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The Changing Geopolitics of Energy – Part II

Global Oil and Gas Production and Reserves

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Center for Strategic and International Studies

August 11, 1998

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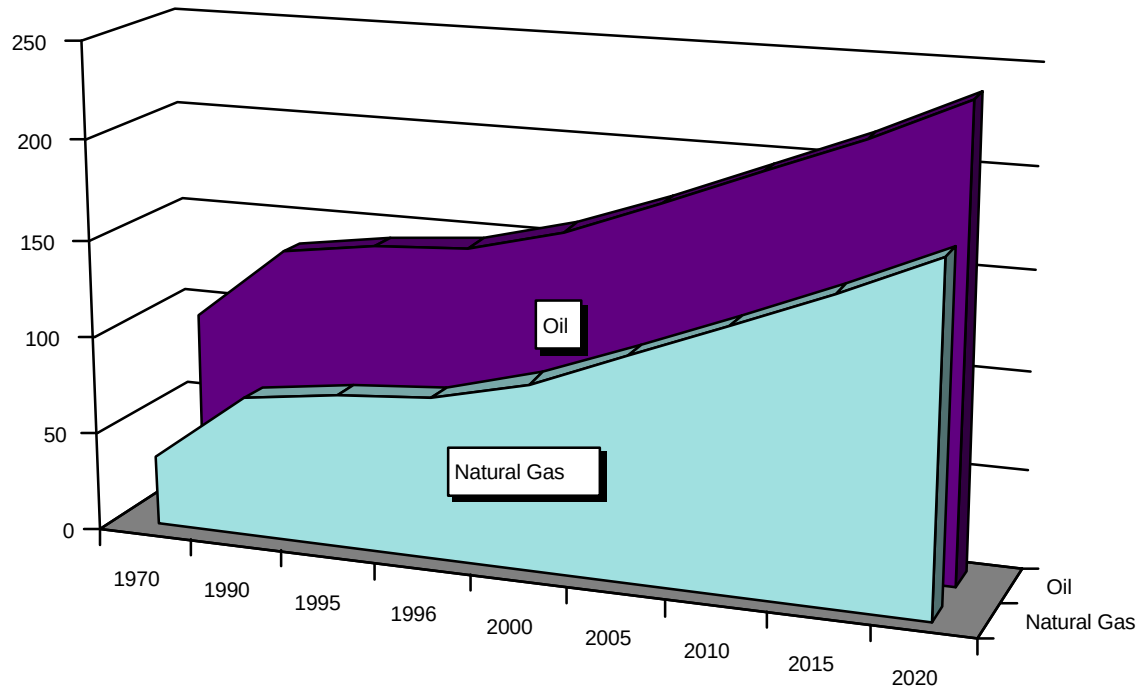
Impact of Oil and Gas on Present and Future Global Energy Demand

Key Oil Issues

- **Oil and gas energy use rises by 75% in BTUs between 1997 and 2020.**
- **Industrialized world and US become steadily more dependent on imports, with economic growth and Enhanced Oil Recovery (EOR) acting as the major uncertainty.**
- **Demand from the industrialized world, however, no longer dominates growth.**
    - **Asian demand has leapt since early 1960s.**
    - **Asia will become the dominant consuming region by 2010.**
    - **Asia's Imports will increase accordingly.**
    - **China is actively competing in the "Great Game" for Central Asia oil and has outbid US firms in some areas.**
- **The Middle East and the Gulf are projected to dominate increases in oil supply.**
- **The growing domestic demand for oil in other developing regions will become a major factor and with steadily limit the export capabilities of the Middle East, Africa, and FSU.**
- **Pipeline, port, and tanker geopolitics will change fundamentally during 1998-2020.**
- **Iran, Iraq, Libya, and Russia represent "high risk" oil suppliers with major potential geopolitical impacts.**

Estimated Growth of Oil and Gas Use: 1970-2020

(Quadrillion BTU)

