

CHAPTER FOUR

ENERGY

World economic recession, being aggravated in 2001 due to September 11 events, faced relative improvement since the beginning of 2002 and enjoyed a growth of 3 percent as compared with 2.3 percent in 2001. This raised the total consumption of primary energy by 2.6 percent to 188.9 mb/d oil equivalent. Consumption of primary energy in Iran remained relatively unchanged in 2002, compared with the previous year at 2.3 mb/d oil equivalent.

World oil supply fell by 0.4 percent to 76.4 mb/d, while crude oil demand with 2 percent rise reached 77.5 mb/d. Thus, on a daily average the world market faced 1.1 mb shortage of supply, largely attributable to the reduction in OPEC crude supply. In the review year, world average crude oil production reached 73.9 mb/d showing 0.6 percent reduction as compared to 2001. Crude oil production of OPEC member countries, with a 6.2 percent reduction, was limited to 28.2 mb/d, constituting 38.2 percent of the world crude oil production. World oil consumption grew by 0.4 percent as compared with the previous year to 75.7 mb/d.

Following the September 11 events and the deepening of global economic recession, crude prices experienced a downward trend at the end of 2001, while this trend was reversed since the beginning of 2002. Therefore, average price of OPEC oil basket rose by 33.7 percent to \$ 26.67 per barrel in the last quarter of 2002 against \$ 19.95 per barrel in the first quarter of 2002.

OPEC reduced its production to meet targets of regulating the market and price band of \$ 22-28 per barrel of OPEC crude basket. Production of OPEC's Middle East members with 6.6 percent reduction reached 19.0 mb/d, while production of other members fell by 5.3 percent to 9.3 mb/d.

The average consumption of oil products by OPEC member countries reached 4.8 mb/d in 2002, up by 0.7 percent as compared with 2001. Consumption of oil products in Saudi Arabia was 1.4 mb/d, which ranked the first among OPEC member countries and it was 0.04 mb/d in Qatar, which had the least consumption of oil products among those countries. The average consumption of oil products in Iran constituted 23.3 percent of OPEC's total oil consumption.

In the framework of OPEC approvals which aimed at market regulation and crude price stabilization, and to adhere to production quota, Iran's crude oil production fell by 8.5 percent in 1381 to reach 3.4 mb/d. In the review year, crude oil export fell by 8.5 percent to 2.0 mb/d. However, export of oil products surged by 23.4 percent to 269 thousand barrels per day.

In the review year, crude oil delivered to domestic refineries fell by 5.1 percent to reach 1.3 mb/d. Domestic consumption of oil products was also limited to one mb/d.

In 1381, the average price of oil products rose by 10 percent, so that the price of gasoline, gas oil, kerosene, and fuel oil amounted to Rls. 500, 130, 130 and 70 per liter, respectively.

In the review year, production of natural gas (excluding gas injected into oil wells) reached 96.1 billion cubic meters, showing 11.1 percent rise compared with 1380. Domestic consumption of natural gas grew by 13.1 percent to 76.0 billion cubic meters.

In 1381, generation of electricity with 9.3 percent growth reached 142.1 billion kw/h. Out of total electricity generated, 136.2 billion kw/h was generated by the power plants affiliated to the Ministry of Energy and 5.9 billion kw/h by other industries. Moreover, consumption of electricity reached 105.1 billion kw/h, up by 8.1 percent. Household and industrial sectors with 33.3 and 31.9 percent, respectively made up the highest shares in total consumption of electricity.

Approved national expenditures for oil, gas and electricity in 1381 amounted to Rls. 2,564.4 billion, including credits allocated to petrochemical industries for the regulation, and implementation of government policies in gas, oil, petrochemicals, and related industries.

OPEC

Primary Energy Consumption

Consumption of primary energy in OPEC member countries reached 10.2 mb/d oil equivalent in 2002, compared to 10.0 mb/d oil equivalent in 2001. Primary energy consumed by OPEC member countries basically includes oil and natural gas. Hydro electricity and coal are consumed by Iran, Venezuela and Indonesia to a very low extent, while nuclear energy has not been consumed by any of OPEC member countries. Middle East members (Saudi Arabia, Iran, Kuwait, UAE and Qatar) had a high consumption of 6.2 mb/d oil equivalent compared with other members (Venezuela, Indonesia and Algeria). Iran and Saudi Arabia with 2.3 mb/d oil equivalent had the greatest rate of consumption among OPEC countries.

