in twenty-three of the 34 member countries for which data is available, and negative in the remaining eleven.

Over the study period, UAE recorded the highest energy use per capita followed by Kuwait, Saudi Arabia, Oman, Libya, etc. Clearly, it was the OIC oil producing countries who have the highest energy use per capita rates.

The record of MCs' net energy imports as a per cent of energy use confirms the paper's early observations regarding the OIC and the subgroups' energy balances (Table 4).

4. OIL PRICES TREND AND IMPACT

Despite extensive developments in conventional as well as new energy sources, oil remains an important source of energy. Up to now, oil is presumably the single most important transport fuel. It is also the most important fuel for electricity generation (Annex Table A3). It is not unreasonable to assume that oil will retain that position in the foreseeable future. Accordingly, oil markets' behaviour has a notable direct impact on the world economy at large as well as on individual

Graph 3
Commercial Energy Use in OIC Countries, 1980 and 1997

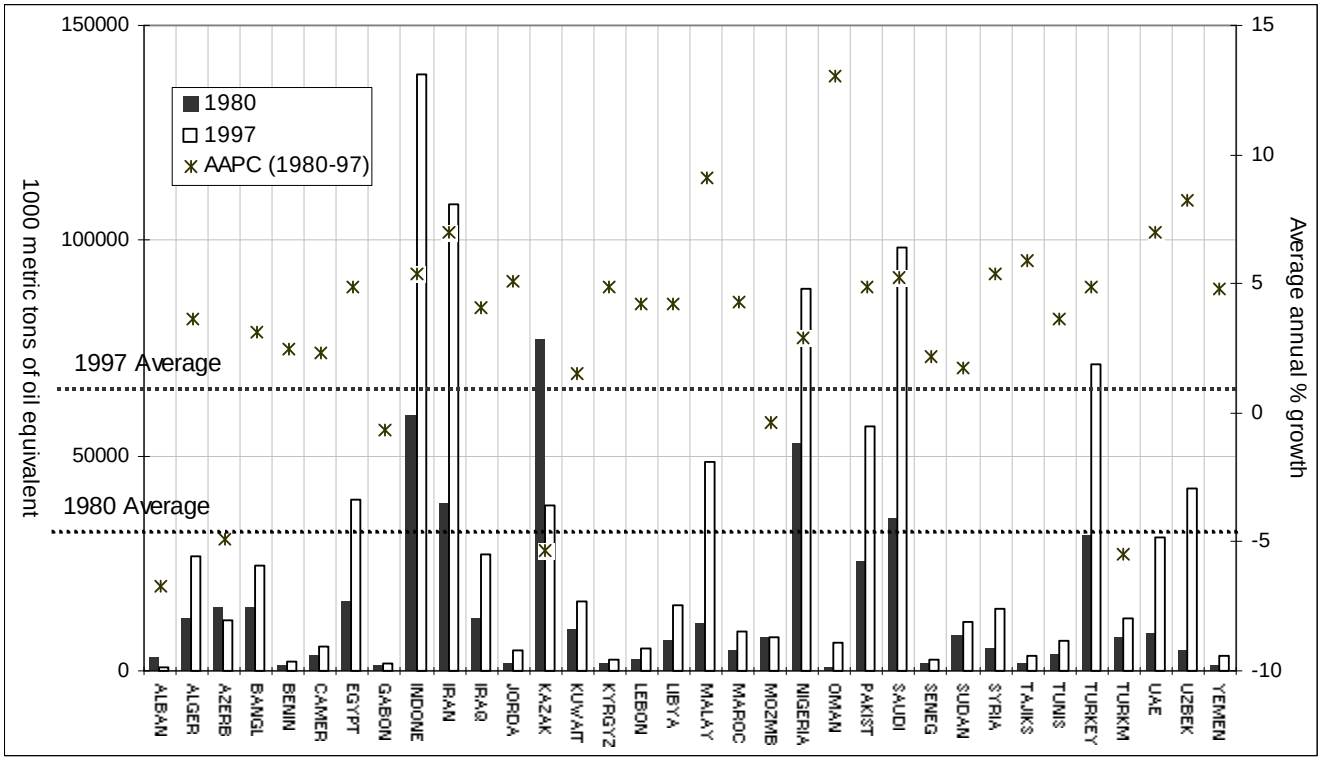
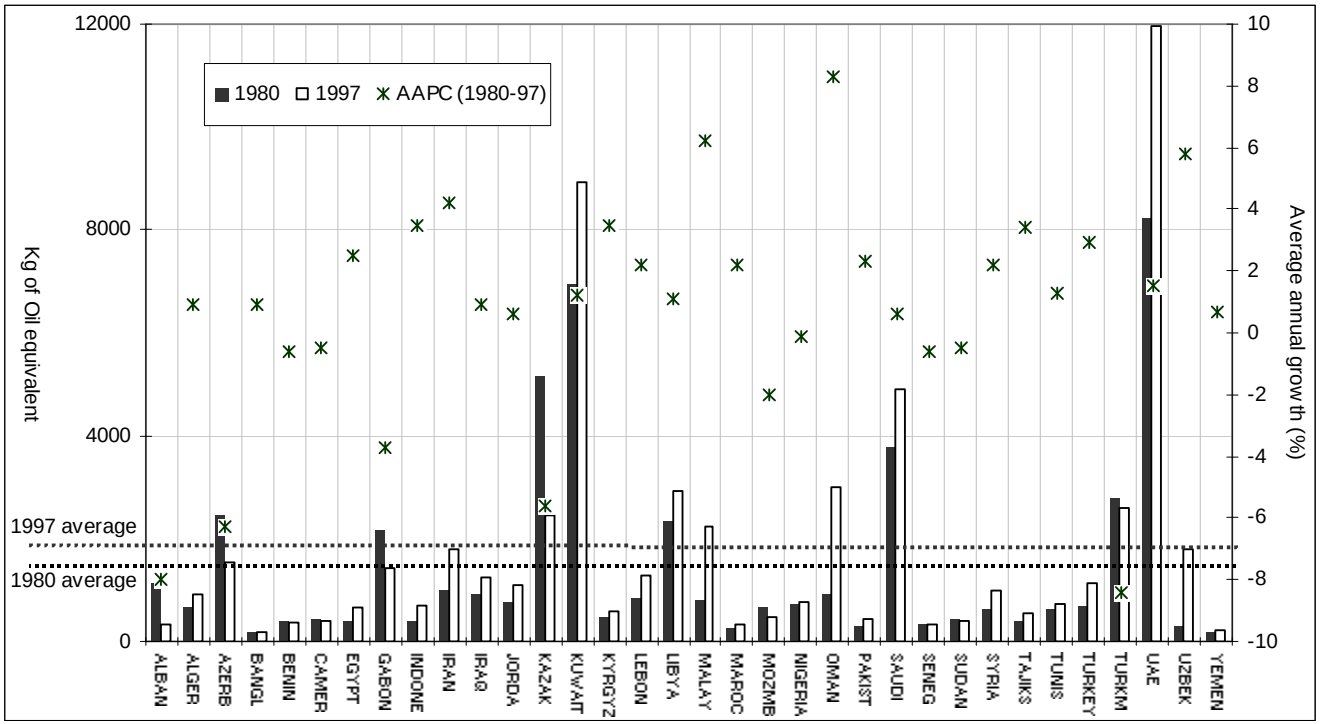