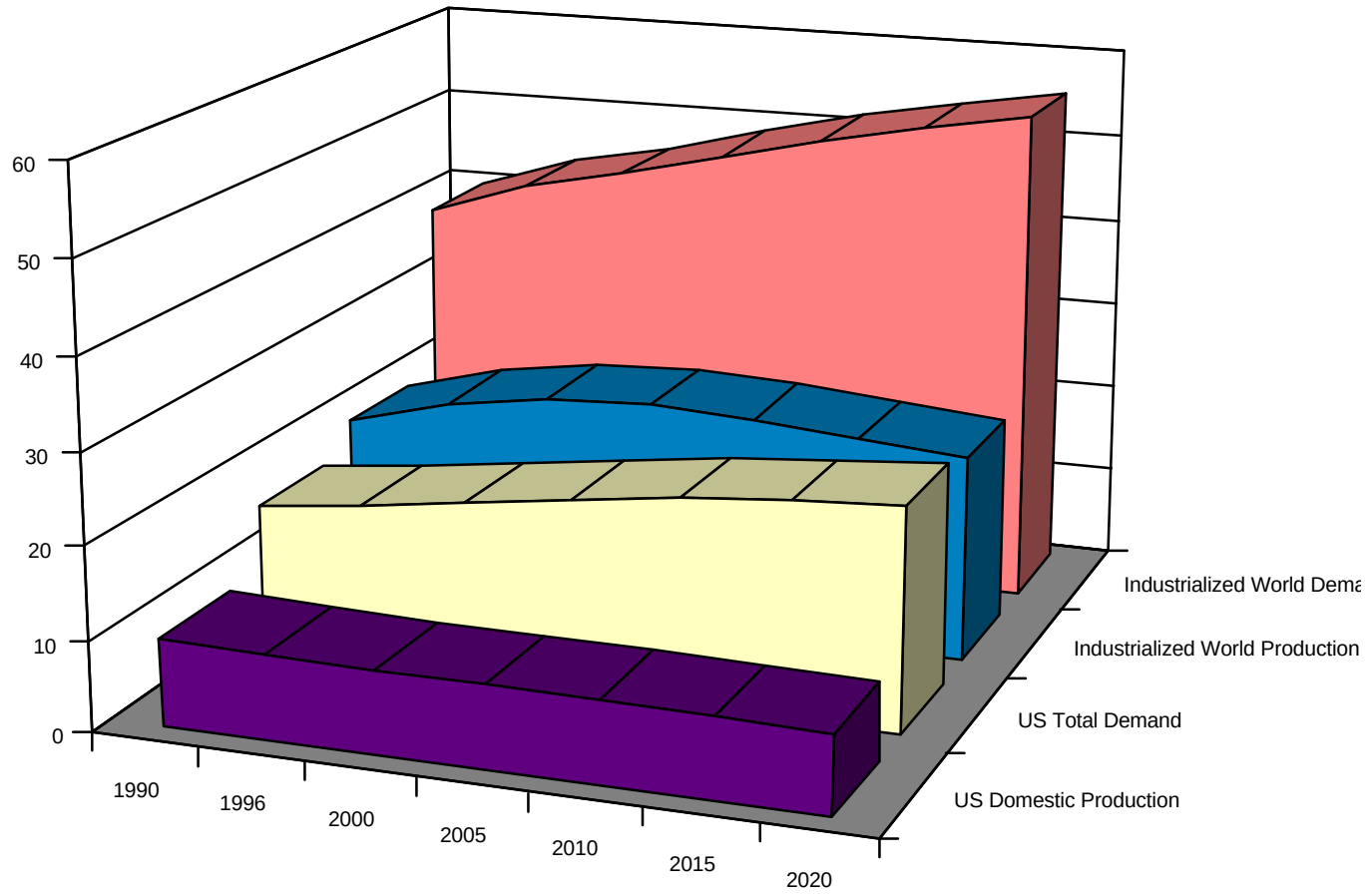


	1970	1990	1995	1996	2000	2005	2010	2015	2020
Natural Gas	36.1	72	78.1	82.2	94.8	113.8	133.3	152.5	174.2
Oil	97.8	134.9	142.5	145.7	157.8	176.3	195.5	215.3	237.3

Source: Adapted by Anthony H. Cordesman from EIA, Internet, July 4, 1996, and International Energy Outlook, 1998, DOE/EIA-484(97), p. 8 and 135.

Growing World and US Dependence on Imported Oil: 1990-2020

(Average Daily Domestic Production vs. Demand in Millions of Barrels Per Day)

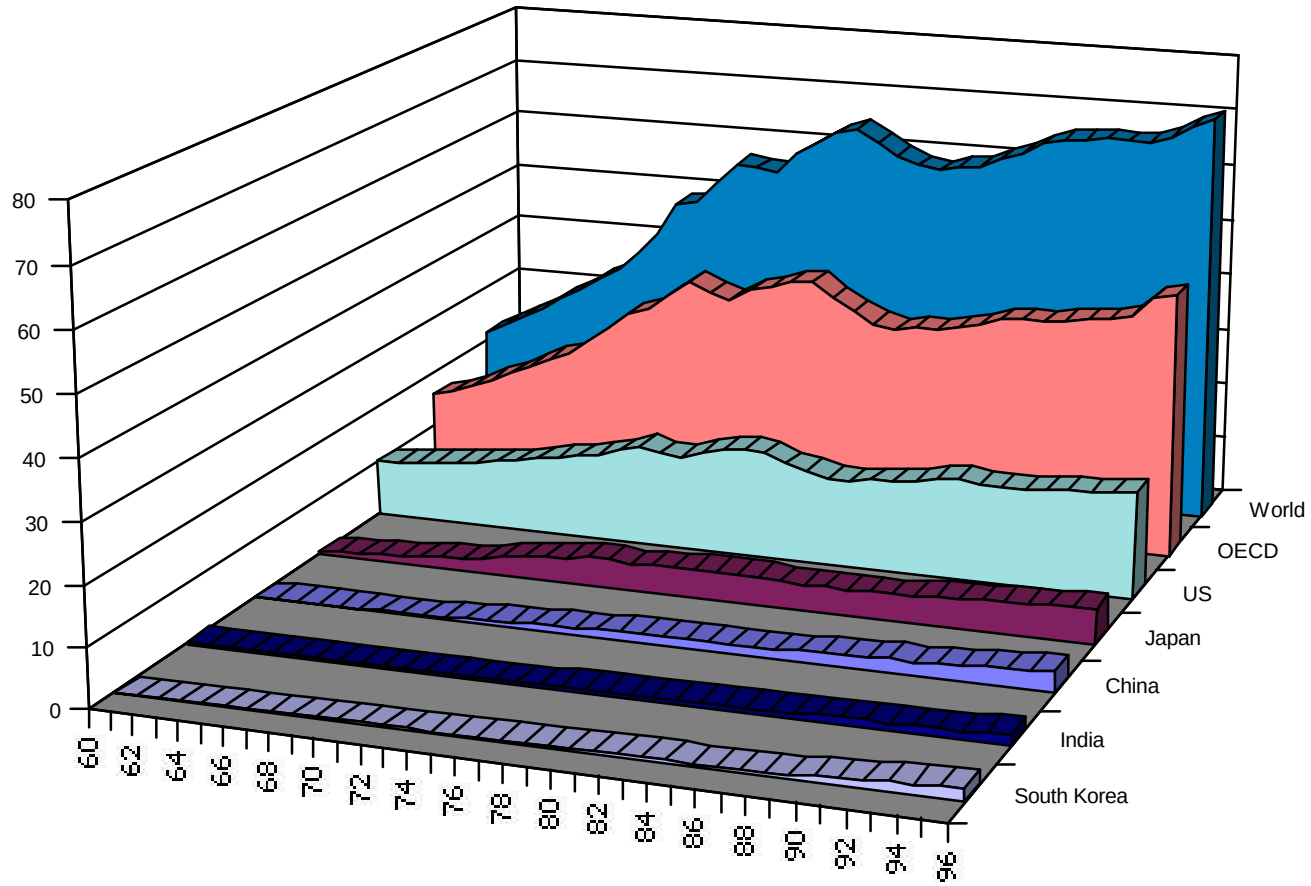


	1990	1996	2000	2005	2010	2015
US Domestic Production	9.7	9.4	9.1	9	8.9	8.7
US Total Demand	17	18.3	19.6	21.3	22.7	23.7
Industrialized World Production	20.1	23	24.7	25.4	24.8	23.7
Industrialized World Demand	39.5	43.4	45.6	48.4	51.1	53.3

Source: DOE/EIA, International Energy Outlook, 1998, p. 136 and 175.

