

***CSIS***

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# **The Changing Geopolitics of Energy - Part III**

**Regional Developments  
in the Middle East**

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**Strategic Energy Initiative  
Center for Strategic and International Studies**

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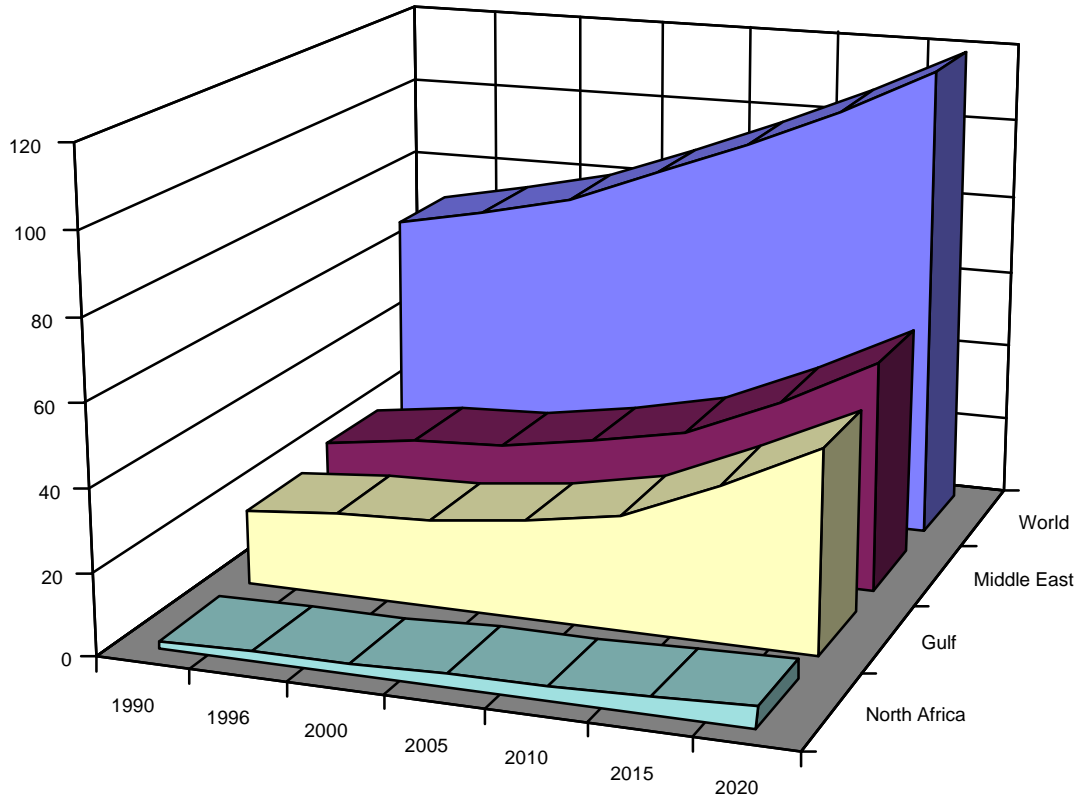
# **The Role of Middle Eastern Oil and Gas Production in Meeting Present and Future Demand**

## **Key Oil Production Issues**

- **While increases in oil production take place in other areas, they are minor compared to the increases in the Middle East .**
  - **Virtually all increases take place in the Gulf.**
  - **North Africa “flatlines” by comparison.**
- **EIA estimates that Middle Eastern oil production capacity will rise from 32% of world total to 46% by 2020.**
  - **Saudi Arabia and Iraq are the key sources of new oil production capacity.**
  - **The FSU will remain below the 1990 level in spite of new production from Central Asia and the Caspian because of cuts in Russian output.**
- **Iran, Iraq, Libya, Saudi Arabia, and the UAE are the key export and swing producers.**
  - **The smaller producers, however, will increase cumulative production from less than 4.0 MMBD to 5.5 MMBD by 2020.**

## Middle Eastern Oil Production Relative to Total World Production: 1990-2020

(Millions of Barrels Per Day of Crude Oil, NGL, and Refined Products, EIA Reference Case)

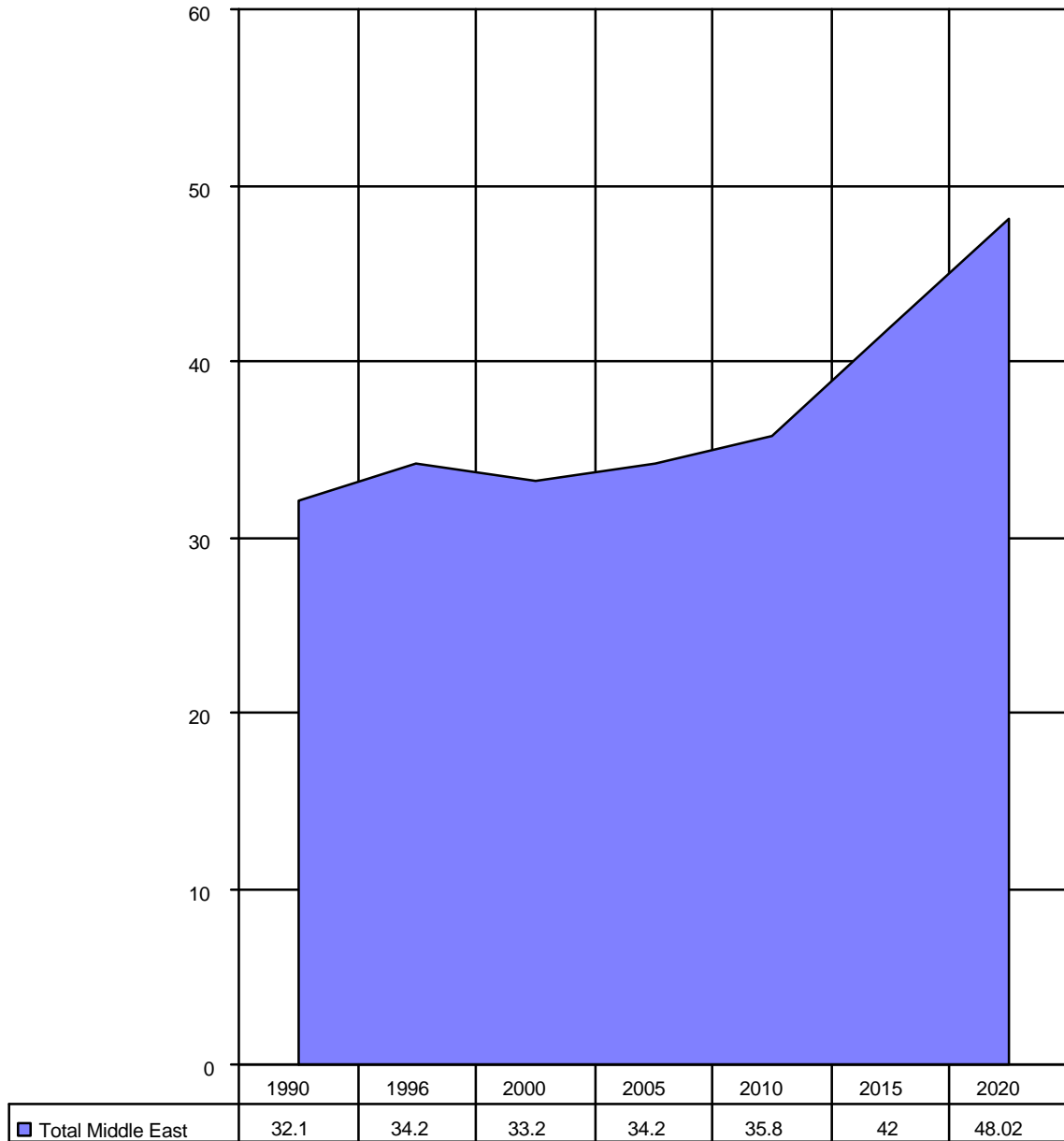


	1990	1996	2000	2005	2010	2015	2020
North Africa	2.2	2.6	2.8	3.5	4	4.6	5.3
Gulf	18.7	20.9	21.6	24.4	28.6	38.4	49.8
Middle East	22.3	25.5	26.4	30.2	34.8	45.1	56.9
World	69.5	74.4	79.5	88.3	97.3	107.4	118.7

Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, DOE/EIA-0484 (97), April 1997, pp. 175, and EIA, Monthly Energy Review, April, 1997, pp. 130-131.