Table 4
Net Energy Imports of OIC Countries: Totals and Percentages of Commercial Energy Use, 1980 and 1997

			Thousand MTOE		AAPC	As % of energy use	
			1980	**1997**	**80-97**	**1980**	**1997**
NET ENERGY IMPORTERS	**Class I-A (7 MCs)**	Bangladesh	1639	2432.7	-2.3	11	10
		Benin	149.93	283.66	-3.7	11	13
		Kyrgyz Rep.	-480.76	1396.5	-193.9	-28	50
		Mozambique	646.32	689.76	-0.4	8	9
		Senegal	883.66	1108	-1.3	46	40
		Sudan	1344.96	1607.2	-1.0	16	14
		Tajikistan	-330	2131.92	-189.6	-20	63
		W	187.6	469.7	5.5	2.1	9.7
		% of OIC	-9.0	-22.4		-14.5	-120.6
	Class II-A (9 MCs)	Albania	-365.88	136.24	-206.0	-12	13
		Jordan	1714	4603.2	-5.6	100	96
		Lebanon	2309.19	5034.24	-4.5	93	96
		Morocco	3917.96	8162	-4.2	82	88
		Pakistan	4586.22	14772.68	-6.6	18	26
		Syria	-4171.44	18156.08	-191.7	-78	124
		Tunisia	-3081	136.1	-220.1	-79	2
		Turkey	14091.3	43476.53	-6.4	45	61
		Uzbekistan	192.84	-6382.95	-181.4	4	-15
		W	140.1	642.9	9.4	1.3	3.6
		% of OIC	-6.7	-30.6		-8.6	-44.6
NET ENERGY EXPORTERS	**Class I-B (6 MCs)**	Azerbaijan	150.01	-2037.79	-185.8	1	-17
		Cameroon	-2138.46	-5468.2	-5.4	-58	-95
		Indonesia	-69090.8	-83267.4	-1.1	-116	-60
		Nigeria	-95651.3	-101950	-0.4	-181	-115
		Turkmenistan	-79.48	-6577.74	-22.9	-1	-54
		Yemen	1367.04	-15735	-186.6	96	-469
		W	-1582.9	-2057.4	1.6	-2.5	-7.7
		% of OIC	75.9	98.1		16.8	96.5
	Class II-B (12 MCs)	Algeria	-54604	-99098.8	-3.4	-440	-374
		Egypt	-18205.8	-18603.1	-0.1	-114	-47
		Gabon	-7942.76	-18148.5	-4.7	-532	-1110
		Iran	-45144.9	-116952	-5.4	-116	-108
		Iraq	-124631	-34947.4	7.8	-1036	-129
		Kazakhastan	0	-26508.4	-100.0	0	-69
		Kuwait	-84545.8	-99899.7	-1.0	-884	-618
		Libya	-89519	-63830.7	2.0	-1248	-423
		Malaysia	-5564	-25690.7	-8.6	-50	-53
		Oman	-14093.4	-44850.5	-6.6	-1415	-662
		Saudi Arabia	-497827	-388874	1.5	-1408	-395
		UAE	-85331.2	-122570	-2.1	-995	-397
		W	-3436.4	-3545.4	0.2	-27.6	-14.7
		% of OIC	164.8	169.0		186.7	182.7
OIC Averages (W)			-2085	-2098	0	-396	-116
OIC TOTALS (T)			-1169806	-1177265	0	--	--

Source: Annex Table A1.
Notes: As in Table 2.

Graph 4
Commercial Energy Use per Capita in OIC Countries in 1980 and 1997



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 national inflation and cross-border relative prices. Having such a critical role, in addition to the special significance of oil to the OIC region, a look at oil prices is imperative for this paper. In a recent report the IMF argues,

> ''The recovery in global economic activity has been accompanied by more than doubling of oil prices since early 1999, mainly to production curb by the Organisation of the Petroleum Exporting Countries (OPEC) and several other oil producers. To a large extent, the rise in oil prices represents a recovery from exceptionally weak prices in early 1999, and this recovery has brought prices back closer to a long-term equilibrium. With oil prices having become a less important factor in world economy since the 1970s, the consequences of the recent price increase for oil importing countries are smaller than they have been in the past. In addition, the price rise is contributing to significant improvements in external balances and fiscal positions of oil exporters, including Russia, many countries in the Middle East, and some African countries, although net global demand will still fall somewhat as oil importers reduce demand more than oil exporters raise it''. (IMF, May 2000, p.3)

During the period 1970-1999, oil prices have been very volatile. Combinations of exogenous and endogenous factors have been behind this volatility. Regional wars are the most important exogenous factors while the conscious efforts of producers and consumers to influence prices represent the endogenous factors. Graph 5 depicts, in 1986 constant dollar, the crude oil price trend over the period 1970-1999. The year 1986[5] is chosen as a base year for three main considerations:

First, 1986 is physically the central year of the period and is, thus, less likely to skew the trend into either direction; i.e., it is less likely to introduce time-specific bias in the constant price trend.

[5] For the sake of completion and comparison, we constructed two other constant series based on the first, 1970, and the last, 1999, years' data points of nominal dollar price series. Neither of these altered the paper findings using 1986 as base. If any, they seem to reinforce them (see Graphs 6 and 7).

Second, in nominal terms, oil prices were low in 1986, and thus the generated constant trend is less likely to include an oil-price-induced inflationary effect.

Thirdly, oil price movements in 1986 epitomise the price behaviour of the full series. Accordingly, the year's average stands as a good representation of the series average.

The constant oil price trend of 1970-1999 is dominated by three abrupt price rises. First, the aptly named first oil shock, started in the second half of 1974 and continued until mid 1975, in the wake of the 1973 war and the oil embargo that followed it. In that instance, crude oil prices rose from around US$7 to over US$25 a barrel (approximately 285 per cent). These higher price levels were more or less maintained thereafter.