In the Past, the West Has Driven the Rise in Demand for Oil with Little Impact from Developing Asia: World Oil Consumption: 1960-1996

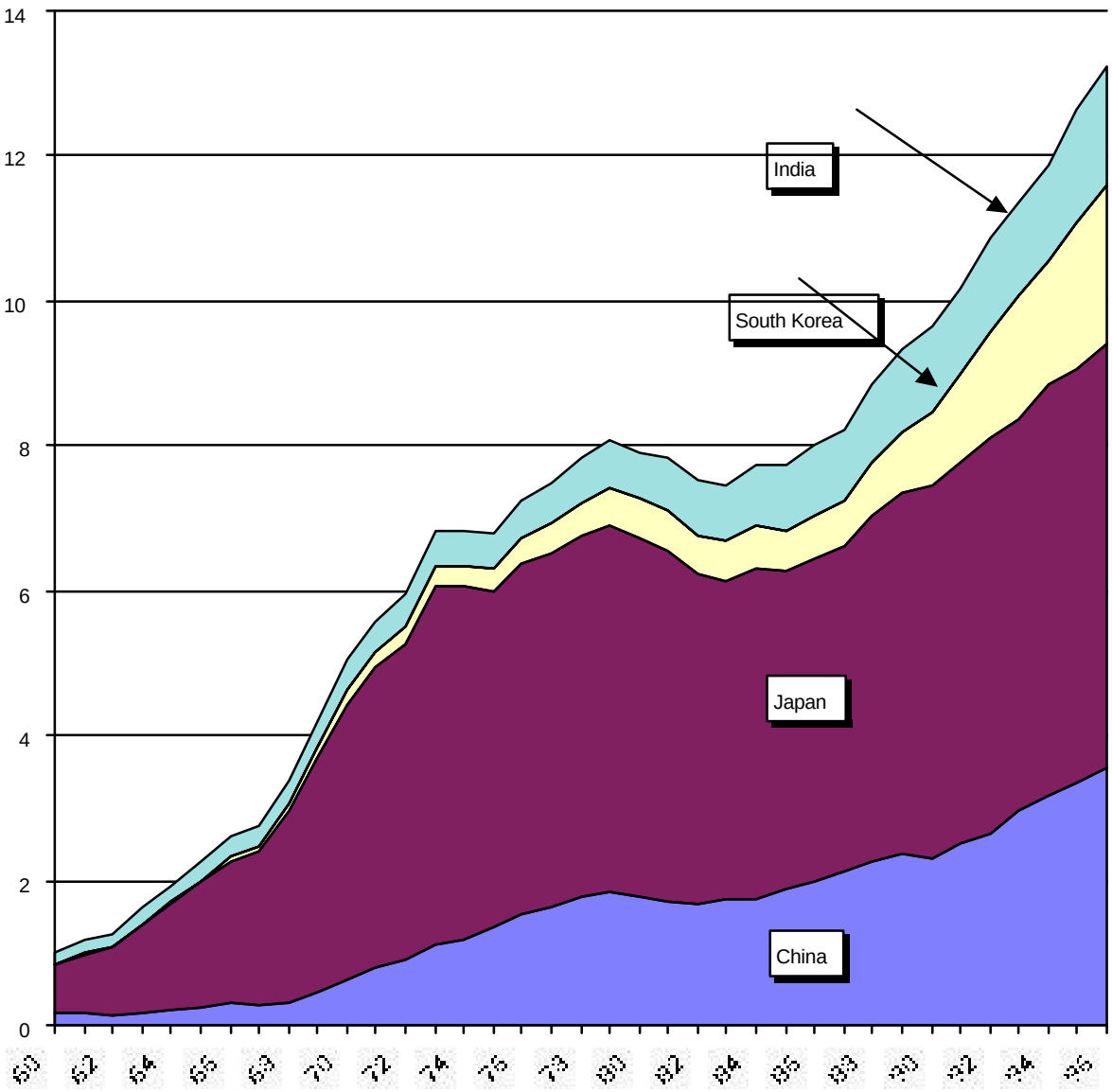
(in Millions of Barrels Per Day (MMBD)



Source: Adapted by Anthony H. Cordesman from EIA Annual Energy Review, 1998, http://www.eia.doe.gov/bookshelf.html

Asia, However, has Become a Major Oil Consumer:
Asian Oil Consumption: 1960-1996

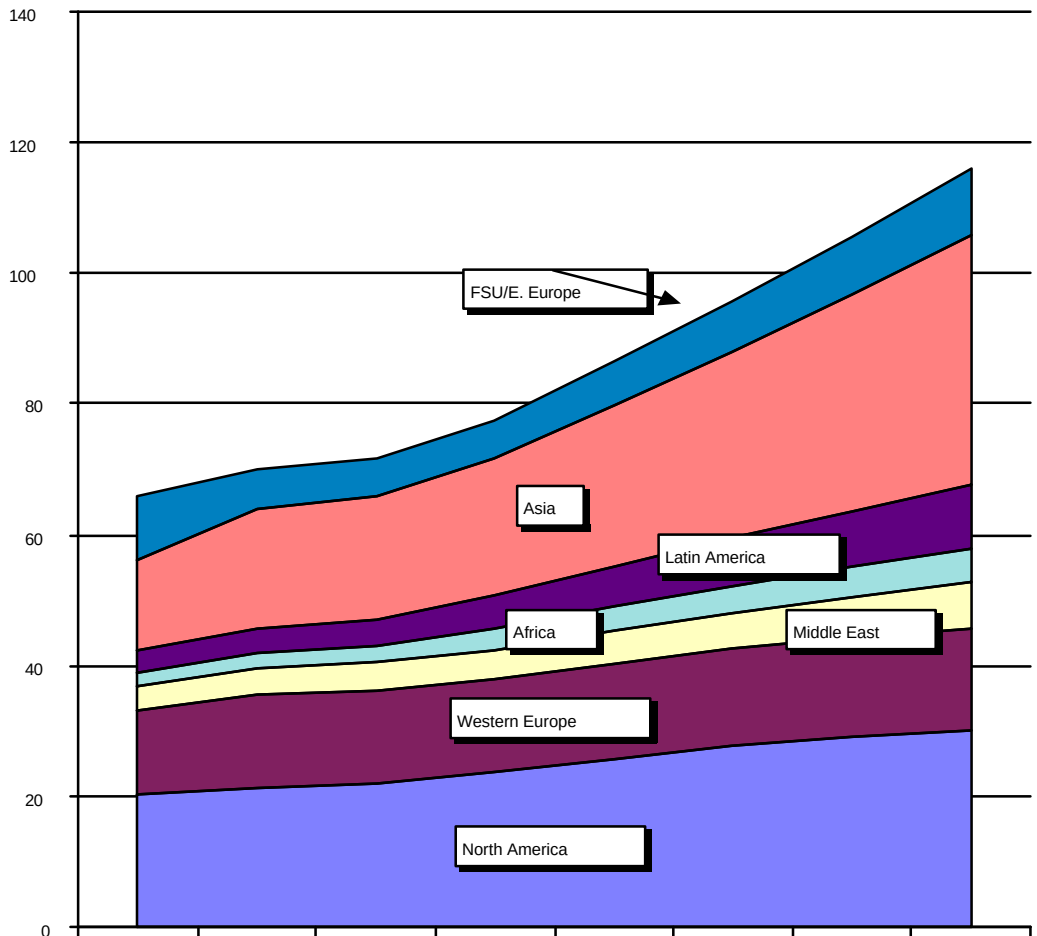
(in Millions of Barrels Per Day (MMBD)



Source: Adapted by Anthony H. Cordesman from EIA Annual Energy Review, 1998, http://www.eia.doe.gov/bookshelf.html .