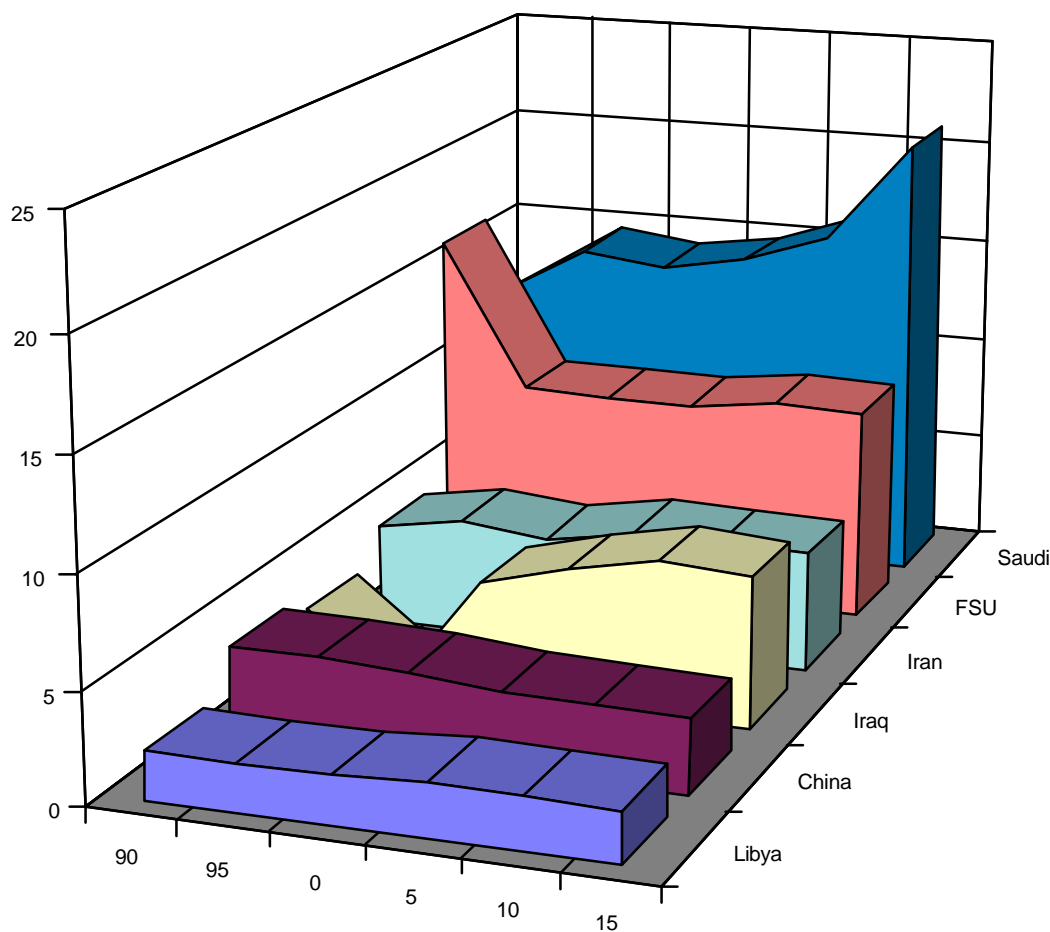
## Middle Eastern Production as an Estimated Percent of World Production Capacity

(EIA Reference Case in Percent)



Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, DOE/EIA-0484 (97), April 1997, pp. 175, and EIA, Monthly Energy Review, April, 1997, pp. 130-131. Note that total world production is 69.7 MMBD in 1990, 73.0 MMBD in 1995, 81.4 MMBD in 2000, 90.5 MMBD in 2005, 98.1 MMBD in 2010, and 106.9 MMBD in 2015.

### Risk by Key Exporting Countries in Terms of Percent of World Supply: 1990-2015 (EIA Reference Case)

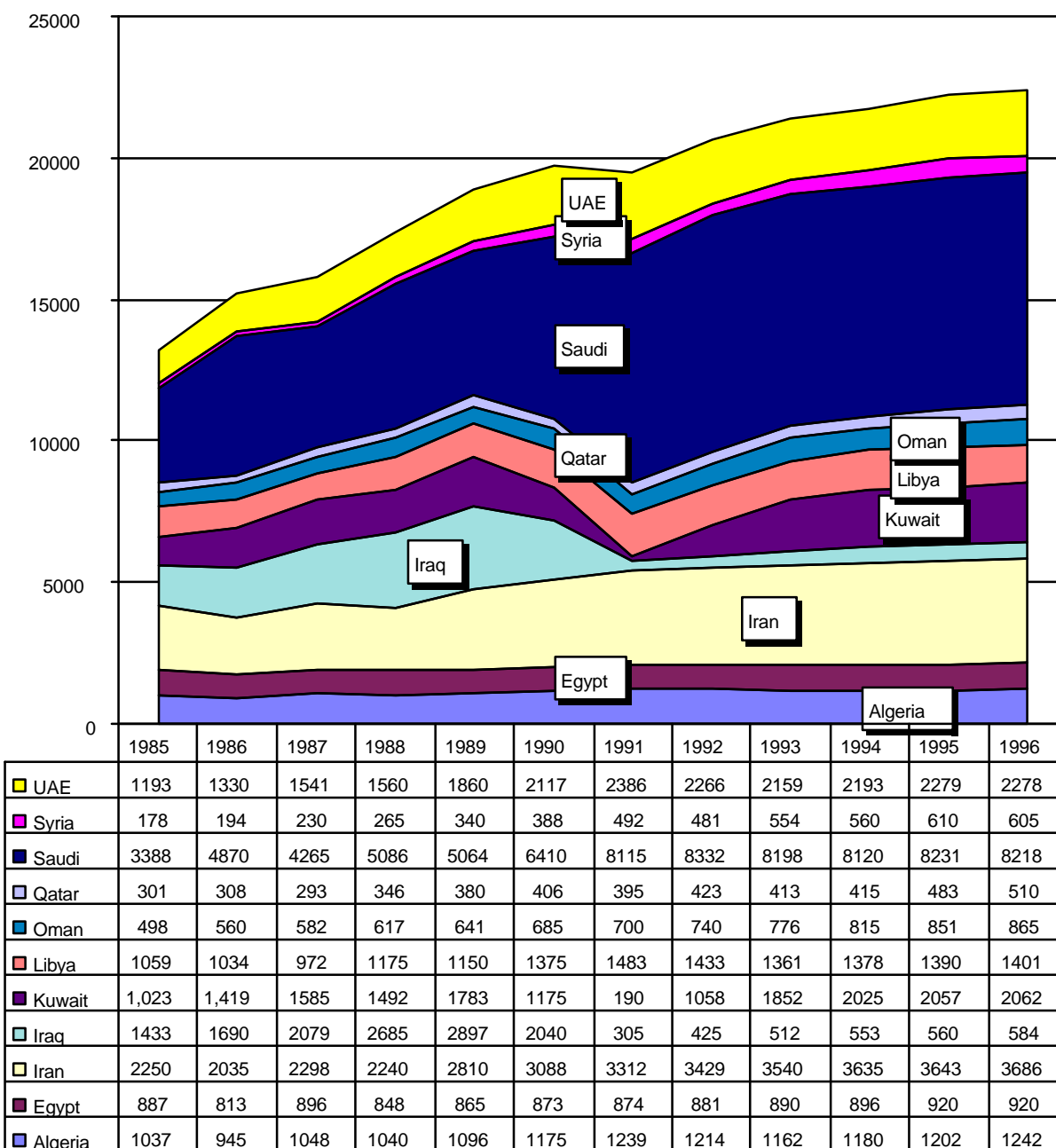


	90	95	0	5	10	15
Libya	2.2	2.1	2.2	2.4	2.4	2.3
China	4	4	3.8	3.5	3.4	3.3
Iraq	3.1	0.1	5.3	6.4	7.2	6.9
Iran	4.6	5.3	4.9	5.6	5.6	5.5
FSU	16.4	9.6	9.5	9.5	10	9.9
Saudi	12.2	14.5	14	14.7	16.1	20.9

Source: Adapted by Anthony H. Cordesman from EIA, *International Energy Outlook, 1997*, DOE/EIA-0484 (97), April 1997, pp. 157-160, and EIA, *Monthly Energy Review*, April, 1997, pp. 130-131. Note that total world production is 69.7 MMBD in 1990, 73.0 MMBD in 1995, 81.4 MMBD in 2000, 90.5 MMBD in 2005, 98.1 MMBD in 2010, and 106.9 MMBD in 2015.

## Key Middle Eastern Oil Producers are Critical to World Oil Production: Cumulative Production of Middle Eastern Producers: 1985-1996

(Thousands of Barrels Per Day of Crude Oil, NGL, and Refined Products)