The second oil shock of 1979, which started with the first gulf war and continued until 1980, saw prices rising to over US$45 a barrel (prices doubled in the span of two years). Unlike in the first case, the second hype in oil prices could not be maintained. A downward price spiral started in 1980 and continued until mid 1986 when it reached its lowest point. During that period, prices came down from over US$45 to about US$27 by the end of 1985. During the first half of 1986 alone, oil prices declined from over US$27 to US$11 per barrel (i.e., lost more than half its price).

The third shock which came with the second gulf war was both moderate and brief compared to the other two. The rise started in mid 1990 from a level of US$12.5 to reach a peak of US$27 a barrel in the second half of that year and then dropped sharply to under US$15 a barrel early in 1991.

With the exception of 1999 and a brief period of 1997, the period following the gulf war mainly saw a downward pressure on crude oil prices. In fact, the year 1998 witnessed the lowest point of the oil price series since 1971.

So to sum up, the following three general narration points may describe the overall crude price trend:

1. A generally rising trend, in sharp steps, during the 1970s.

2. Except for a brief period between mid 1986 and mid 1987, crude oil prices have continuously declined, sometimes sharply, during the 1980s.

3. A general downward pressure on prices may also typify the 1990s. Except for the period mid 1990-early 1991 (the period of the Second Gulf War) and the second half of 1997 and 1999, the 1990s also could be seen as a decade of moderate decline.

While it is true that oil prices more than doubled during 1999, they still remained some way below the 1970-1999 period average. In fact, since 1986, oil prices have always been below the 1970-1999 average[6], except for the Second Gulf War period. One may argue that the period average may not be the best representation of a long-term, stable equilibrium on the basis that it involves artificially high rates. They may be justified in that regard. However, the trend also includes the very low rate of the early 1970s. For the sake of completion, using an ad hoc criterion[7], we re-calculate the average after omitting the extreme data observations in the trend.

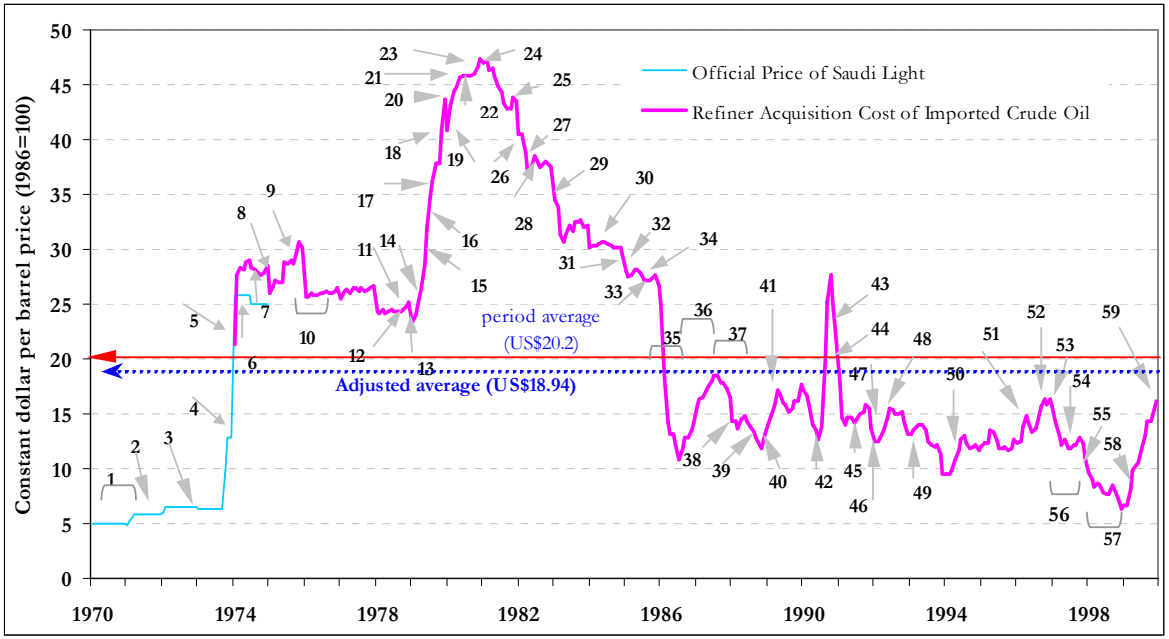
The result of this exercise is the adjusted average which is reported in the respective graphs. The adjusted average of the trend using 1970 prices as a base year is the period average itself (US$7.1 per barrel). Using the other extreme end of the trend, 1999, as base, the adjusted average amounted to US$24.87 per barrel, compared to US$30.7 per barrel for the unadjusted period average. In the centrally-based trend, 1986 as base, the adjusted average came to US$18.98 while the overall period average was US$20.2 per barrel. This paper argues that the latter of the three adjusted averages is the one that closely approximates the long-term price path of crude oil. The argument is based on the premise that a much accurate adjusted path is the simple average of the sum of the adjusted averages of using every year of the trend as base, which should be closest to the central year's adjusted average.

Using the refined adjusted average as guide instead of the period average does not alter any of our earlier observations. This in turn

[6] This is the simple average of the full length of the real trend in the graph above.

[7] Since we believe the simple average of the real trend is a good approximation of the stable long-term price path, we include, in the recalculated average, all observations that are within a ten point range from the overall period average.

Graph 5
Crude Oil Price Trend, 1970-1999
(In 1986 constant dollar prices)



Author's construction, SESRTCIC.
Data Source: Current dollar price data obtained from the Energy Information Administration of the United States, http://www.eia.doe.gov.

Graph 5-Notes[8]:

1. OPEC begins to assert power; raises tax rate & 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. Saudis increase tax rates and royalties.
8. US crude oil entitlements programme begins.
9. OPEC announces 15% 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% price increase for 1979.
13. Iranian revolution; Shah deposed.
14. OPEC raises prices 14.5% on April 1, 1979.
15. US phased price decontrol begins.
16. OPEC raises prices 15%.
17. Iran takes hostages; President Carter halts imports from Iran; Iran cancels US contracts; Non-OPEC output hits 17.0 million b/d.
18. Saudis raise 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. President Reagan 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. Saudis link to spot prices and begin 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.