Asia Will Drive Most of the Future Increase in Demand for Oil: Total World Oil Consumption by Region: 1990-2020

(Millions of Barrels per Day)

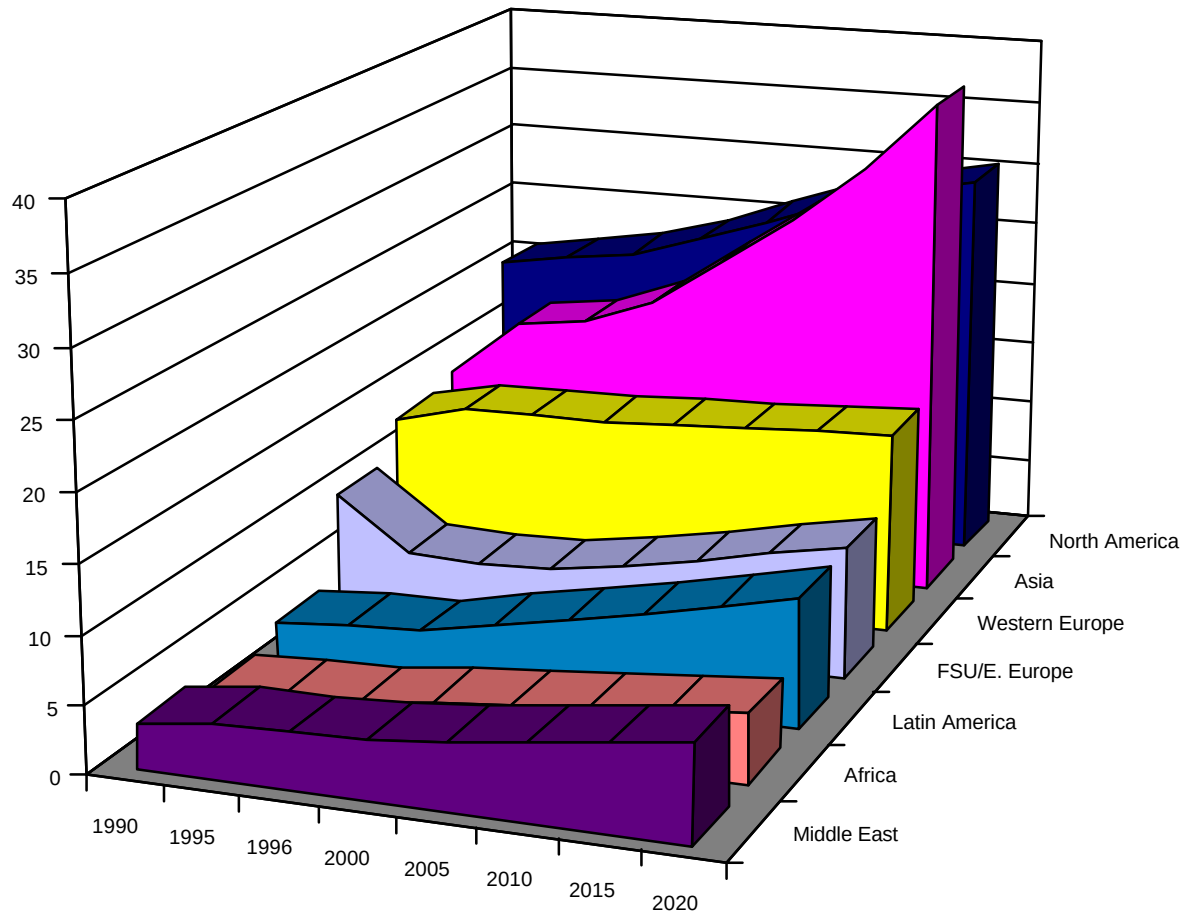


	1990	1995	1996	2000	2005	2010	2015	2020
FSU/E. Europe	10	5.9	5.7	5.9	6.7	7.8	9	10.1
Asia	13.8	18.3	19	21	24.8	28.5	33	38.4
Latin America	3.4	3.9	4	5.2	6.2	7.3	8.5	9.8
Africa	2.1	2.3	2.4	3.1	3.7	4.1	4.6	5.1
Middle East	3.4	4.1	4.2	4.4	5	5.6	6.3	7.1
Western Europe	12.9	14.1	14.3	14.3	14.6	14.9	15.2	15.4
North America	20.4	21.3	22	23.7	25.6	27.6	29	30.1

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1996, Washington, DOE, EIA-0484(96), May, 1996, p. 92, and International Energy Outlook, 1998, April, 1998, DOE/EIA-484(97), Reference Case, p. 136.

Comparative Growth in Demand for Oil by Region: 1990-2020

(Millions of Barrels per Day)