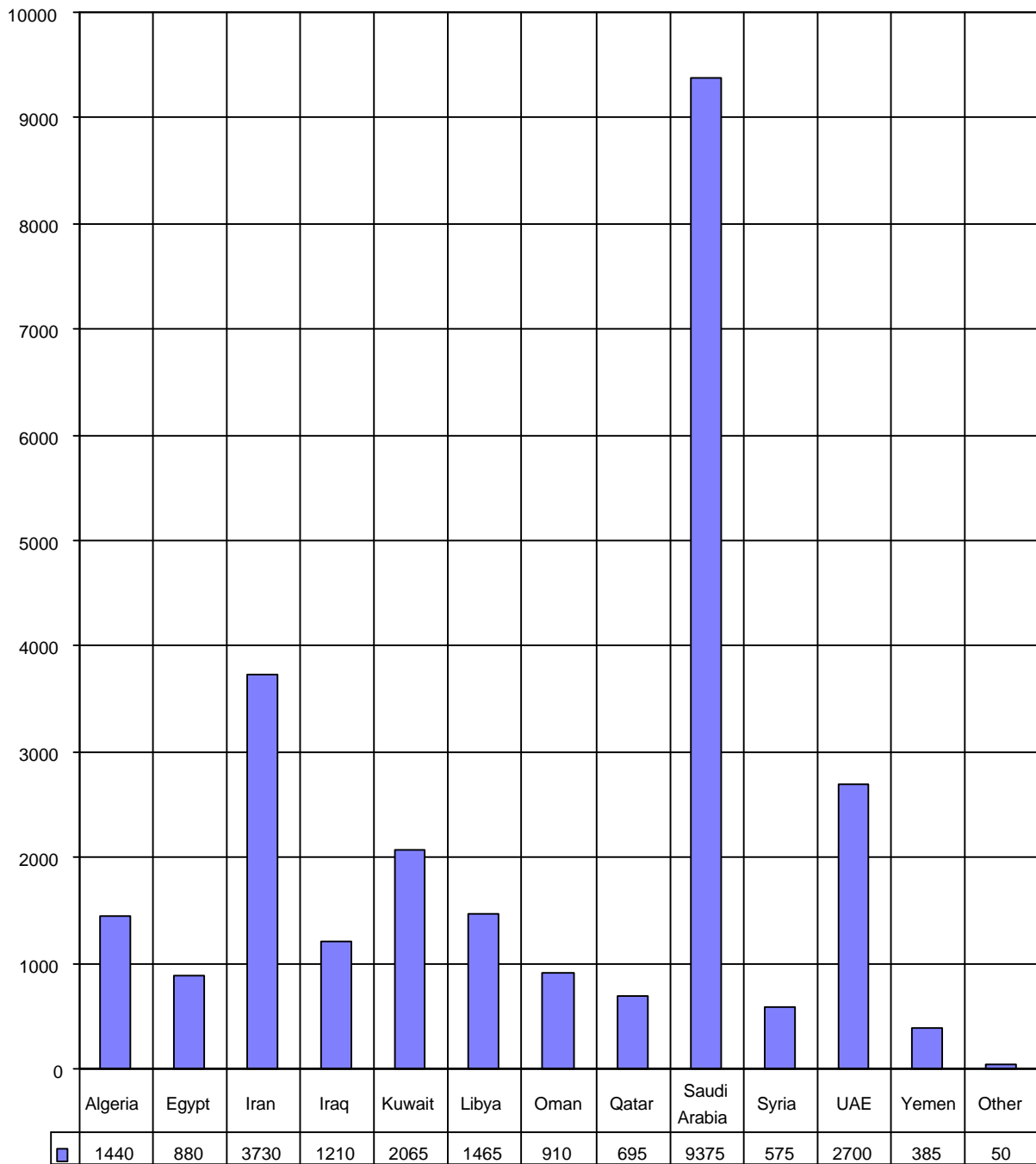


Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1997, DOE/EIA-0484 (97), April 1997, pp. 157-160, and EIA, Monthly Energy Review, April, 1997, pp. 130-131.



### BP Estimate of Middle East Oil Production by Country in 1997

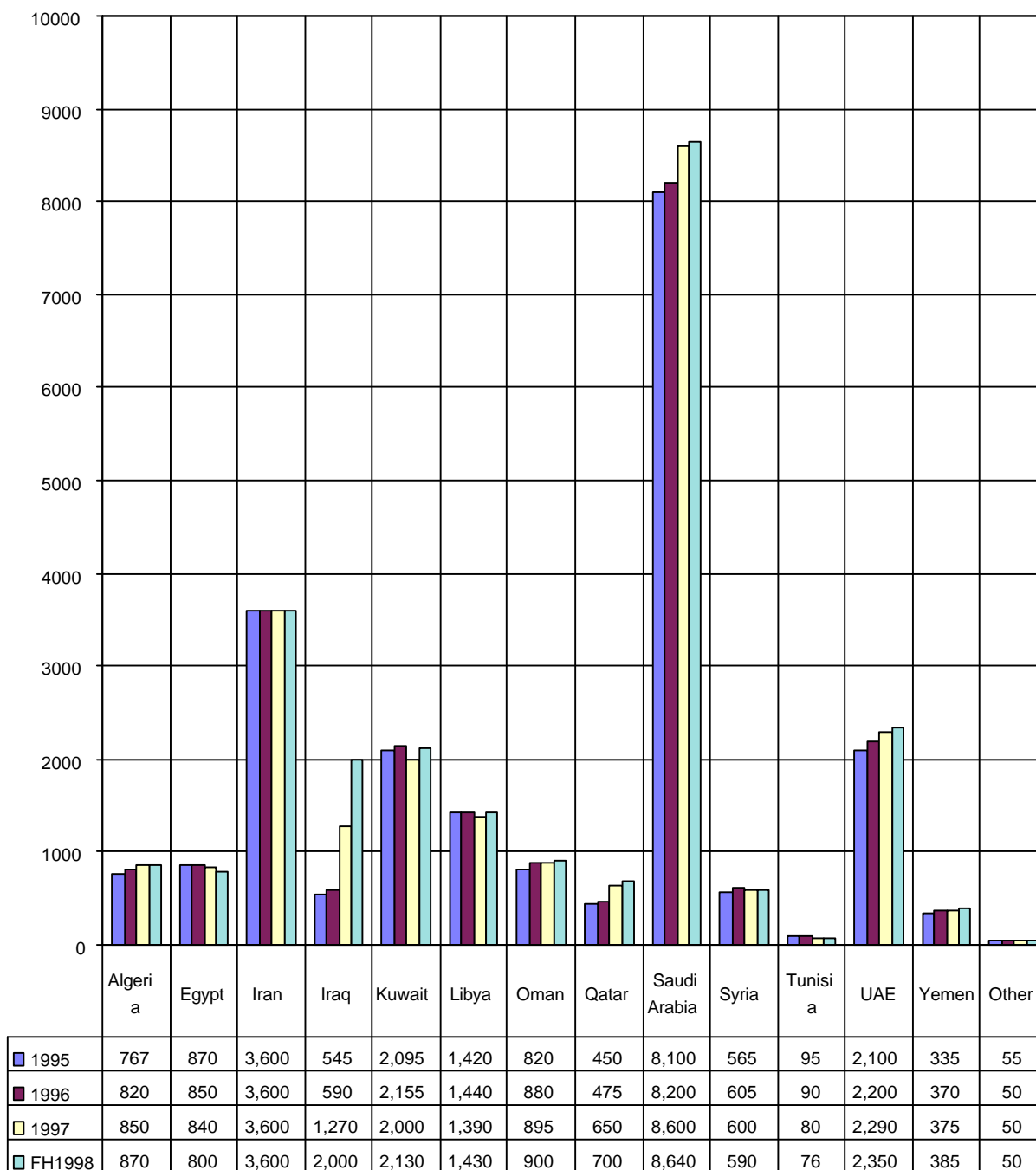
(in Thousands of Barrels per Day: 1997)



Source: Adapted by Anthony H. Cordesman from BP Statistical Review of World Energy, June, 1998, pp. 6-7.

### Estimate of Middle East Oil Production by Country in 1995-First Half of 1998

(in Thousands of Barrels per Day)

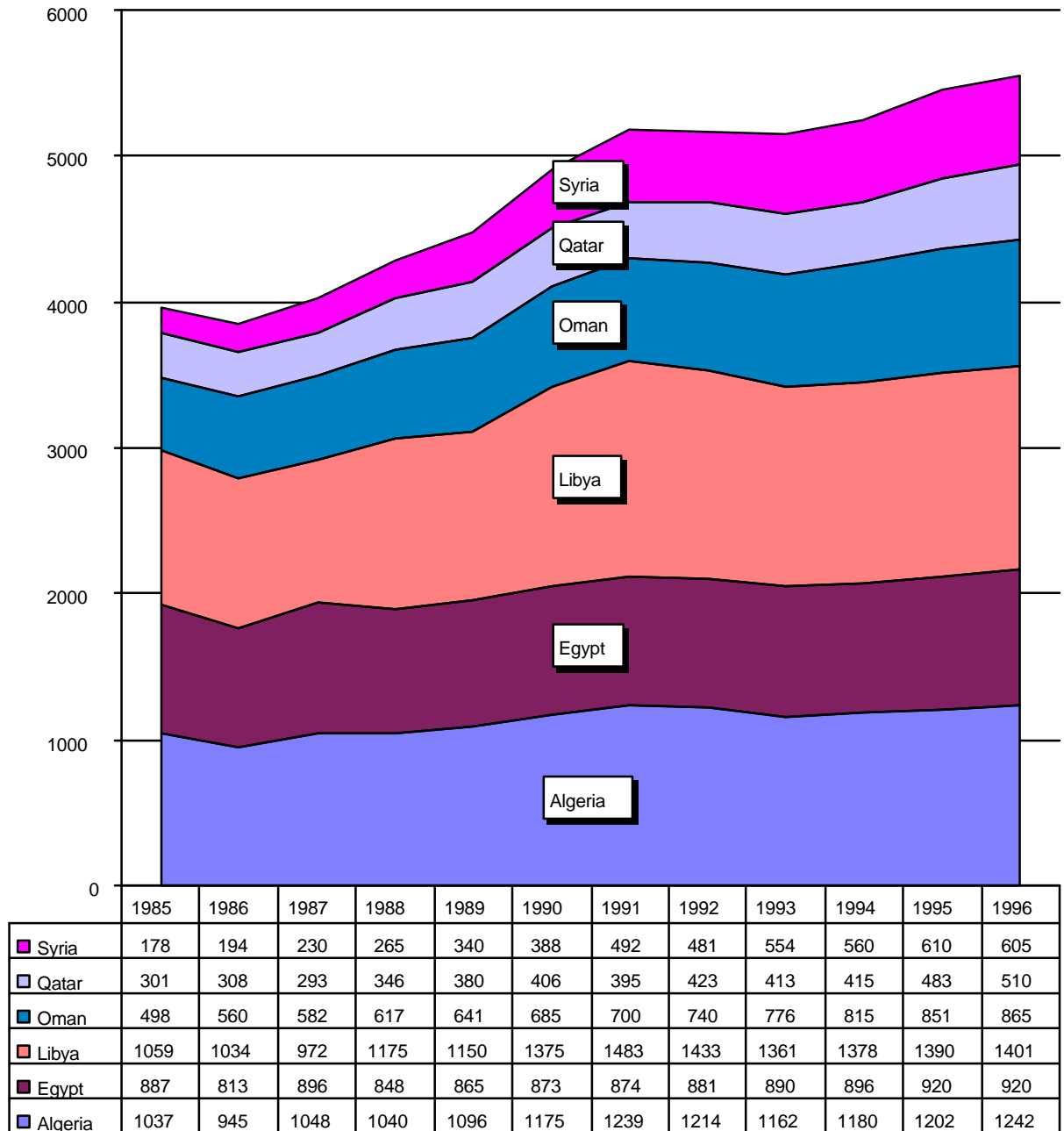


**TOTAL AVERAGE DAILY MIDDLE EASTERN PRODUCTION EQUALS 21,817 IN 1995, 22,325 IN 1996, 23,490 IN 1997, AND 24,521 IN FIRST HALF OF 1998**

Source: Adapted by Anthony H. Cordesman from Middle East Economic Digest, July 24, 1998, p. 12.