OPEC PRIMARY ENERGY CONSUMPTION IN 2002(1) (mb/d oil equivalent)						
	Oil	Natural gas	Coal	Nuclear energy	Hydro electricity	Total
Middle East members	2.8	3.3	—	0	—	6.2
Saudi Arabia	1.3	1.0	0	0	0	2.3
Iran	1.1	1.2	—	0	—	2.3
Kuwait	0.2	0.2	0	0	0	0.4
United Arab Emirates	0.2	0.7	0	0	0	1.0
Qatar	0	0.2	0	0	0	0.2
Other members	1.7	1.6	0.4	0	0.3	4.0
Total	4.5	4.9	0.4	0	0.3	10.2

Source: BP Statistical Bulletin, 2003

(1) Excludes Iraq, Libya and Nigeria.

Crude Oil Reserves

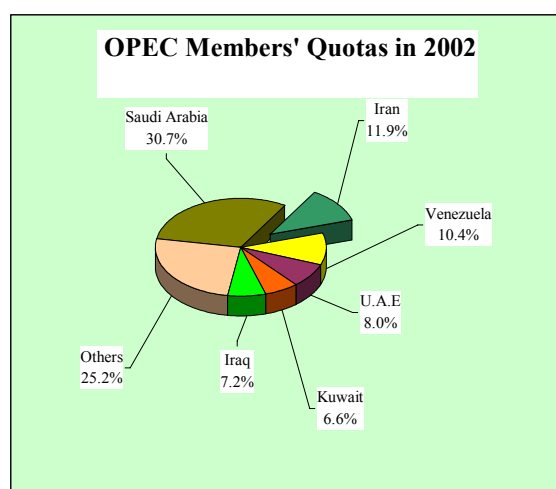
OPEC crude oil reserves reached 819.0 billion barrels in 2002, which remained almost unchanged as compared with the previous year. Saudi Arabia with 261.8 billion barrels ranked the first in the amount of reserves, Iraq with 112.5 billion barrels the next and Iran (after UAE and Kuwait) with 89.7 billion barrels the fifth among OPEC member countries.

OPEC PROVEN OIL RESERVES							(billion barrels)	
	2000	2001	2002	Percentage change		Share (percent)		
				2001	2002	2001	2002	
Middle East members	671.4	673.4	673.5	0.3	*	82.2	82.2	
Saudi Arabia	261.7	261.8	261.8	0	0	32.0	32.0	
Iran	89.7	89.7	89.7	0	0	11.0	11.0	
Iraq	112.5	112.5	112.5	0	0	13.7	13.7	
Kuwait	96.5	96.5	96.5	0	0	11.8	11.8	
United Arab Emirates	97.8	97.8	97.8	0	0	11.9	11.9	
Qatar	13.2	15.1	15.2	14.4	0.7	1.8	1.9	
Other members	143.0	145.4	145.5	1.7	0.1	17.8	17.8	
Total	814.4	818.8	819.0	0.5	*	100.0	100.0	

Source: BP Statistical Bulletin, 2003

Crude Oil Production

In the review year, OPEC average production of crude oil fell by 6.2 percent as compared with the year before to reach 28.2 mb/d. OPEC reduced its output to meet target price band of \$ 22-28. In this year, production of OPEC Middle East members reached 19.0 mb/d, down by 6.6 percent. Production of other members amounted to 9.3 mb/d, showing 5.3 percent reduction. Saudi Arabia with the highest share of 30.7 percent (8.6 mb/d) in crude oil production ranked the first among OPEC member countries.