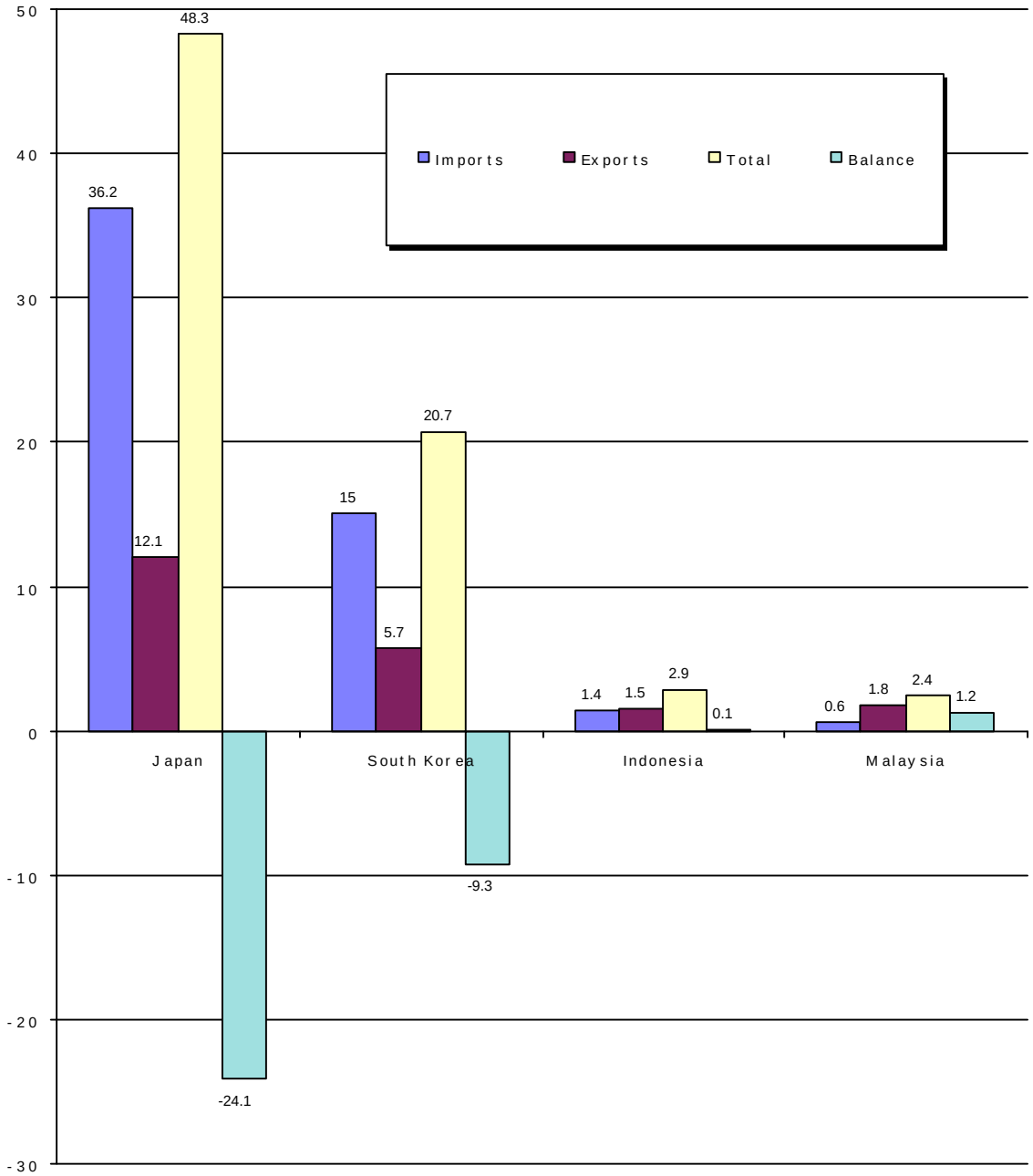


	1990	1995	1996	2000	2005	2010	2015	2020
Middle East	3.4	4.1	4.2	4.4	5	5.6	6.3	7.1
Africa	2.1	2.3	2.4	3.1	3.7	4.1	4.6	5.1
Latin America	3.4	3.9	4	5.2	6.2	7.3	8.5	9.8
FSU/E. Europe	10	5.9	5.7	5.9	6.7	7.8	9	10.1
Western Europe	12.9	14.1	14.3	14.3	14.6	14.9	15.2	15.4
Asia	13.8	18.3	19	21	24.8	28.5	33	38.4
North America	20.4	21.3	22	23.7	25.6	27.6	29	30.1

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1996, Washington, DOE, EIA-0484(96), May, 1996, p. 92, and International Energy Outlook, 1998, April, 1998, DOE/EIA-484(97), Reference Case, p. 136.

Middle Eastern Trade with Asia Must Change Fundamentally and Recycling "Petro-Yen" Will Not Be Easy

(Trade Patterns in 1996 in $US Current Millions)



Note: Arabia and the Gulf includes Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, UAE, and Yemen. Eastern Mediterreanean includes Egypt, Israel, Jordan and Syria. North Africa includes Algeria, Morocco, Libya, Tunisia, and Sudan. All Arab includes previous countries less Iran and Israel. Middle East and North Africa includes all countries listed above.

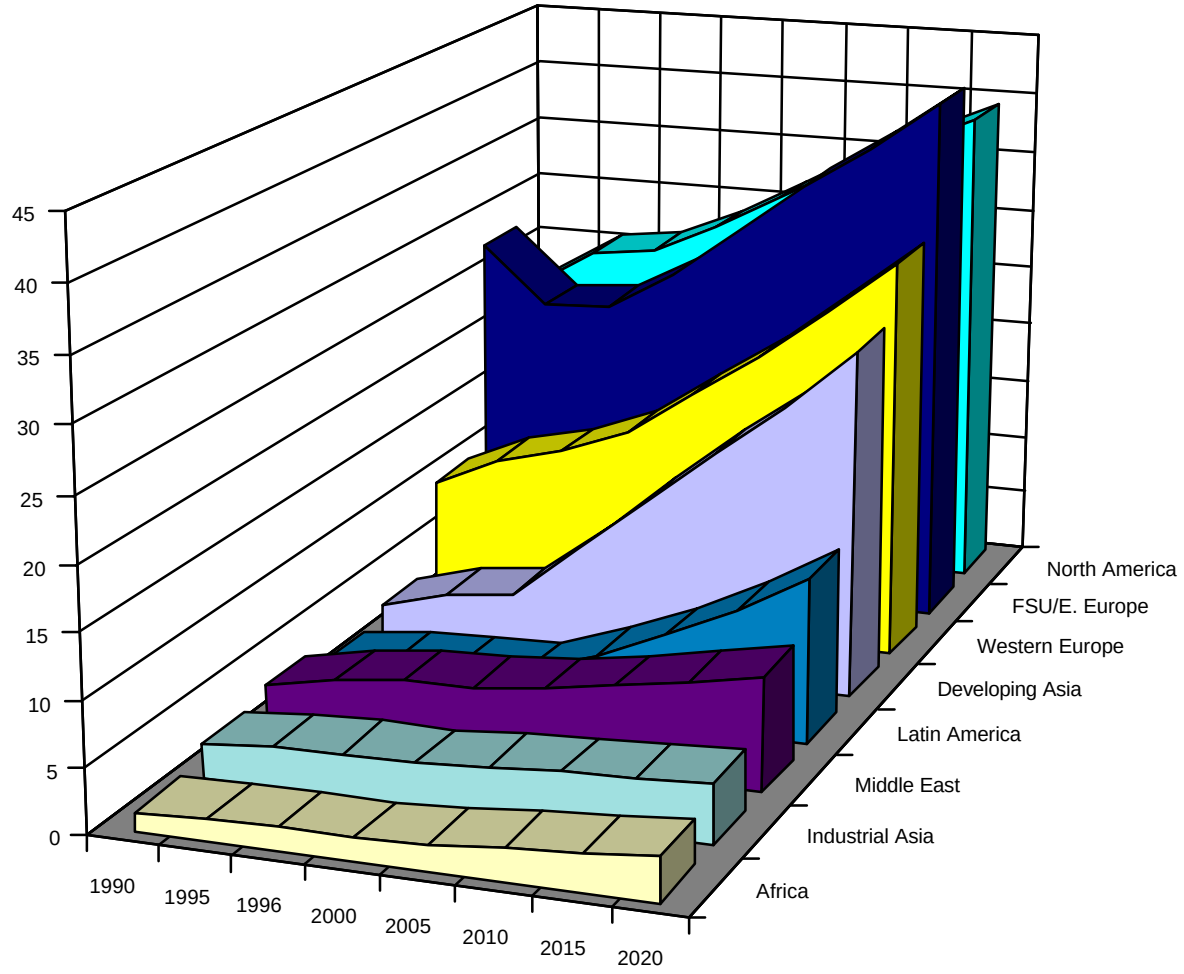
Source: Adapted by Anthony H. Cordesman from EIU, Internet data base, December 16, 1997.