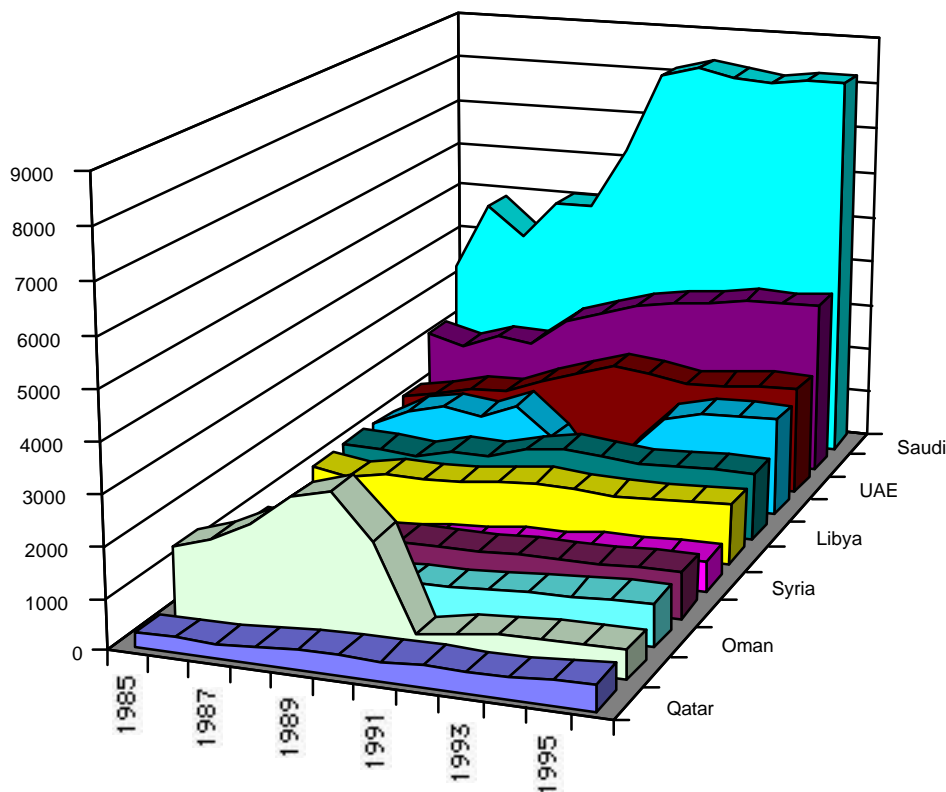
### The Cumulative Output of Smaller (Less than 2 MMBD) Middle Eastern Producers Has High Geopolitical Impact: Production: 1985-1996

(Thousands of Barrels Per Day of Crude Oil, NGL, and Refined Products)



Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1997, DOE/EIA-0484 (97), April 1997, pp. 157-160, and EIA, Monthly Energy Review, April, 1997, pp. 130-131.

### Comparative Production of Individual Middle Eastern Producers: 1985-1996 (Thousands of Barrels Per Day of Crude Oil, NGL, and Refined Products)



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Qatar	301	308	293	346	380	406	395	423	413	415	483	510
Iraq	1433	1690	2079	2685	2897	2040	305	425	512	553	560	584
Oman	498	560	582	617	641	685	700	740	776	815	851	865
Egypt	887	813	896	848	865	873	874	881	890	896	920	920
Syria	178	194	230	265	340	388	492	481	554	560	610	605
Algeria	1037	945	1048	1040	1096	1175	1239	1214	1162	1180	1202	1242
Libya	1059	1034	972	1175	1150	1375	1483	1433	1361	1378	1390	1401
Kuwait	1,023	1,419	1585	1492	1783	1175	190	1058	1852	2025	2057	2062
UAE	1193	1330	1541	1560	1860	2117	2386	2266	2159	2193	2279	2278
Iran	2250	2035	2298	2240	2810	3088	3312	3429	3540	3635	3643	3686
Saudi	3388	4870	4265	5086	5064	6410	8115	8332	8198	8120	8231	8218

Source: Adapted by Anthony H. Cordesman from EIA, *International Energy Outlook, 1997*, DOE/EIA-0484 (97), April 1997, pp. 157-160, and EIA, *Monthly Energy Review*, April, 1997, pp. 130-131.

## Comparative Oil Reserves and Production Levels of Middle Eastern States

### Comparative Oil Reserves in 1994 in Billions of Barrels

<u>Country</u>	<u>Identified</u>	<u>Undiscovered</u>	<u>Identified + Undiscovered</u>	<u>Proven</u>	<u>% of World Total</u>
Bahrain	-	-	-	.35	
Iran	69.2	19.0	88.2	89.3	8.9%
Iraq	90.8	35.0	125.8	100.0	10.0%
Kuwait	92.6	3.0	95.6	96.5	9.7%
Oman	-	-	-	5.0	NA
Qatar	3.9	0	3.9	3.7	0.4%
Saudi Arabia	265.5	51.0	316.5	261.2	26.1%
UAE	<u>61.1</u>	<u>4.2</u>	<u>65.3</u>	<u>98.1</u>	9.8%
<b>Total</b>	<b>583.0</b>	<b>112.2</b>	<b>695.2</b>	<b>654.1</b>	<b>64.9%</b>
Algeria	-	-	-	9.0	0.01
Libya	-	-	-	23.0	2.3%
<b>Total Middle East</b>	-	-	-	<b>686.1</b>	<b>68.6%</b>
Rest of World (US)	-	-	-	313.7	31.4%
				23.0	2.3%
World	-	-	-	999.8	100.0

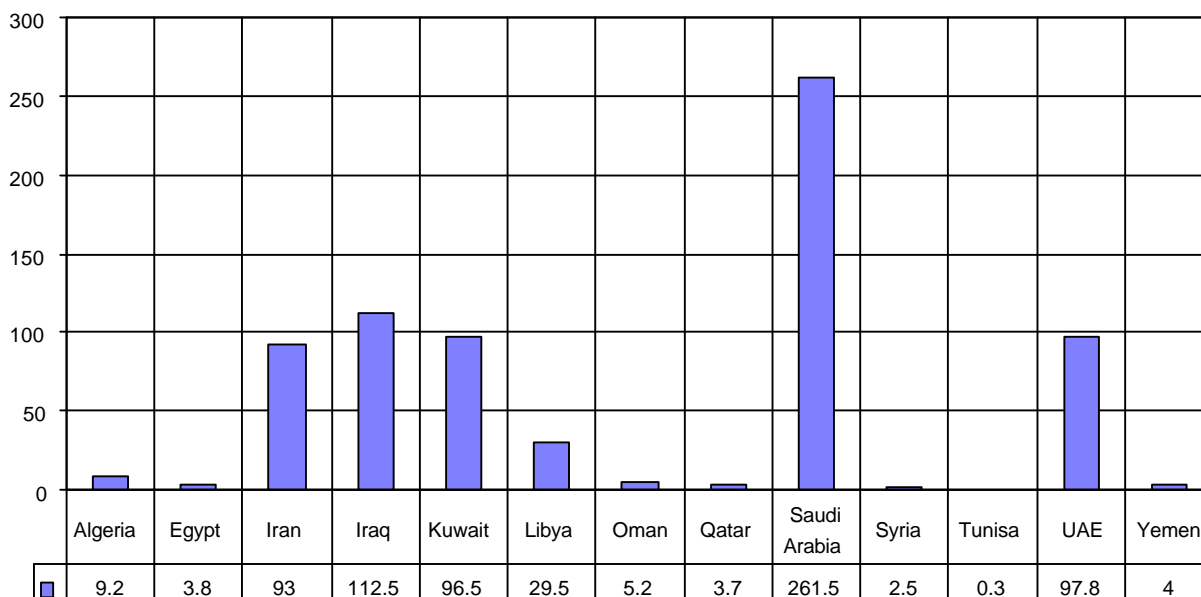
### Comparative Oil Production in Millions of Barrels per Day