OPEC CRUDE OIL PRODUCTION (1)							(thousand b/d)	
	2000	2001	2002	Percentage change		Share (percent)		
				2001	2002	2001	2002	
Middle East members	21,039	20,320	18,972	-3.4	-6.6	67.5	67.2	
Saudi Arabia	9,297	8,992	8,680	-3.3	-3.5	29.9	30.7	
Iran	3,766	3,680	3,366	-2.3	-8.5	12.2	11.9	
Iraq	2,583	2,371	2,030	-8.2	-14.4	7.9	7.2	
Kuwait	2,105	2,069	1,871	-1.7	-9.6	6.9	6.6	
United Arab Emirates	2,492	2,429	2,270	-2.5	-6.5	8.1	8.0	
Qatar	796	779	755	-2.1	-3.0	2.6	2.7	
Other members	9,935	9,785	9,268	-1.5	-5.3	32.5	32.8	
Total	30,974	30,105	28,240	-2.8	-6.2	100.0	100.0	

Source: BP Statistical Bulletin, 2003

(1) Includes NGL, shale oil and oil sands.

To maintain stability in oil market, OPEC did not change production quotas in its 120th and 121st ministerial meetings held on June 26, and September 19, 2002, and OPEC production ceiling was still kept at 21.7 mb/d as before. However, in its 122nd meeting held on December 12, 2002, the production ceiling rose by 1.3 mb/d to 23 mb/d, basically due to the seasonal changes and political environment. Moreover, in an extraordinary meeting on January 12, 2003, OPEC raised the production ceiling to 24.5 mb/d, effective since February. This was largely taken to ensure consumers of sufficient supply and to restore equilibrium in the market.

OPEC CRUDE OIL PRODUCTION QUOTA (thousand b/d)

	Since April 2001	Since September 2001	Since January 2002	Since January 2003	Since February 2003
Saudi Arabia	7,865	7,541	7,053	7,476	7,963
Iran	3,552	3,406	3,186	3,377	3,597
Others (1)	12,784	12,254	11,462	12,147	12,940
Production ceiling (1)	24,201	23,201	21,701	23,000	24,500

Source: OPEC's Internet Site

(1) Excludes Iraq.

Consumption of Oil Products

In 2002, average consumption of oil products by OPEC member countries⁽¹⁾ rose by 0.7 percent compared to 2001 and reached 4.8 mb/d. Saudi Arabia had the highest consumption of oil products with 1.4 mb/d, while Qatar with 0.04 mb/d was considered as the least consumer. Consumption of oil products in Iran equaled 1.1 mb/d, constituting 23.3 percent of OPEC total consumption.

OPEC CONSUMPTION OF OIL PRODUCTS (1) (thousand b/d)

	2000	2001	2002	Percentage change		Share (percent)	
				2001	2002	2001	2002
Middle East members	2,961	2,955	2,979	-0.2	0.8	62.3	62.4
Saudi Arabia	1,333	1,347	1,363	1.1	1.2	28.4	28.5
Iran	1,158	1,127	1,115	-2.7	-1.1	23.8	23.3
Kuwait	202	206	210	2.0	2.1	4.3	4.4
United Arab Emirates	243	245	248	0.8	0.9	5.2	5.2
Qatar	25	30	44	20.0	45.7	0.6	0.9
Other members	1,742	1,790	1,798	2.7	0.5	37.7	37.6
Total (2)	4,703	4,745	4,777	0.9	0.7	100.0	100.0

Source: BP Statistical Bulletin, 2003

(1) Includes domestic demand for oil, aviation and navy fuel, fuel for refineries and oil wastes.

(2) Excludes Iraq, Nigeria and Libya.

Natural Gas Proven Reserves

OPEC proven reserves of natural gas in 2002 totaled 70.5 trillion cubic meters, up by 0.3 percent as compared to 2001. This increase was related to Saudi Arabia and Venezuela. Iran and Qatar with 23.0 and 14.4 trillion cubic meters have the highest proven reserves of natural gas among OPEC member countries.

OPEC NATURAL GAS PROVEN RESERVES (trillion cubic meters)

	2000	2001	2002	Percentage change		Share (percent)	
				2001	2002	2001	2002
Middle East members	50.8	54.2	54.4	6.7	0.3	77.1	77.1
Saudi Arabia	6.1	6.2	6.4	1.6	3.2	8.8	9.0
Iran	23.0	23.0	23.0	0	0	32.7	32.6
Iraq	3.1	3.1	3.1	0	0	4.4	4.4
Kuwait	1.5	1.5	1.5	0	0	2.1	2.1
United Arab Emirates	6.0	6.0	6.0	0	0	8.5	8.5
Qatar	11.2	14.4	14.4	28.6	0	20.5	20.4
Other members	15.6	16.1	16.1	3.2	0	22.9	22.9
Total	66.4	70.3	70.5	5.9	0.3	100.0	100.0

Source: BP Statistical Bulletin, 2003

(1) Excludes Iraq, Nigeria and Libya.