Key Gas Issues

- **Massive uncertainties exist regarding the size of reserves and major changes could occur in current estimates by 2020.**
    - **Iran is a key uncertainty.**
- **Changes in gas liquids technology could change the definition of economic reserves, the value of gas, and the entire market for gas.**
- **Pipeline geopolitics are even more important for gas than for oil.**
- **North America, Europe, and FSU will dominate gas use, but Asian demand will rise sharply.**
    - **The growth of gas use in the Pacific Rim states will be particularly high.**
    - **Tanker traffic will increase because of both oil and gas demand.**
- **Russia may create pipelines to service China, Korea, and Japan -- altering current estimates of dependence on oil.**

North America, the FSU, and Western Europe Will Stay the Largest Consumers, but Asia Will Drive Most of the Increase in Gas Demand

(Total World Gas Consumption by Region: 1990-2015, Trillion Cubic Feet, EIA Reference Case)

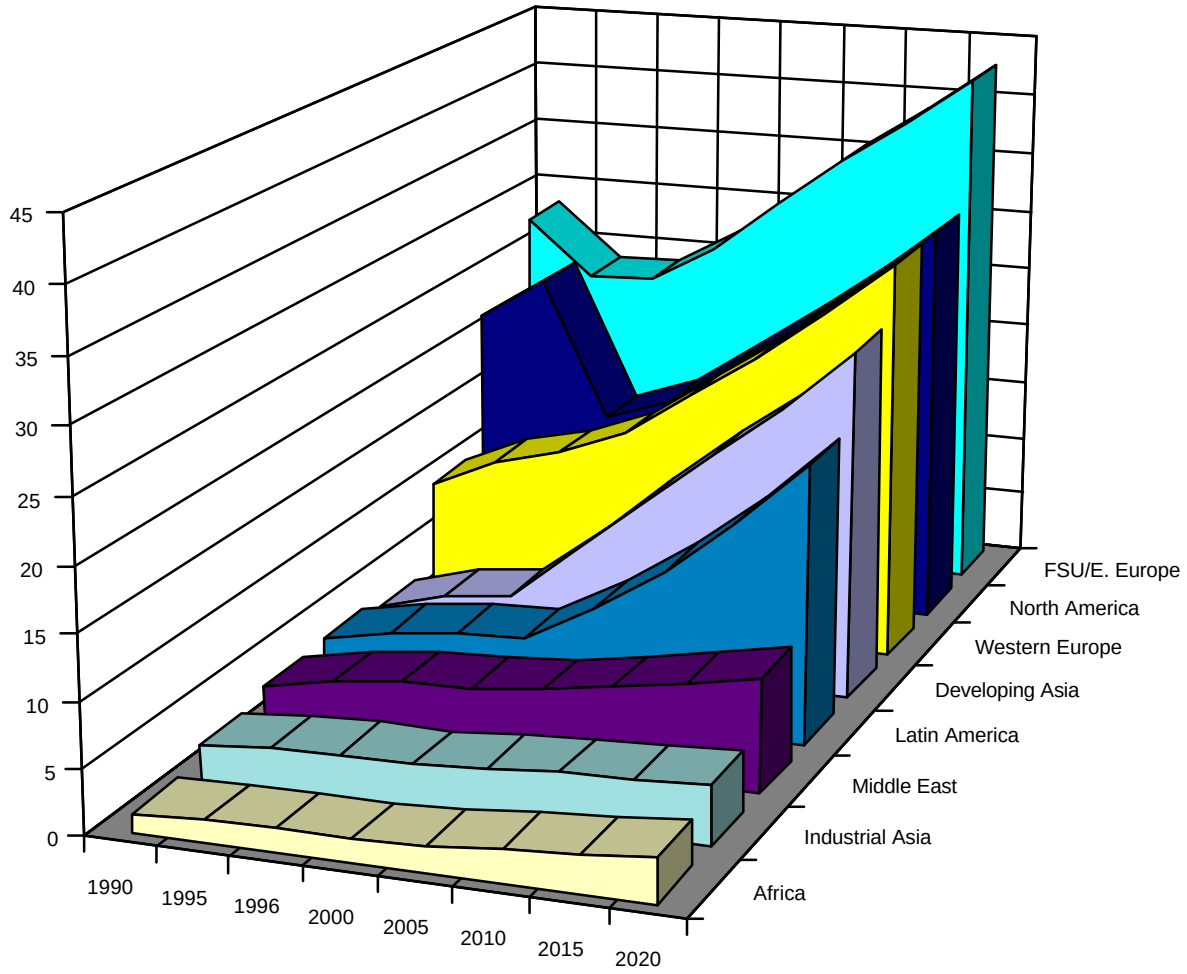


	1990	1995	1996	2000	2005	2010	2015	2020
Africa	1.4	1.7	1.8	1.7	1.9	2.4	2.9	3.4
Industrial Asia	2.6	3.1	3.3	3.3	3.7	4.1	4.3	4.6
Middle East	3.6	4.7	5.2	5.4	6	6.8	7.8	8.9
Latin America	2	2.6	2.9	3.1	5	7.2	9.8	13
Developing Asia	3	4.7	5.3	9.5	14.1	18.5	22.6	27.7
Western Europe	10.3	12.7	14.1	16.2	19.9	23.5	27.7	32.1
FSU/E. Europe	28.1	23.4	23.7	26.8	31	35.2	38.7	42.7
North America	22	25.4	26	28.5	31.5	34.4	36.9	39.4

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1996, Washington, DOE, EIA-0484(96), May, 1996, p. 92, and International Energy Outlook, 1998, April, 1998, DOE/EIA-484(97), Reference Case, p. 137.