<u>Country</u>	<u>DOE/IEA Estimate of Actual Production</u>						<u>2020</u>	<u>Sustainable</u>	<u>Maximum Announced</u>	
	<u>1990</u>	<u>1996</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2015</u>			<u>Capacity in 2000</u>	
									<u>1995</u>	<u>2000</u>
Bahrain	-	-	-	-	-	-	-	-	-	-
Iran	3.2	3.9	4.0	4.3	4.5	5.7	6.8	3.2	4.5	4.5
Iraq	2.2	0.6	0.6	2.1	3.2	5.9	7.8	2.5	5.0	5.0
Kuwait	1.7	2.6	2.8	3.1	3.3	4.3	5.2	2.8	3.3	3.3
Oman	-	-	-	-	-	-	-	-	-	-
Qatar	0.5	0.6	0.5	0.6	0.6	0.6	0.7	0.5	0.6	0.6
Saudi Arabia	8.6	10.6	10.9	11.2	13.5	17.2	23.8	10.3	11.1	11.1
UAE	2.5	2.6	2.8	3.1	3.5	4.7	5.5	3.0	3.8	3.2
<b>Total Gulf</b>	<b>18.7</b>	<b>20.9</b>	<b>21.6</b>	<b>24.4</b>	<b>28.6</b>	<b>38.4</b>	<b>49.8</b>	<b>23.5</b>	<b>28.2</b>	<b>28.2</b>
Algeria	1.3	1.4	1.6	1.9	2.2	2.1	2.0	-	-	-
Libya	1.5	1.5	1.5	1.6	1.7	1.6	1.5	-	-	-
<b>Total Middle East</b>	<b>21.5</b>	<b>23.8</b>	<b>24.7</b>	<b>27.9</b>	<b>32.5</b>	<b>42.1</b>	<b>53.3</b>	-	-	-
World	69.5	74.4	79.5	88.3	97.3	107.4	118.7	-	-	-

Source: Adapted by Anthony H. Cordesman from estimates in IEA, Middle East Oil and Gas, Paris, OECD/IEA, 1995, Annex 2 and DOE/EIA, International Energy Outlook, 1995, Washington, DOE/EIA, June, 1995, pp. 26-30, and International Energy Outlook, 1998, Washington, DOE/EIA, April, 1998, pp. 175. IEA and DOE do not provide country breakouts for Bahrain and Oman. Reserve data estimated by author.

## Proven Middle Eastern Oil Reserves by Country

(in Billions of Barrels)

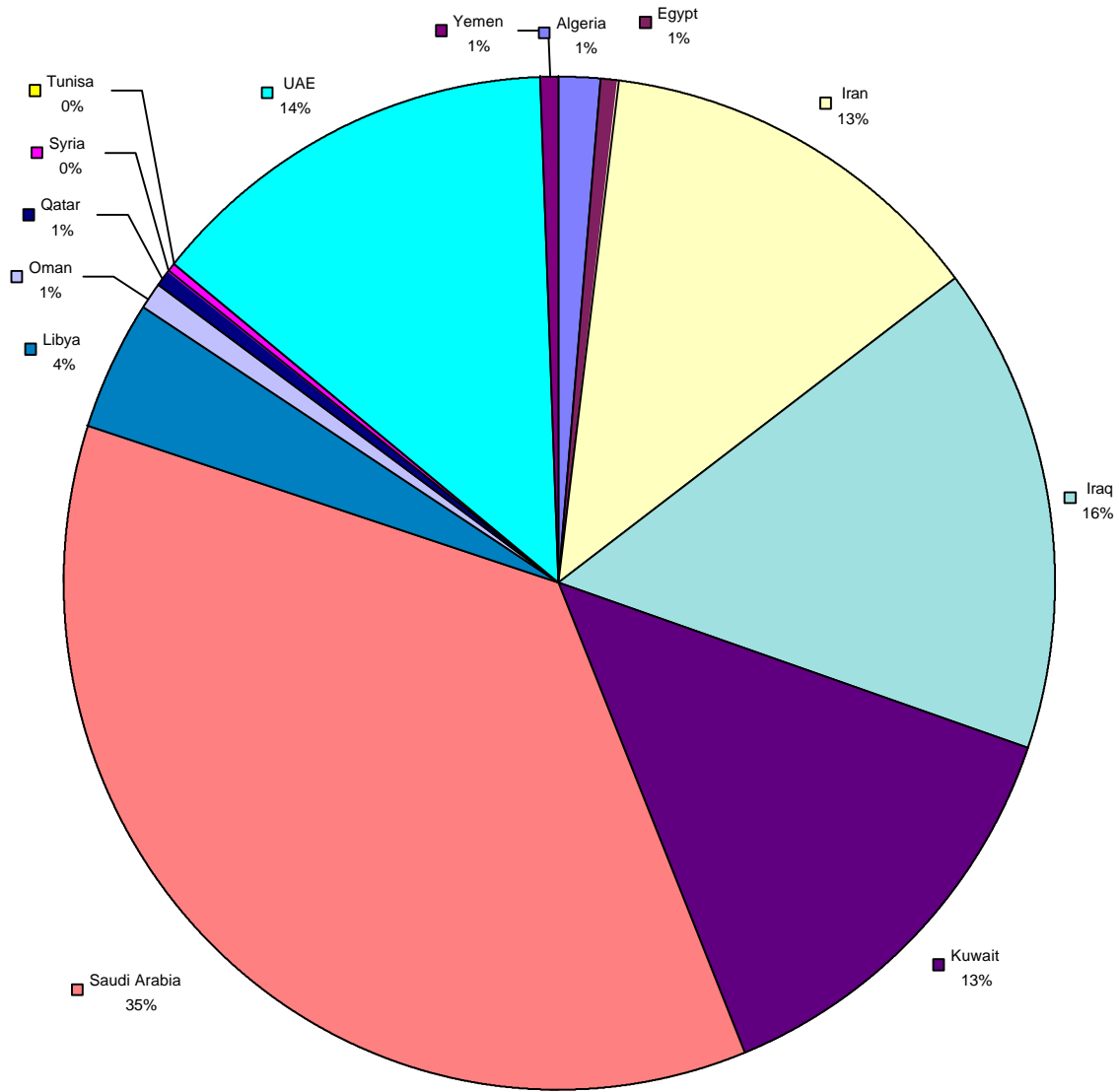


Country	<u>End-1996</u>	<u>End-1997</u>	<u>Percent of World Proven Reserves</u>	<u>Reserve to Production Ratio In Years at Current Rates</u>
Algeria	9.2	9.2	0.9	18.8
Egypt	3.7	3.8	0.4	11.4
Iran	93.0	93.0	9.0	69.0
Iraq	112.0	112.5	10.8	100+
Kuwait	96.5	96.5	9.3	100+
Libya	29.5	29.5	2.8	55.6
Oman	5.1	5.2	0.5	15.8
Qatar	3.7	3.7	0.4	15.1
Saudi Arabia	261.5	261.5	25.2	79.5
Syria	2.5	2.5	0.2	12.0
Tunisia	0.3	0.3	-0.5	-0.5
UAE	97.8	97.8	9.4	100+
Yemen	4.0	4.0	0.4	28.9
Total	718.8	719.5	69.8	28.9

Source: BP Statistical Review of World Energy, 1997 and Middle East Economic Digest, July 24, 1998, p. 12.

## Middle Eastern Country Share of Proven World Oil Reserves

(in Percent of World Total)



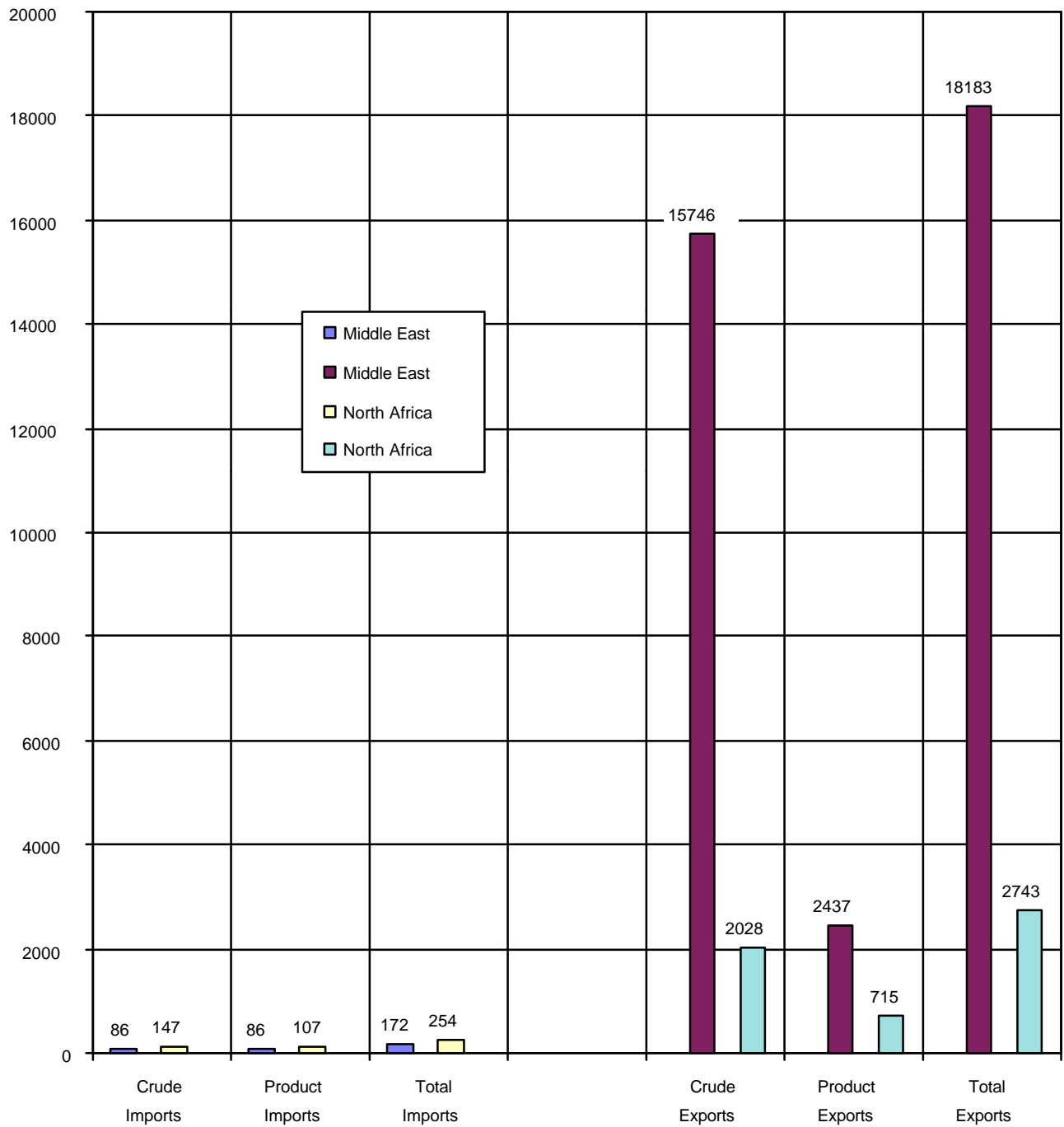
Source: BP Statistical Review of World Energy, 1997 and Middle East Economic Digest, July 24, 1998, p. 12.