Production of Natural Gas

In the review year, OPEC production of natural gas grew by 2.4 percent as compared to 2001 and reached 406.6 billion cubic meters. Algeria and Indonesia with 80.4 and 70.6 billion cubic meters production are the largest producers of natural gas. Iran's production of 64.5 billion cubic meters of natural gas made up 15.9 percent of OPEC total production.

	OPEC PRODUCTION OF NATURAL GAS (1)						(billion cubic meters)	
	2000	2001	2002	Percentage change		Share (percent)		
				2001	2002	2001	2002	
Middle East members	182.9	199.4	204.9	9.0	2.8	50.2	50.4	
Saudi Arabia	49.8	53.7	56.4	7.8	5.0	13.5	13.9	
Iran	60.2	63.3	64.5	5.1	1.9	15.9	15.9	
Kuwait	9.6	9.5	8.7	-1.0	-8.4	2.4	2.1	
United Arab Emirates	38.4	45.0	46.0	17.2	2.2	11.3	11.3	
Qatar	24.9	27.9	29.3	12.0	5.0	7.0	7.2	
Other members	198.7	197.6	201.7	-0.6	2.1	49.8	49.6	
Total	381.6	397.0	406.6	4.0	2.4	100.0	100.0	

Source: BP Statistical Bulletin, 2003

(1) Excludes flared gas, gas injected into oil wells and gas produced for local consumption.

Consumption of Natural Gas

OPEC consumption of natural gas reached 271.3 billion cubic meters, up by 2.0 percent as compared to 2001. OPEC Middle East members, with 3.0 percent rise as compared with the previous year, consumed 183 billion cubic meters, constituting 67.5 percent of total amount consumed by all member countries.

	OPEC CONSUMPTION OF NATURAL GAS						(billion cubic meters)	
	2000	2001	2002	Percentage change		Share (percent)		
				2001	2002	2001	2002	
Middle East members	164.6	177.7	183.0	8.0	3.0	66.8	67.5	
Saudi Arabia	49.8	53.7	56.4	7.8	5.0	20.2	20.8	
Iran	63.0	65.0	67.9	3.2	4.5	24.4	25.0	
Kuwait	9.6	9.5	8.7	-1.0	-8.4	3.6	3.2	
United Arab Emirates	31.4	38.1	39.3	21.3	3.1	14.3	14.5	
Qatar	10.8	11.4	10.7	5.6	-6.1	4.3	3.9	
Other members	82.0	88.4	88.3	7.8	-0.1	33.2	32.5	
Total	246.6	266.1	271.3	7.9	2.0	100.0	100.0	

Source: BP Statistical Bulletin, 2003

Iran

Iran's Production, Export and Consumption of Oil Products

In 1381, Iran's crude oil production fell by 8.5 percent on average to 3.4 mb/d. Crude oil export reached 2,021 thousand b/d, down by 8.5 percent as compared to 1380. Export of oil products grew by 23.4 percent to 269 thousand b/d. Total crude oil export (including oil products) in 1381 equaled 2,290 thousand b/d, showing a 5.6 percent fall compared with the year before. In the review year, the share of crude oil export out of total oil export was 88.3 percent. Average price of each barrel of crude oil export picked up by 20.3 percent to \$ 25.74 during the course of this year.

In 1381, crude oil delivered to refineries fell by 5.1 percent to 1,296 thousand b/d. Abadan Refinery ranked first in the amount of crude oil delivered to refineries (292 thousand b/d).

CRUDE OIL DELIVERED TO REFINERIES				(thousand b/d)	
	1380	1381	Percentage change	Share (percent)	
				1380	1381
Abadan Refinery	321	292	-9.0	23.5	22.5
Isfahan Refinery	277	268	-3.2	20.3	20.7
Tehran Refinery	201	201	0	14.7	15.5
Arak Refinery	157	144	-8.3	11.5	11.1
Bandar Abbas Refinery	220	211	-4.1	16.1	16.3
Others (1)	190	180	-5.3	13.9	13.9
Total	1,366	1,296	-5.1	100.0	100.0

Source: Ministry of Petroleum

(1) Includes Tabriz, Shiraz, Kermanshah refineries and Lavan Topping Plant.