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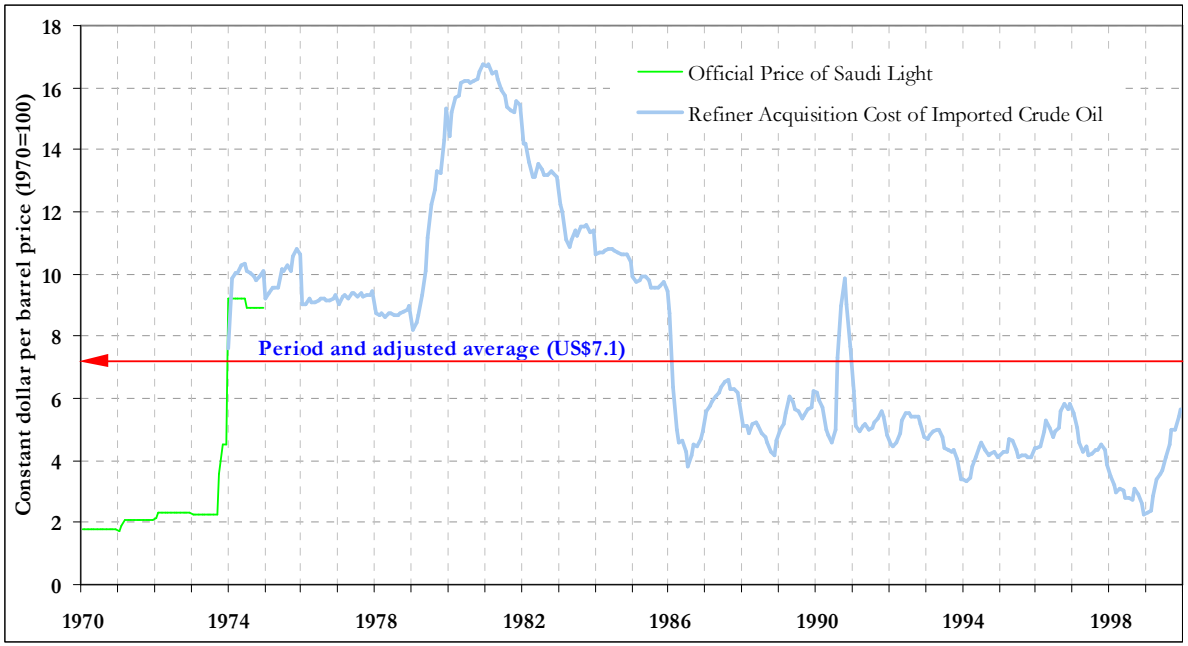
[8] World Oil Market and Oil Price Chronologies: 1970 – 1999, notes are adopted 'as is' from the source. The basic difference is that our paper imposes them on constant oil price trend while in the source, they were used on a nominal 'dollar-of-the-day' price trend.

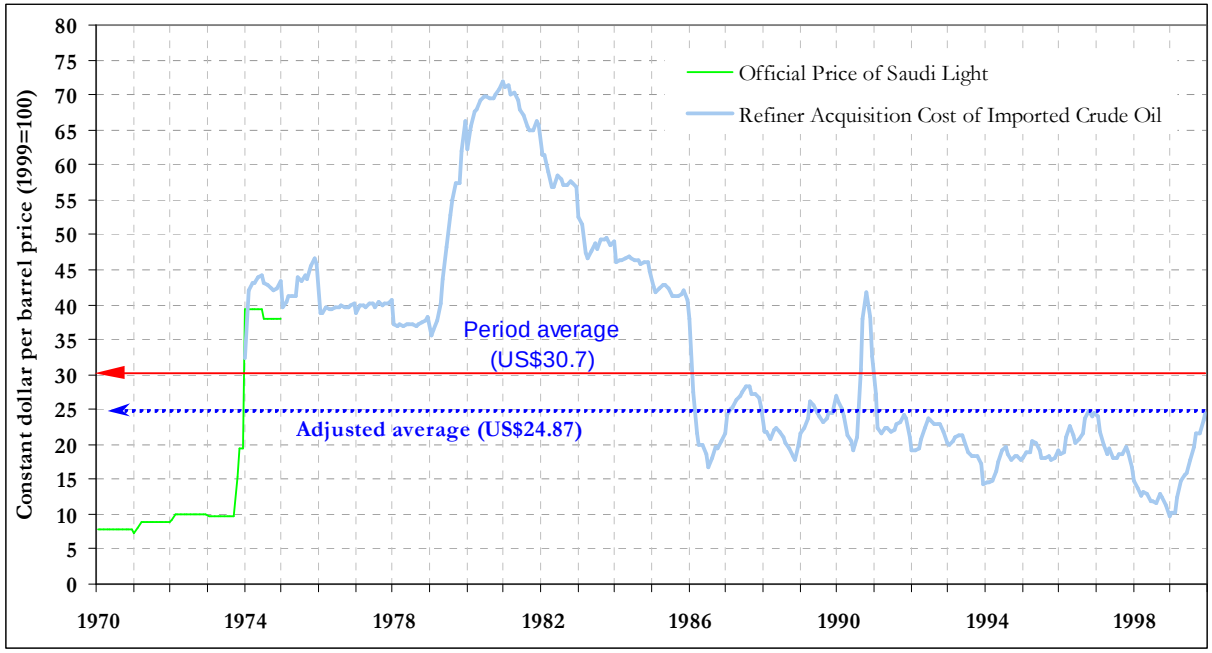
38. OPEC/Non-OPEC meeting failure.
39. OPEC production accord; Fulmar/Brent production outages in the North Sea.
40. Exxon's Valdez tanker spills 11 million gallons of crude oil.
41. OPEC raises production ceiling to 19.5 million b/d.
42. Iraq invades Kuwait.
43. Operation Desert Storm begins; 17.3 million barrels of SPR crude oil sales is awarded.
44. Persian Gulf war ends.
45. Dissolution of Soviet Union; Last Kuwaiti oil fire is extinguished on November 6, 1991.
46. UN sanctions threatened against Libya.
47. Saudi Arabia agrees to support OPEC price increase.
48. OPEC production reaches 25.3 million b/d, the highest 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. US launches cruise missile attacks on southern Iraq following an Iraqi-supported invasion of Kurdish safe haven areas in northern Iraq.
53. Iraq begins exporting oil under United Nations Security Council Resolution 986.
54. Prices rise as Iraq's refusal to allow United Nations weapons inspectors into "sensitive" sites 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 per day. 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 rise 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. Anticipation of possible Y2K impacts results in an undetermined amount of stockbuilding at secondary and tertiary levels.

Graph 6
Crude Oil Price Trend, 1970-1999
(In 1970 constant dollar prices)



Author's construction, SESRTCIC.
Data Source: Current dollar price data obtained from the Energy Information Administration of the United States, http://www.eia.doe.gov.