## **Key Middle Eastern Oil Export Issues**

- **The balance of exports will shift so that more exports come from the Middle East: 52% in 2020 versus 40% in 1997.**
  - **Gulf Exports will rise from 37% of world total to 45%.**
- **Exports from outside Middle East will go largely to North America and Europe.**
  - **As a result, an even larger share of Gulf and Middle Eastern exports will shift to Asia.**
- **China and the Pacific Rim states drive the demand for exports.**
- **Much depends on assumption that market forces will drive supply after 2000: E.g. Iran, Iraq, and Libya**
- **If so, EIA estimates that Middle East oil exports will rise from 17.6 MMBD to 40.4 MMBD by 2020.**
  - **Middle East exports to Pacific Rim and China will rise from 4.5 MMBD to 16.7 MMBD.**
  - **Exports to industrial world will rise from 11.5 MMBD to 18.7 MMBD**
- **Total Gulf exports will rise from 15.3 MMBD to 37.0 MMBD.**



### BP Estimate of Middle Eastern and North African Oil Exports by Category (in Thousands of Barrels Per Day: 1997)

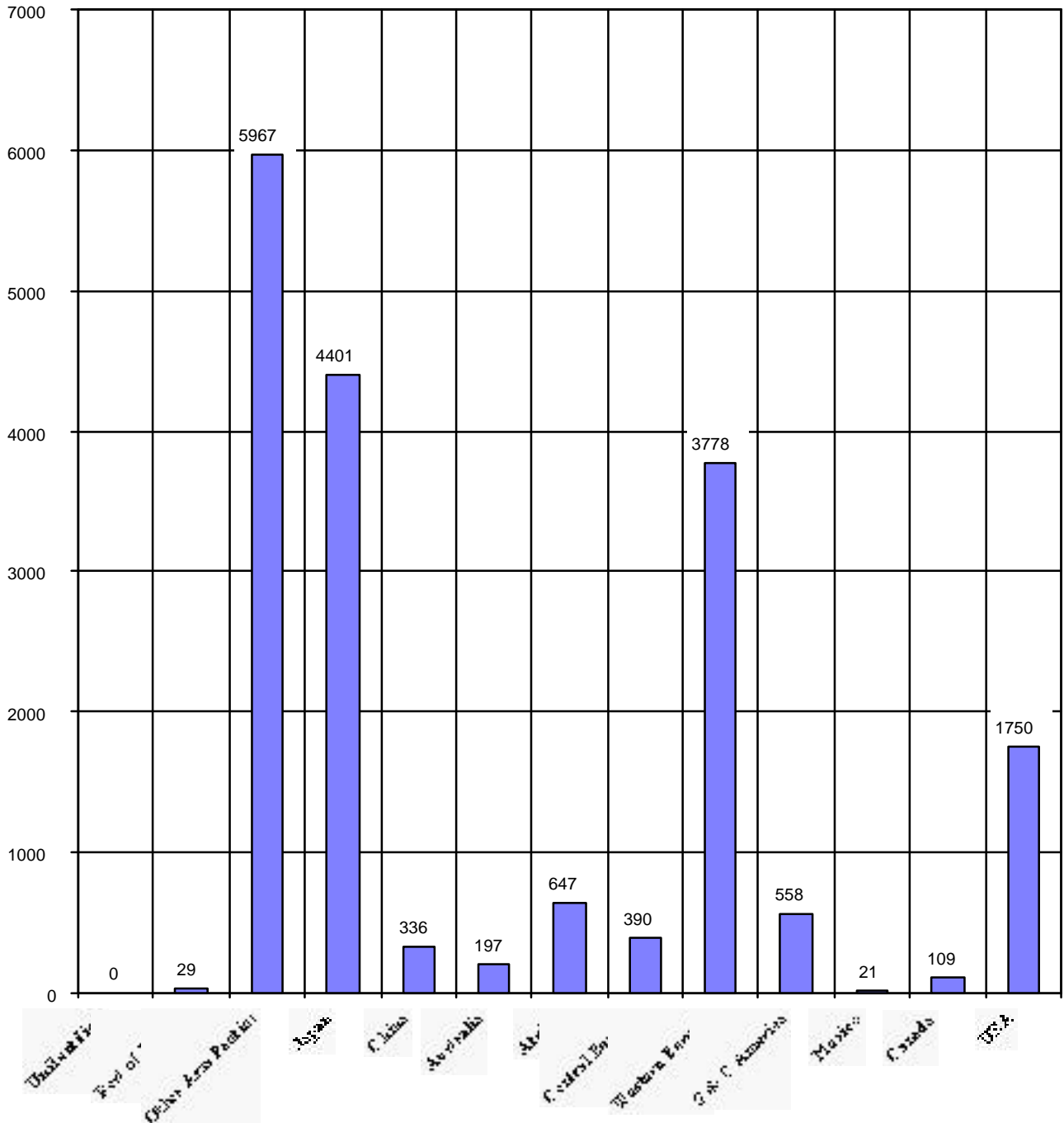


Total oil exports = 3,413 thousand barrels per day.

Source: Adapted by Anthony H. Cordesman from BP Statistical Review of World Energy, June, 1998, pp. 18-19.

### BP Estimate of Middle Eastern Oil Exports by Region and Country of Destination

(in Thousands of Barrels Per Day: 1997)

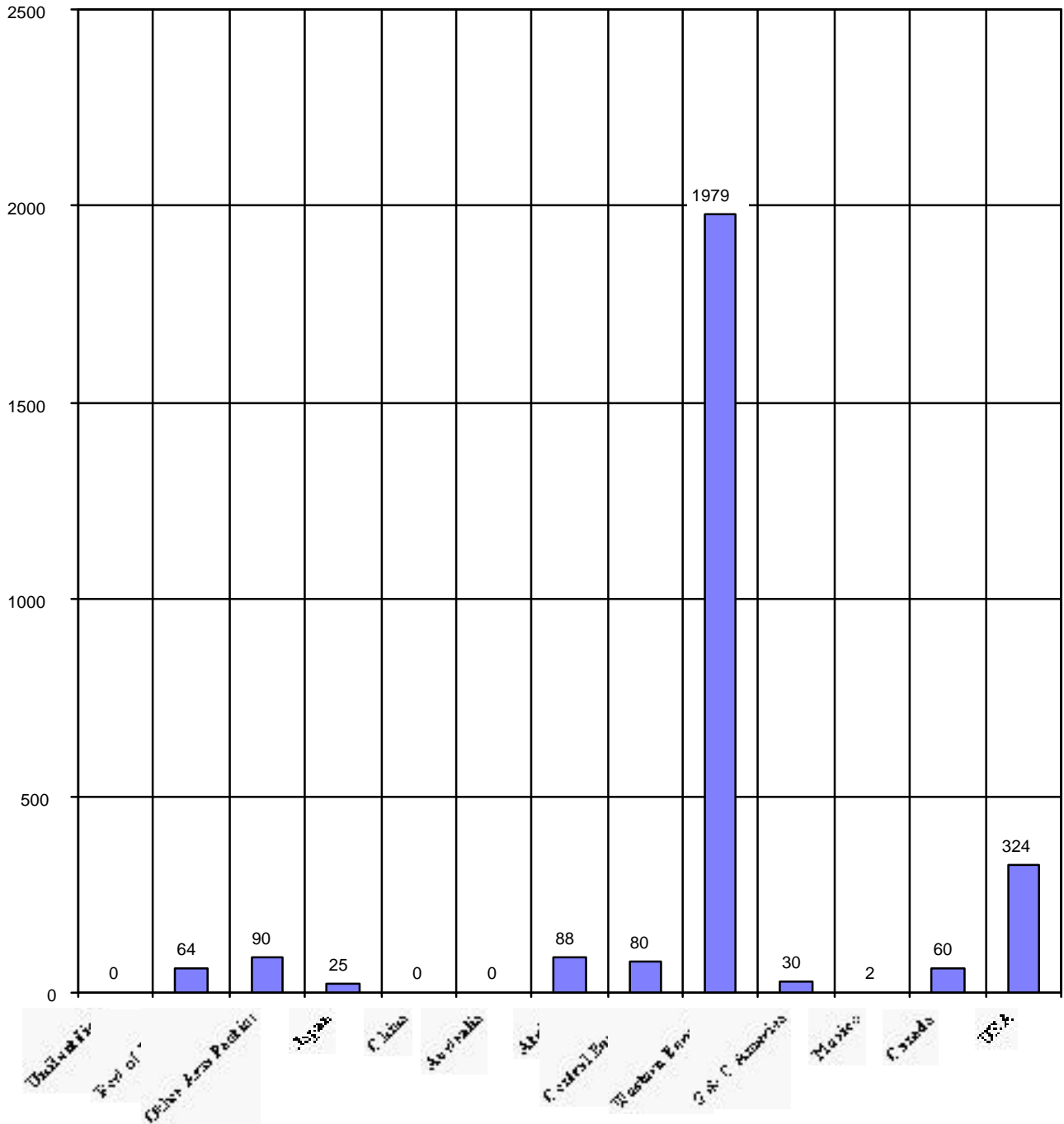


Total oil exports = 18,184 thousand barrels per day.