Total domestic consumption of oil products decreased to 1,049 thousand b/d. The highest rate of increase in the consumption of oil products was related to gasoline, while fuel oil had the highest rate of decrease. The shares of gas oil and liquefied gas out of total consumption of oil products were 32.7 and 5.1 percent, respectively.

In 1381, price of oil products rose by 10 percent on the average. Price of gasoline reached Rls. 500 per liter, showing 11 percent growth as compared to 1380. Price of kerosene, gas oil and crude oil also went up by Rls. 130, 130 and 70, respectively.

Investment in Oil Sector

According to the Budget Law for 1382, Rls. 170.6 billion was approved to be allocated to oil, gas, petrochemical and related industries, showing 185.8 percent growth as compared with the amount paid by the Treasury in 1380.

Production and Consumption of Natural Gas

Production of natural gas (excluding gas injected into oil wells) reached 96.1 billion cubic meters in 1381, showing a rise of 11.1 percent as compared with 1380. Out of total natural gas produced, 76.0 billion cubic meters was used for domestic consumption, showing 13.1 percent rise as compared to the year before. However, flared gas fell by 18.8 percent from 13.3 billion cubic meters in 1380 to 10.8 billion cubic meters in 1381. In the review year, gas used for local consumption and wastes amounted to 8.0 billion cubic meters. Export of natural gas to Turkey surged by 160.0 percent as compared to the previous year and reached 1.3 billion cubic meters.

Investment in Gas Sector

According to the Budget Law for 1382, out of government general revenue Rls. 357.7 billion was allocated to investing in gas distribution network, showing 44.0 percent growth as compared to the amount allocated in 1380.

Electricity

In 1381, generation of electricity grew by 9.3 percent to 142,115 million kw/h. Hydro power plants generated 7,948 million kw/h electricity, up by 57.2 percent. Electricity generated by gas and combined cycle power plants grew by 20.0 percent to 45,358 million kw/h. About 95.9 percent of the total generated electricity was through the Ministry of Energy. Steam power plants, producing 82,562 million kw/h electricity (58.1 percent), had the highest share in the generation of electricity among power plants.

A total of 105,076 million kw/h electricity was consumed in household, industrial, public, commercial and agricultural sectors and also for street lighting. The total consumption of electricity grew by 8.1 percent in 1381, as compared with 1380. In this year, 34,946 million kw/h electricity was consumed in household sector, accounting for the highest amount of consumption (33.3 percent) among other sectors. Industrial sector had 31.9 percent share in total consumption, and the least consumption was related to street lighting with 4.4 percent share. Electricity consumed by agriculture sector with 12.2 percent growth amounted to 12,435 million kw/h.

	CONSUMPTION OF ELECTRICITY			(million kw/h)	
	1380	1381	Percentage change	Share (percent)	
				1380	1381
Household	32,891	34,946	6.2	33.9	33.3
Industrial	30,739	33,469	8.9	31.6	31.9
Public	11,951	12,630	5.7	12.3	12.0
Commercial	6,394	6,925	8.3	6.6	6.6
Agriculture	11,079	12,435	12.2	11.4	11.8
Street lighting	4,117	4,671	13.5	4.2	4.4
Total	97,171	105,076	8.1	100.0	100.0

Source: Ministry of Energy

Investment in Electricity Sector

Acquisition of non-financial assets (development expenditures) approved in the Budget Law for electricity sector reached Rls. 2,036.1 billion in 1381. This figure indicates a gargantuan rise of 354.7 percent as compared with the amount paid by the Treasury in 1380. Of this amount, 81.8 percent was allocated to electricity generation and the remainder to electricity distribution.

Moreover, on the basis of the Budget Law, acquisition of non-financial assets (development expenditures) approved for energy research in 1381 amounted to Rls. 53.5 billion, showing 93.8 percent growth as compared to the Treasury payment in 1380.