Graph 7
Crude Oil Price Trend, 1970-1999
(In 1999 constant dollar prices)



Author's construction, SESRTCIC.
Data Source: Current dollar price data obtained from the Energy Information Administration of the United States, http://www.eia.doe.gov.

supports the use of the period average as a yardstick. Accordingly, the paper is justified in its assertion that despite the recent increase, crude oil prices are still some way below their long-term stable path. The findings of the paper support the World Bank affirmation that the recent price surge was more of a correction of a long-term distortion rather than being a distortion in themselves, as some have recently been claiming.

> "The production increases agreed by OPEC in March 2000 will probably stabilise oil prices. However, in the relatively unlikely case that prices continue to increase, the benign effects on global activity to date could turn more worrisome" (IMF, May 2000, p.4).

The findings also explain why crude oil prices are no longer as important a factor as they used to be in the 1970s and 1980s. This is clear from the shape of the graphs and from the shares of oil in the energy market. Accordingly, the paper concludes that as long as crude oil prices are within the range of simple and adjusted long-term averages, they pose no problem to the world economy. In addition, their positive effects on the producing countries' internal balances and demand will contribute positively to global activity.

5. ENERGY POLICY AND THE OIC COUNTRIES

5.1. Energy Sector Reform[9]

Reforming the energy sector in general involves two main elements, namely:

Institutional reform, which entails the reformation of the sector policies, including the sector's industrial organisation and market structure and the regulation policy.

Financial reform, which requires the restructuring of the sector financing. Financial reform looks into the way the sector is financed.

The implementation of the two elements is a sector-specific package of reform and liberalisation policy tailored for the energy sector.

[9] This section is based on Chapter 1: Taking Stock of Progress, The Energy Sector in Developing Countries (WB 2000B).

5.2. Institutional Reform in Developing Countries

In the words of the World Bank, "The goal of institutional reform of the energy sector in developing countries is to organise energy policy, legislation, regulatory framework, and market structure, in the way that best enables the energy sector to fulfil its role in development" (WB 2000B, p.1). Energy policy is thought to have two main roles in development. The first of these roles concerns the widely acknowledged need to minimise and ameliorate the damaging impact of energy on the local as well as the global environments. The second, which is indirect and relatively less understood, is the potential role of energy sector reform on poverty. The World Bank (2000b) asserts that energy sector reform could help alleviate poverty. Through its impact on labour's productivity, access to modern energy promotes the productive use of labour. That leads to job creation which is one of the main strategies of alleviating poverty (World Bank, 1990). The other channel of energy reform impact on the poor is through removal of energy price subsidies, which are thought to benefit the well off and impose a high cost on the economy at large. The savings raised could be targeted to more direct poverty alleviation measures such education and health provisions and to merit goods such as rural roads, urban public transport and sewage, etc.

Accordingly, institutional energy reform to date revolves around the following functions:

- To improve economic, financial, technical and operational efficiency in the energy sector. These include the revaluation of inefficient and unsustainable energy practices and projects and the rethinking of improvident energy policies including the elimination of wasteful and poorly-targeted subsidies.
- To expand access to modern energy for the urban and rural poor. This may still entail an element of subsidy but that has to be used selectively and for the provision of merit goods.
- To mitigate and prevent the harmful emissions and effects of energy production and energy use on the local and global environments. Mitigating previous damage by attempting to ameliorate its effects and prevent it by stopping immediately or phasing out the causes and sources of such damage.

A number of typical problems are identified in energy sectors in developing countries, the most important of which are the economic waste and the fiscal burden. The sources of this inefficiency are the following:

1. Distorted pricing systems and pricing regimes.
2. Low quality of service.
3. High technical and non-technical losses.
4. Lack of efficient technical equipment.
5. Inefficient and dated systems of operation.
6. Lack of commercial managerial and technical skills.
7. Sub-optimal economic fuels and investment choices.

The root causes of all these shortcomings are institutional in the first degree. In the final analysis, these can be summarised in the following: inappropriate sectoral policy and structure, excessive government interference, poor incentive systems and mismanagement.

A list of remedies have been suggested to solve these problems and rectify the energy sector's operation in developing countries, viz.,

- To commercialise the management and enhance investment recovery.
- To put into place the needed adequate legislation that supports restructuring, reform and privatisation.
- To establish autonomous and independent regulations in the sector.
- To separate production, transport and retail operations under independent management and institutional structures.
- To introduce and encourage private ownership in the sector by freeing the licensing of new projects.
- To privatise, wherever and whenever appropriate, existing publicly-owned enterprises in the sector.

5.3. Financial Reform

Reform of the energy sector finances has been among the main policy objectives of the sector's overall policy reform programme. It involves the financial system, investment and the pricing policies of the sector. The financial systems and structures of the developing countries have undergone tremendous changes during the past few years. These changes have been mainly problem as well as reform-driven.

Recent experience suggests that the energy sector's financial reform brings about the following benefits:

- *More efficient mobilisation of financial resources:* it is argued that the discipline exerted by the capital markets results in more efficient mobilisation of financial resources in the sector. Since investment planning is often subjected to more rigorous scrutiny, capital portfolios and structure would be optimised and risk analysis and mitigation would be more efficient.

- *Easing of financial constraints imposed by the sector:* in many developing countries, cost recovery in publicly-owned utilities is typically poor. This is particularly the case in the power sector due to the large technical and other losses, particularly those related to poor financial management. Such a poor performance discharges private investment and financing in the sector. That is precisely why developing countries' power sectors are totally dependent on public and officially-borrowed funds to finance initial investments, developments and, in some instances, even the cost of reform. Thus, freeing the sector of crippling regulation and public sector malaise enables private sector finance and participation. That, in turn, alleviates the claims on scarce public and borrowed funds while privatisation of existing projects eliminates the need for subsidy.

- *Enhancement of sector creditworthiness:* the most needed change in this respect is to reform the cost recovery system from the user end. Therefore, tariff reform represents the backbone of the whole reform programme. Pricing of energy services has to be designed to reflect the real cost of provision. In addition, measures have to be introduced to stamp out large-scale non-payment. Without these, no investment, whether public or private, would be sustainable. "The institutional reforms which have permitted tariff reform and independently regulated private participation in the retail supply of energy have been responsible not only for an increase in the level of private capital flows to the sector, but for an increase in the sector's creditworthiness – and hence its attractiveness to any capital, public or private" (World Bank, 2000B, p.6).