Source: Adapted by Anthony H. Cordesman from BP Statistical Review of World Energy, June, 1998, pp. 18-19.

### BP Estimate of North African Oil Exports by Region and Country of Destination

(in Thousands of Barrels Per Day: 1997)

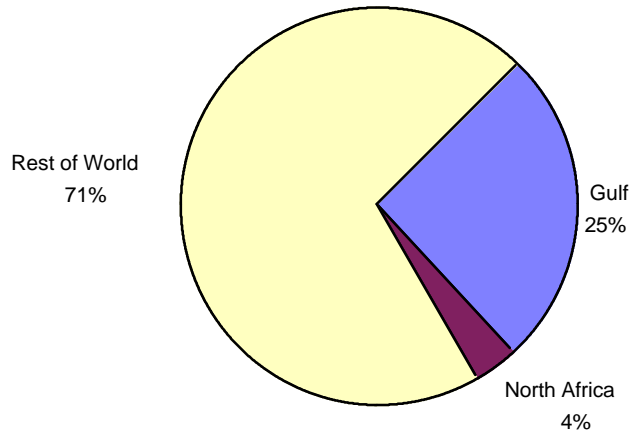


Total oil exports = 2,734 thousand barrels per day.

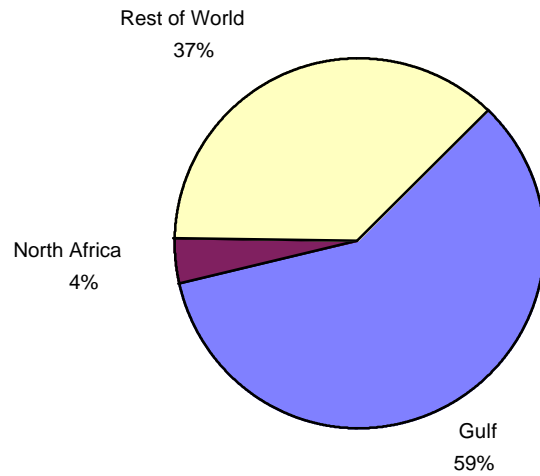
Source: Adapted by Anthony H. Cordesman from BP Statistical Review of World Energy, June, 1998, pp. 18-19.

### Middle Eastern Oil Exports Relative to Total World Exports: 1995 and 2020:

1995

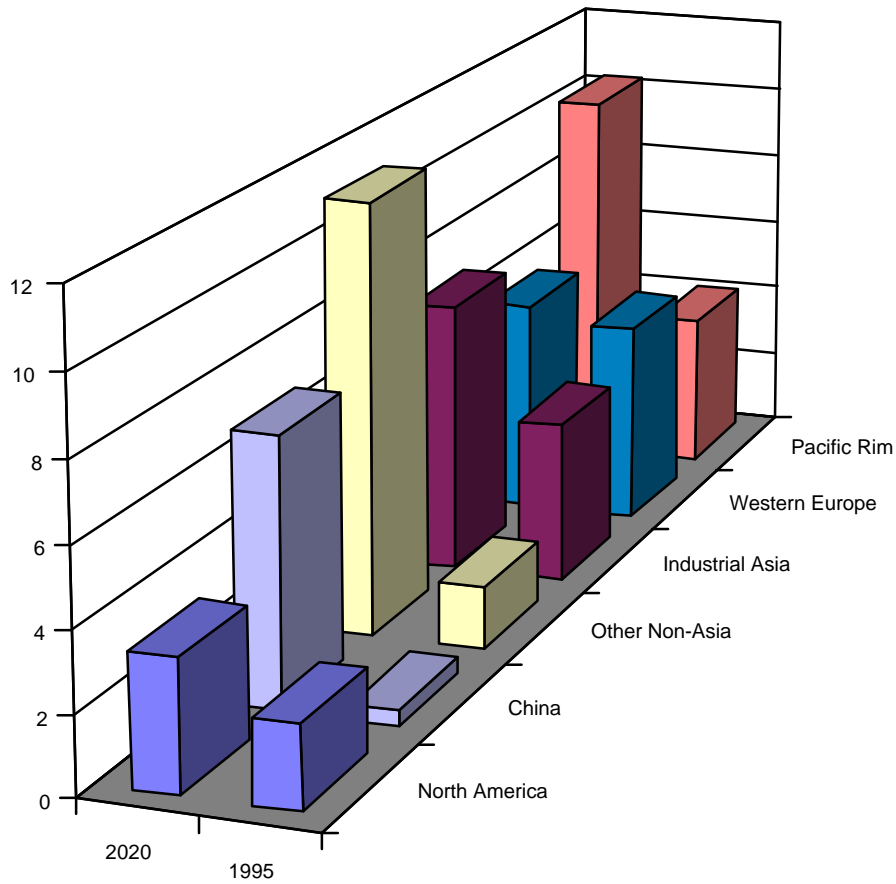


2020



Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, DOE/EIA-0484 (97), April 1998, p. 36.

### Estimated Middle Eastern Oil Exports by Region of Destination: 1995-2020 (MMBD, EIA Reference Case)

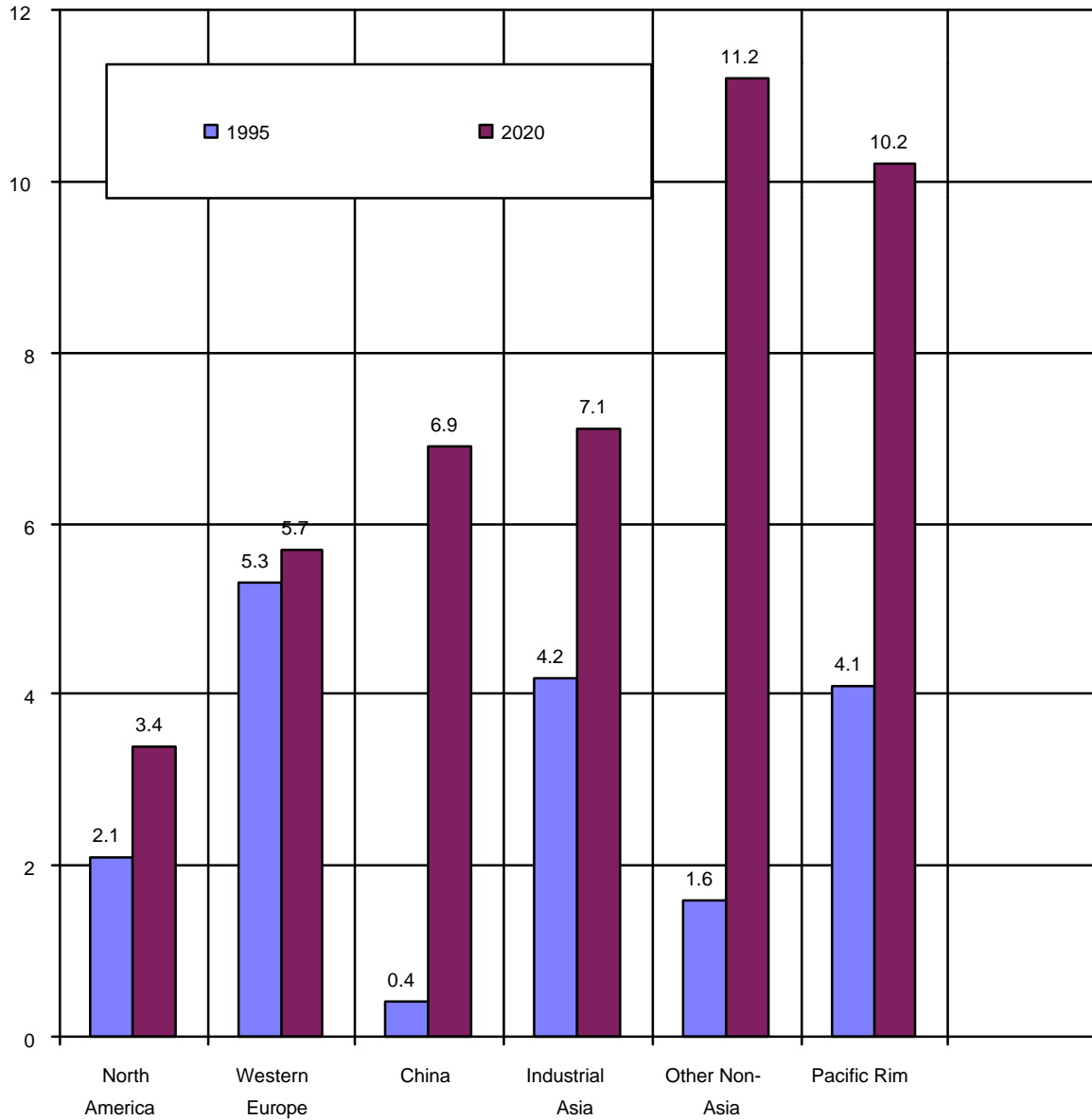


	2020	1995
North America	3.3	2.1
China	6.9	0.4
Other Non-Asia	11.2	1.6
Industrial Asia	7.1	4.2
Western Europe	5.7	5.3
Pacific Rim	10.2	4.1

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1998, April, 1998, DOE/EIA-484(97), Reference Case, p. 36.