Comparative Growth in Demand for Gas by Region: 1990-2020

(Millions of Barrels per Day)

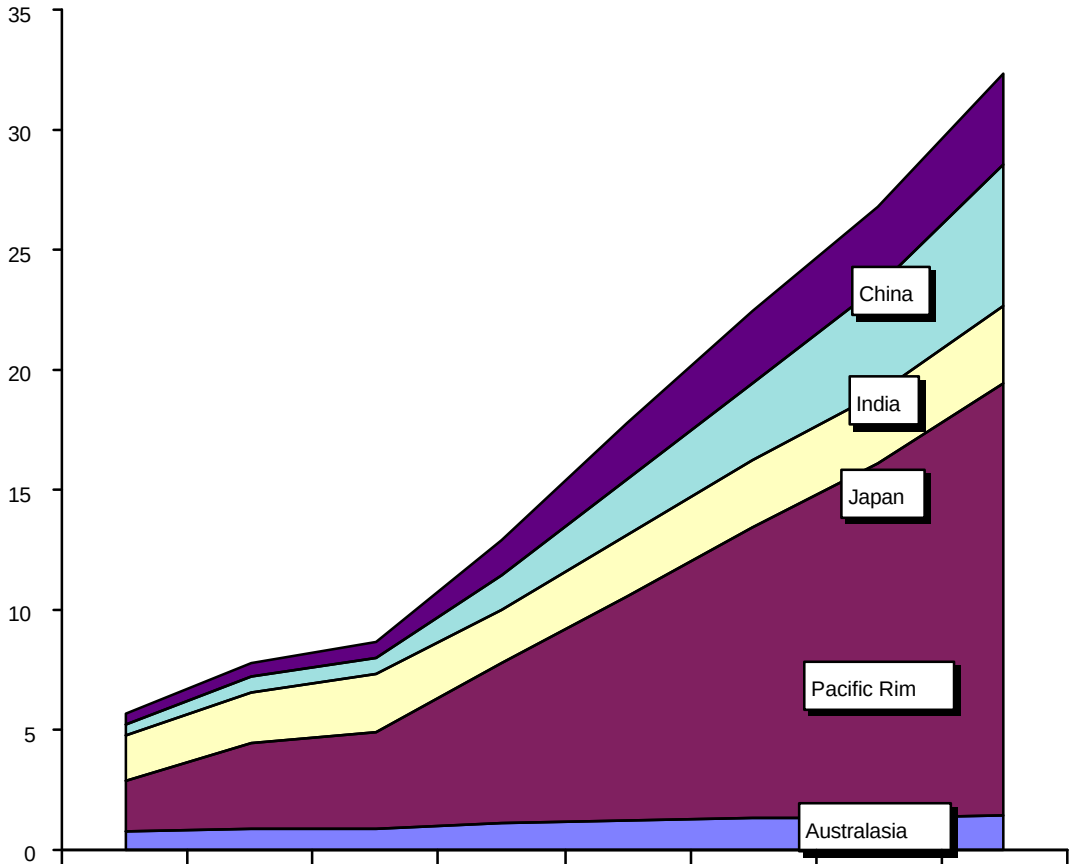


	1990	1995	1996	2000	2005	2010	2015	2020
Africa	1.4	1.6	1.8	1.7	1.9	2.4	2.9	3.4
Industrial Asia	2.6	3.1	3.3	3.3	3.7	4.1	4.3	4.6
Middle East	3.6	4.7	5.2	5.4	6	6.8	7.8	8.9
Latin America	3.9	5	5.6	5.8	8.8	12.4	16.6	21.8
Developing Asia	3	4.7	5.3	9.5	14.1	18.5	22.6	27.7
Western Europe	10.3	12.7	14.1	16.2	19.9	23.5	27.7	32.1
North America	22	25.4	14.1	16.2	19.9	23.5	27.7	32.1
FSU/E. Europe	28.1	23.4	23.7	26.8	31	35.2	38.7	42.7

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1996, Washington, DOE, EIA-0484(96), May, 1996, p. 92, and International Energy Outlook, 1997, April, 1997, DOE/EIA-484(97), Reference Case, p. 119.

Asia Will Make Major Increases in its Gas Imports:
Asian Gas Consumption: 1990-2020

(Trillion Cubic Feet of Consumption, EIA Reference Case)



	1990	1995	1996	2000	2005	2010	2015	2020
China	0.5	0.6	0.7	1.4	2.4	3	3.3	3.7
India	0.4	0.6	0.7	1.5	2.3	3.3	4.5	5.9
Japan	1.9	2.2	2.4	2.2	2.5	2.8	2.9	3.2
Pacific Rim	2.1	3.5	4	6.7	9.4	12.1	14.8	18.1
Australasia	0.8	0.9	0.9	1.1	1.2	1.3	1.3	1.4

Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, p. 137.

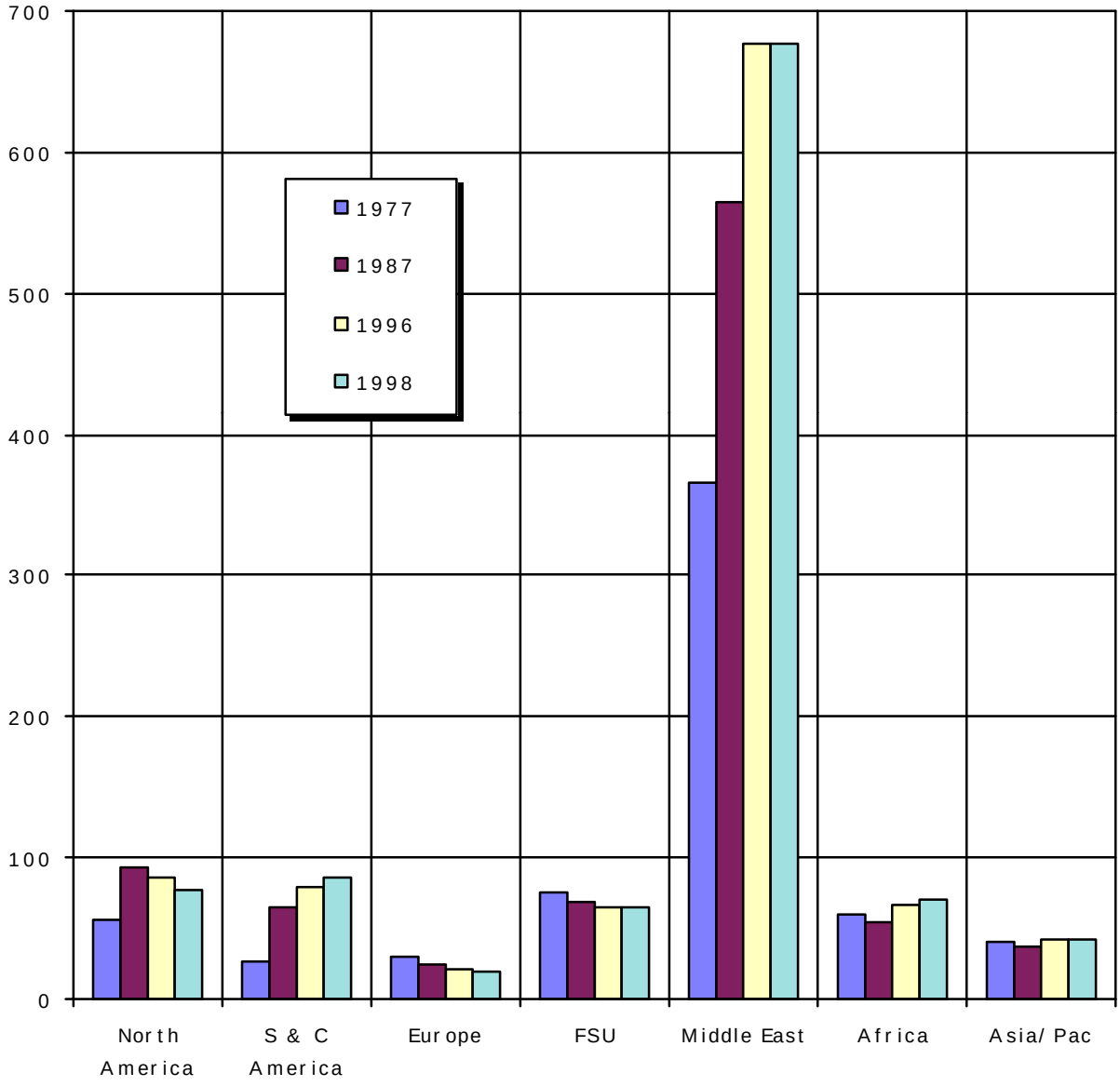
Geopolitical Impact of Oil and Gas Reserves