6. CONCLUSIONS

Commercial energy is the prerequisite input for modern life. Electricity generation is the most vital product of commercial energy. The five

main commercial energy sources listed by order of importance as per 1997 data are coal, hydropower, nuclear power, gas and oil. In 1980, oil was the second to coal in the energy market contributing some 29 per cent. In 1997 it took only 9 per cent of the market, the least contribution of the five main conventional sources. Despite the sharp decline of its share in the world energy market, oil continues to be at the centre stage of the world energy scene. The paper traced that phenomenon to economic and non-economic justifications. Physically, oil is still the sole fuel that is most technically and commercially viable for important economic activities such as transport. However, taking into consideration the state of innovation and technological developments, that reason alone would not justify this intense attention. Other political, strategic, market structure as well as historical reasons may all be contributing to the markets' preoccupation with oil.

The OIC region is the most important producer and net-exporter of energy in the world, particularly oil-based energy. Accordingly, changes in market shares and prices of oil are of vital importance to the OIC region in general and the OIC NEXs in particular.

The recent surge in oil prices is merely a correction of existing distortions, which is bringing oil prices closer to their long-term stable path. Over the last twenty years, oil prices have widely diverged from their stable path. The diversions were primarily driven from or instigated by external factors, war situation in particular. The closer oil prices to their long-term path, the more stable they will be. Stability dividend would be good for markets and producers alike. Using the paper notations, an ideal oil price range would be to maintain prices between the long-term adjusted and unadjusted averages.

New large discoveries of oil reserves in the OIC region, particularly in the Caspian Sea, reinforce its position as an energy surplus region. This is strengthened further with the relatively moderate discoveries in other parts of the OIC region, particularly in Africa. While not very significant on world energy supply, these moderate finds are critical for the individual MCs themselves.

For environmental as well as strategic reasons, advances in technology contribute to improving energy use efficiency of conventional sources as well as to developing substitute sources.

Developments have been made on both fronts. Some of these developments have contributed to the steep reduction of oil share in the energy market. Nevertheless, oil continues to attract the most attention. Taking in consideration the figures, such attention can more appropriately be explained on historical, strategic and political grounds rather than on purely economic ones.

Among the conventional energy sources, nuclear power represents an untapped source of energy for the OIC countries. Only one OIC country has an installed nuclear power facility. Other OIC MCs are contemplating this potential to meet rapidly increasing energy demand.

The production and use of energy create emissions that are harmful to the local as well as the global environments. Remedies, precautions and preventive measures need to be put into place so as to clean, combat and ameliorate these effects. As with all economic products, energy has to be produced, distributed and consumed in the most efficient way possible, so as to maximise its benefits and minimise its harmful emissions. To promote efficiency and environmental harmony, MCs need to reform their energy sector's policies. Reform policy entails both institutional as well as financial reforms (see chapter 5 for details of energy policy reforms).

With the development of technology, alternative and greener energy sources' unit price will gradually decline. In contrast, the unit cost of conventional energy sources will tend to increase over time, with depletion of non-renewable sources as well as increases in the environmental costs associated with these sources. With the evolvement of these two factors together, over time, the use of alternative energy sources will gradually become economically viable, at which time, countries may come under pressure to supplant their energy sources and technology with greener and more environmentally friendly alternatives. Although there is a long time yet before such an eventuality, it pays a great deal for countries to adopt the internationally recognised environmental standards and introduce measures for making their own standards higher compared to the minimum allowable levels.

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ANNEX

Table A1

Energy Production and Use in OIC Countries

	Country classification	Commercial energy production		Commercial energy use			Commercial energy use per capita			Net energy imports	
	By income and energy	Thousand metric tons of oil equivalent		Thousand metric tons of oil equivalent			Kg of oil equivalent		Average annual % growth	% of commercial energy use	
	1997	**1980**	**1997**	**1980**	**1997**	**1980-97**	**1980**	**1997**	**1980-97**	**1980**	**1997**
Albania	2A	3428	912	3049	1048	-6.7	1142	317	-8	-12	13
Algeria	2B	67061	125576	12410	26497	3.6	665	904	0.9	-440	-374
Azerbaijan	1B	14821	14027	15001	11987	-4.9	2433	1529	-6.3	1	-17
Bangladesh	1A	13204	21894	14900	24327	3.1	172	197	0.9	11	10
Benin	1A	1212	1897	1363	2182	2.5	393	377	-0.6	11	13
Burkina Faso	1A										
Cameroon	2B	5824	11250	3687	5756	2.3	426	413	-0.5	-58	-95
Chad	1A										
Egypt	2B	34168	57997	15970	39581	4.9	391	656	2.5	-114	-47
Gabon	2B	9441	19786	1493	1635	-0.7	2161	1419	-3.7	-532	-1110
Gambia	1A										
Guinea	1A										
Guinea-Bissau	1A										
Indonesia	1B	128403	221549	59561	138779	5.4	402	693	3.5	-116	-60
Iran	2B	84001	224935	38918	108289	7	995	1777	4.2	-116	-108
Iraq	2B	136643	62088	12030	27091	4.1	925	1240	0.9	-1036	-129
Jordan	2A	1	193	1714	4795	5.1	786	1081	0.6	100	96
Kazakhastan	2B	76799	64784	76799	38418	-5.3	5163	2439	-5.6	0	-69
Kuwait	2B	94085	116087	9564	16165	1.5	6956	8936	1.2	-884	-618
Kyrgyz Rep.	1A	2190	1408	1717	2793	4.9	473	603	3.5	-28	50
Lebanon	2A	178	207	2483	5244	4.2	827	1265	2.2	93	96
Libya	2B	96662	78942	7173	15090	4.2	2357	2909	1.1	-1248	-423
Malaysia	2B	16644	73979	11128	48473	9.1	809	2237	6.2	-50	-53
Mali	1A										
Mauritania	1A										
Morocco	2A	877	1067	4778	9275	4.3	247	340	2.2	82	88
Mozambique	1A	7417	6994	8079	7664	-0.4	668	461	-2	8	9
Niger	1A										

Table A1 (continued)