### Total Volume of Middle Eastern Oil Exports by Region of Destination: 1995-2020

(Millions of Barrels per Day)



Source: Adapted by Anthony H. Cordesman from DOE/EIA, *International Energy Outlook, 1998*, April, 1998, DOE/EIA-484(97), Reference Case, p. 36.

## Estimated Trends in Middle Eastern Petroleum Exports By Supplier and Destination

(Millions of Barrels Per Day)

Exporting Region	Industrialized			Total Industrial World	Non-Industrialized			Total Non-Industrial World	Total World
	North America	Western Europe	Asia		Pacific Rim	China	Rest of Non-Industrial World		

### Use of Exports in MMBD

#### 1995

Persian Gulf	1.8	3.4	4.2	<b>9.4</b>	4.1	0.4	1.5	<b>6.0</b>	<b>15.4</b>
North Africa	0.3	1.9	0.0	<b>2.2</b>	0.0	0.0	0.1	<b>0.1</b>	<b>2.3</b>
<b>Total</b>	<b>2.1</b>	<b>5.3</b>	<b>4.2</b>	<b>11.6</b>	<b>4.1</b>	<b>0.4</b>	<b>1.6</b>	<b>6.1</b>	<b>17.7</b>

#### 2020

Persian Gulf	3.1	3.8	6.9	<b>13.8</b>	10.1	6.9	11.0	<b>28.0</b>	<b>41.8</b>
North Africa	0.3	1.9	0.2	<b>2.4</b>	0.1	0.0	0.2	<b>0.3</b>	<b>2.7</b>
<b>Total</b>	<b>4.2</b>	<b>8.0</b>	<b>6.6</b>	<b>18.7</b>	<b>11.6</b>	<b>5.1</b>	<b>5.1</b>	<b>21.7</b>	<b>44.5</b>

### Percentage of Total Exports Going to a Given Region

#### 1995

Persian Gulf	11.7	22.1	27.3	<b>61.1</b>	26.6	2.6	9.7	<b>38.9</b>	<b>100.0</b>
North Africa	13.0	82.6	0.0	<b>95.6</b>	0.0	0.0	4.4	<b>4.4</b>	<b>100.0</b>

#### 2020

Persian Gulf	7.4	9.1	16.5	<b>33.0</b>	24.2	16.5	26.3	<b>67.0</b>	<b>100.0</b>
North Africa	11.1	70.3	7.4	<b>88.8</b>	3.7	0.0	7.5	<b>11.2</b>	<b>100.0</b>

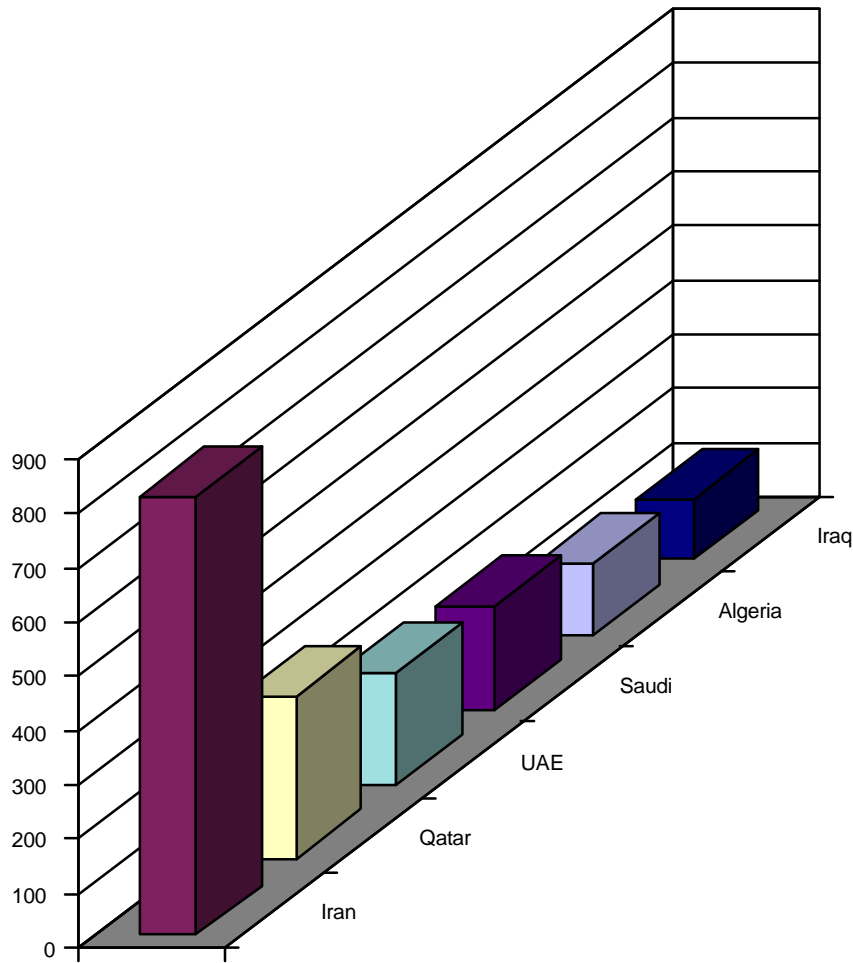
Source: Adapted by Anthony H. Cordesman from estimates in International Energy Outlook, 1998, Washington, DOE/EIA, April, 1998, pp. 36.

## **Key Middle Eastern Gas Issues**

- **Much depends on assumption that market forces will drive supply after 2000: E.g. Iran, Iraq, and Libya.**
- **Major uncertainties exist regarding Iranian reserves.**
- **Region could interact heavily with Central Asian exports.**
- **Pipelines, LNG, Ports, and Tankers can change the strategic map.**
- **Gas liquids may fundamentally change technology and importance of Gas resources.**



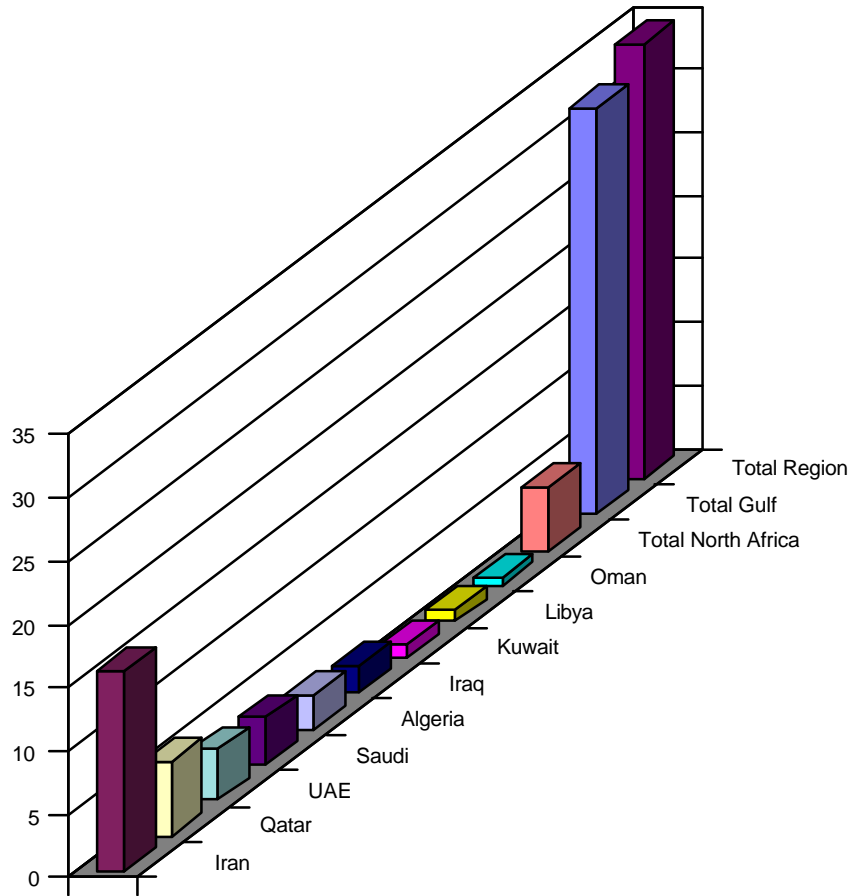
### Gas Reserves by Middle Eastern Nation (Nations with At Least 100 Trillion Cubic Feet in Reserves)



Iran	810
Qatar	300
UAE	205
Saudi	190
Algeria	131
Iraq	110

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1998, April, 1998, DOE/EIA-484(97), Reference Case, p. 51.

### Middle Eastern Gas Reserves as Percent of Total World Reserves



Iran	15.9
Qatar	5.9
UAE	4
Saudi	3.7
Algeria	2.6
Iraq	2.2
Kuwait	1
Libya	0.9
Oman	0.6
Total North Africa	4.9
Total Gulf	32.1
Total Region	34.4

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1998, April, 1998, DOE/EIA-484(97), Reference Case, p. 51.