	Country classification	Commercial energy production		Commercial energy use			Commercial energy use per capita			Net energy imports	
	1997	**1980**	**1997**	**1980**	**1997**	**1980-97**	**1980**	**1997**	**1980-97**	**1980**	**1997**
Nigeria	1B	148479	191034	52846	88652	2.9	743	753	-0.1	-181	-115
Oman	2B	15090	51620	996	6775	13	905	3003	8.3	-1415	-662
Pakistan	2A	20998	42048	25479	56818	4.9	308	442	2.3	18	26
Saudi Arabia	2B	533071	487095	35357	98449	5.2	3773	4906	0.6	-1408	-395
Senegal	1A	1046	1654	1921	2770	2.2	347	315	-0.6	46	40
Sierra Leone	1A										
Sudan	1A	7078	9881	8406	11480	1.7	450	414	-0.5	16	14
Syria	2A	9502	32794	5348	14642	5.4	614	983	2.2	-78	124
Tajikistan	1A	1986	1253	1650	3384	5.9	416	562	3.4	-20	63
Togo	1A										
Tunisia	2A	6966	6655	3900	6805	3.6	611	738	1.3	-79	2
Turkey	2A	17190	27556	31314	71273	4.9	704	1140	2.9	45	61
Turkmenistan	1B	8034	18739	7948	12181	-5.5	2778	2615	-8.4	-1	-54
Uganda	1A										
UAE	2B	93915	153555	8576	30874	7	8222	11967	1.5	-995	-397
Uzbekistan	2B	4615	49054	4821	42553	8.2	302	1798	5.8	4	-15
Yemen	1B	60	19105	1424	3355	4.8	167	208	0.7	96	-469
OIC (t)		**1661089**	**2197615**	**491803**	**985100**	**4.2**	**1298**	**1854**	**2.2**	**-396**	**-116**
World (1)		6889350 t	9579862 t	9622832 t	9431190 t	2.8 w	1625 w	1692 w	0.9 w		
Low income		1296366	2267533	1148189	2116021	3.9	480	646	2	-14	-9
Exc. China & India		465815	765820	307537	541939	3.7	425	500	1.1	..	..
Middle income		2804139	3607537	2001642	2601928	4.7	1854	1830	1.8	-35	-33
Low & middle (2)		4100505	5875070	3149831	4717949	4.3	907	1005	2	-32	-28
High income		2788845	3704792	3773001	4713241	1.7	4794	5369	1.0	27	24
MENA		989401	1155761	145825	374375	5.4	839	1353	2.5	-577	-225
EMU		365725	434996	940146	1094605	1.2	3408	3767	0.9	61	59
OIC % of (1)		**24.1**	**22.9**	**5.1**	**10.4**		**81.0**	**111.2**			
OIC % of (2)		**40.5**	**37.4**	**15.6**	**20.9**		**145.1**	**187.2**			

Source: World Bank, World Development Indicators 2000, Table 3.7, pp.138-140.

Notes: w: weighted averages, t: totals. MENA: Middle East and North Africa, EMU: European Monetary Union.

Table A2
Energy Efficiency and Emissions in OIC Countries

	GDP per energy use		Traditional fuel use		Carbon dioxide emissions					
	PPP $ per kg oil equivalent		% of total energy use		Total million metric tons		Per capita metric tons		Kg per PPP $ of GDP	
	1980	**1997**	**1980**	**1996**	**1980**	**1996**	**1980**	**1996**	**1980**	**1996**
Albania		8.5	13.1	9.3	4.8	1.9	1.8	0.6		0.2
Algeria	4.7	5.3	1.9	1.5	66.2	94.3	3.5	3.3	1.1	0.7
Azerbaijan		1.3		0		30		3.9		2
Bangladesh	2.9	6.8	81.3	43.3	7.6	23	0.1	0.2	0.2	0.1
Benin	1.2	2.3	85.4	87.5	0.5	0.7	0.1	0.1	0.3	0.1
Burkina Faso			91.3	87.4	0.4	1	0.1	0.1	0.1	0.1
Cameroon	2.3	3.6	51.7	68.8	3.9	3.5	0.4	0.3	0.5	0.2
Chad			95.9	97.6	0.2	0.1	0	0	0.1	0
Egypt	2.8	4.7	4.7	3.5	45.2	97.9	1.1	1.7	1	0.6
Gabon	2	4.5	30.8	32.6	4.9	3.7	7.1	3.3	1.6	0.5
Gambia			72.7	78.6	0.2	0.2	0.2	0.2	0.3	0.1
Guinea			71.4	72.4	0.9	1.1	0.2	0.2		0.1
Guinea-Bissau			80	57.1	0.1	0.2	0.2	0.2	0.5	0.2
Indonesia	2	4.5	51.5	28.7	94.6	245.1	0.6	1.2	0.8	0.4
Iran	2.7	3	0.4	0.9	116.1	266.7	3	4.4	1.1	0.9
Iraq			0.3	0.1	44	91.4	3.4	4.3		
Jordan	2.3	3.3	0	0						
Kazakhastan		1.8		0.1		173.8		10.9		2.5
Kuwait			0	0						
Kyrgyz Rep.		3.8		0		6.1		1.3		0.6
Lebanon		3.3	2.4	2.8	6.2	14.2	2.1	3.5		0.9
Libya										
Malaysia	3.2	4	15.7	6	28	119.1	2	5.6	0.8	0.6
Mali			86.7	88.6	0.4	0.5	0.1	0	0.1	0.1
Mauritania			0	0	0.6	2.9	0.4	1.2	0.4	0.8
Morocco	6.4	9.5	5.2	4.8	15.9	27.9	0.8	1	0.5	0.3
Mozambique	0.6	1.6	43.7	91.4	3.2	1	0.3	0.1	0.6	0.1
Niger			79.5	80	0.6	1.1	0.1	0.1	0.2	0.2
Nigeria	0.7	1.1	66.8	69	68.1	83.3	1	0.7	1.9	0.9
Oman			0		5.9	15.1	5.3	7		
Pakistan	2	3.9	24.4	17.3	31.6	94.3	0.4	0.8	0.6	0.4

Table A2 (continued)

	GDP per energy use		Traditional fuel use		Carbon dioxide emissions					
	PPP $ per kg oil equivalent		% of total energy use		Total million metric tons		Per capita metric tons		Kg per PPP $ of GDP	
	1980	**1997**	**1980**	**1996**	**1980**	**1996**	**1980**	**1996**	**1980**	**1996**
Saudi Arabia	2.8	2.1	0	0	130.7	267.8	14	13.8	1.3	1.3
Senegal	2.1	4.1	50.8	56.3	2.8	3.1	0.5	0.4	0.7	0.3
Sierra Leone	1.5	3.3	86.9	76.5	3.3	3.5	0.2	0.1	0.3	0.1
Sudan	1.5	3.3	86.9	76.5	3.3	3.5	0.2	0.1	0.3	0.1
Syria	2.9	3	0	0	19.3	44.3	2.2	3.1	1.3	1
Tajikistan		1.6				5.8		1		1
Togo			35.7	71	0.6	0.8	0.2	0.2	0.2	0.1
Tunisia	3.7	7.2	16.1	12.7	9.4	16.2	1.5	1.8	0.6	0.3
Turkey	3.3	5.7	20.5	3.4	76.3	178.3	1.7	2.9	0.7	0.5
Turkmenistan		1				34.2		7.4		2.4
Uganda			93.6	90.6	0.6	1	0.1	0.1	0.1	0
UAE	2.9	1.7	0		36.3	81.8	34.8	33.3	1.5	1.6
Uzbekistan		1.1		0		95		4.1		2
Yemen		3.5	0	2						
OIC (w)	**2.6**	**4.0**	**22.6**	**14.0**	**832.7 t**	**2135.4 t**	**3.7**	**4.7**	**0.8**	**0.7**
World (1)			7.4w	7.2w	13640.7 t	22653.9 t	3.4 w	4.0 w	1.2 w	0.6 w
Low income			26.3	19.5	2251	5306.2	0.9	1.6	1.6	0.7
Exc. China & India			59.9	48.1	302	690.9	0.4	0.6	0.6	0.4
Middle income			11.5	6	2679.6	6617.1	3.2	4.7	1	0.7
Low & middle (2)			18.6	12.2	4930.6	11923.3	1.5	2.5	1.2	0.7
High income			1.0	2.4	87710.2	10730.6	12.3	12.3	1.2	0.5
MENA		3.3	1.6	1.2	493.9	987.2	3.0	3.9	1.1	0.8
EMU	2.9	5.5	0.7	0.8	1504.4	2329.5	7.6	8.0	0.9	0.4
OIC as % of (1)			306.1	194.1	6.1	9.4	108.6	117.0	69.9	118.8
OIC as % of (2)			121.8	114.5	16.9	17.9	246.1	187.3	69.9	101.8

Source: World Bank, World Development Indicators 2000, Table 3.7, pp.142-144.
Notes: w: weighted averages, t: totals. PPP: Purchasing Power Parity.

Table A3
Sources of Electricity

	Electricity production		Hydropower		Coal		Oil		Gas		Nuclear power	
	billion kwh		%		%		%		%		%	
	1980	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**
Albania	3.7	5.6	79.4	96.3			20.6	3.7				
Algeria	7.1	21.7	3.6	0.3			12.2	3.6	84.1	96.1		
Azerbaijan	15	16.8	7.3	9			92.7	72.8		18.1		
Bangladesh	2.4	11.9	24.8	6.1			26.6	9.4	48.6	84.5		
Benin	0	0.1					100	100				
Burkina Faso												
Cameroon	1.5	3.1	93.9	98.8			6.1	1.2				
Chad												
Egypt	18.9	57.7	51.8	20.8			27.7	35.2	20.5	44		
Gabon	0.5	1	49.1	73.5			50.9	16		10.5		
Gambia												
Guinea												
Guinea-Bissau												
Indonesia	8.4	74.8	16	8		30.7	84	30		27.8		
Iran	22.4	95.8	25.1	7.7			50.1	33.9	24.8	58.4		
Iraq	11.4	29.6	6.1	2			93.9	98				
Jordan	1.1	6.3		0.4			100	87.2		12.5		
Kazakhastan	61.5	52	9.3	12.5		72	90.7	7.3		8.2		
Kuwait	9.4	27.1					37.2	26	62.8	74		
Kyrgyz Rep.	9.2	12.6	53.1	89.1		6.6	46.9	4.3				
Lebanon	2.8	8.5	30.9	10.6			69.1	89.4				
Libya	4.8	18.2					100	100				
Malaysia	10	57.9	13.9	5.7		5.3	84.7	10.2	1.3	78.8		
Mali												
Mauritania												
Morocco	5.2	13.1	28.9	15.7	19.5	45	51.6	39.3				
Mozambique	0.5	1	65.2	78.7	17.5		21.1		0.2			
Niger												
Nigeria	7.1	15.2	39	36.8	0.4		45.1	25.8	15.5	37.3		
Oman	0.8	7.3					21.5	16.5	78.5	83.5		
Pakistan	15	59.1	58.2	35.3	0.2	0.6	1.1	38.5	40.5	24.9	0	0.6

Table A3 (continued)

	Electricity production		Hydropower		Coal		Oil		Gas		Nuclear power	
	billion kwh		%		%		%		%		%	
	1980	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**	**1980**	**1997**
Saudi Arabia	20.5	103.8				58.5	57.5	41.5	42.5			
Senegal	0.6	1.3				100	93.9		6.1			
Sierra Leone												
Sudan	0.8	2	70	53			30	47				
Syria	4	18	64.7	55.9			31.9	26.3	3.4	17.7		
Tajikistan	13.6	14	93.4	98.8			6.6			1.3		
Togo												
Tunisia	2.9	8	0.8	0.6			64.5	15.7	34.7	83.7		
Turkey	23.3	103.3	48.8	38.5	25.6	32.8	25.1	6.9		21.4		
Turkmenistan	6.7	9.4	0.1	0.1			99.9			99.9		
Uganda												
UAE	6.3	20.6					44.8	16.2	55.2	83.8		
Uzbekistan	33.9	46.1	14.6	12.5		4.1	85.4	11.9		71.5		
Yemen	0.5	2.4					100	100				
OIC (w)	**331.8 s**	**925.3s**	**21.6**	**13.8**	**3.5**	**16.1**	**58.6**	**37.7**	**15.3**	**31.1**	**0**	**0.1**
World	8192.7s	13872.6s	20.4w	18.2w	33.1w	38.4w	28.5w	9.1w	8.8w	15.5w	8.7w	17.3w
Low income	579.1	1931.8	29.7	20.3	41.5	63.8	25.8	8.8	1.8	5.6	1.3	1.4
Exc. China & India	146.6	305	46	39.5	1.5	9.9	43.7	24.5	5.8	24.3	3	0.6
Middle income	2211.2	3545.2	20.3	24.3	15.1	24.4	55.5	14.6	4.8	25.1	3.8	10.5
Lower middle	1570	2033.1	15.2	18.8	9	24.3	67.8	12.3	3	32	4.7	11.6
Upper middle	641.1	1512.2	32.8	31.7	30.2	24.7	25.4	17.7	9.3	15.9	1.6	9
Low & middle	2790.3	5477.1	22.3	22.9	20.6	38.3	49.3	12.6	4.2	18.2	3.3	7.3
OIC as % of:												
World total	**4.0**	**6.7**	127.7	89.6	19.7	77.0	206.6	415	228.5	263.2	0.0	3.5
Low & Middle	**11.9**	**16.9**	116.9	71.2	31.6	77.2	119.8	299.8	478.7	224.2	0.0	8.2

Source: World Bank, World Development Indicators 2000, Table 3.9, pp.146-148.

Notes: w: weighted averages, s: totals include estimates.