Oil Reserves and Geopolitics

- **Enhanced Oil Recovery (EOR) is steadily change reserve estimates and help the US and Northern Europe maintain reserve ratios for much longer than previously expected.**
- **Asia is "oil poor" in reserves, and reserves are depleting faster than new discoveries.**
    - **China is having little success in finding new reserves.**
    - **Offshore oil reserves in South China Sea may be myth.**
    - **India has virtually no oil.**
    - **Enhanced oil recovery (EOR) unlikely to provide much help.**
- **Russia's ability to exploit its reserves is economically and technically uncertain. Siberia is a particular problem.**
- **Gulf has about two-thirds of world's known oil reserves. Algeria and Libya have major reserves, and Egypt, Syria, and Tunisia have some oil.**
    - **North African reserves exceed reserves of all Sub-Saharan states: Angola, Nigeria, etc.**
    - **Far Eastern reserves are comparatively low, with little potential for major new discoveries.**
    - **Other regions have a faster growth of domestic consumption as a ratio of reserves.**
- **Gulf and Middle Eastern oil reserves are just as important even if ultimate oil reserves are considered.**
- **New reserves in other regions tend to be offset by depletion of existing reserves.**

Shifts in the Regional Balance of Oil Reserves

(Billions of Barrels)

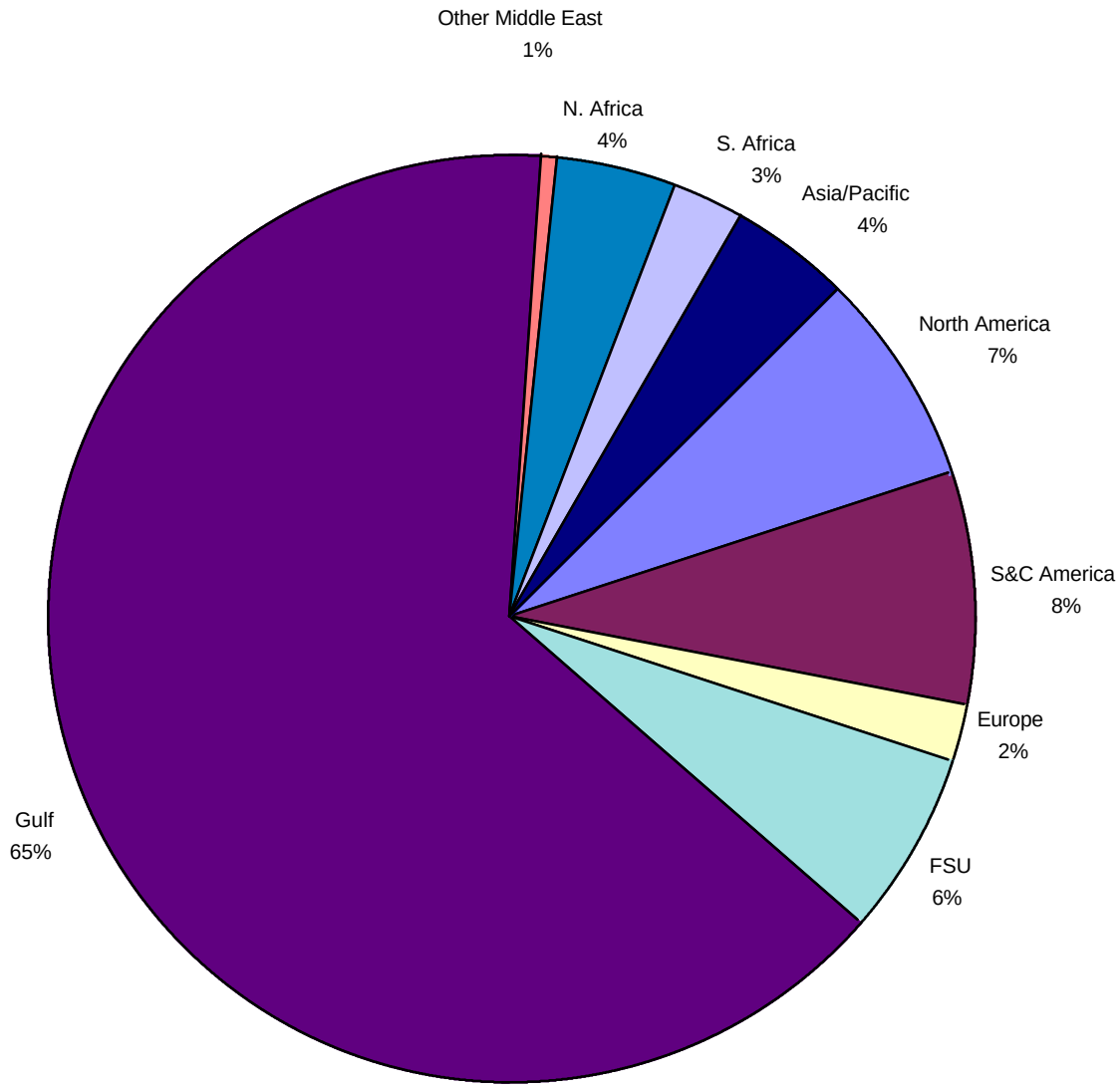


1977	56.9	26.4	30.3	75	365.8	59.2	39.7
1987	93	65.7	24.2	69	564.7	55.3	37.8
1996	85.9	79.1	20.5	65.5	676.3	67.5	42.4
1998	76.6	86.2	20.2	65.4	676.9	70	42.3

Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 4.

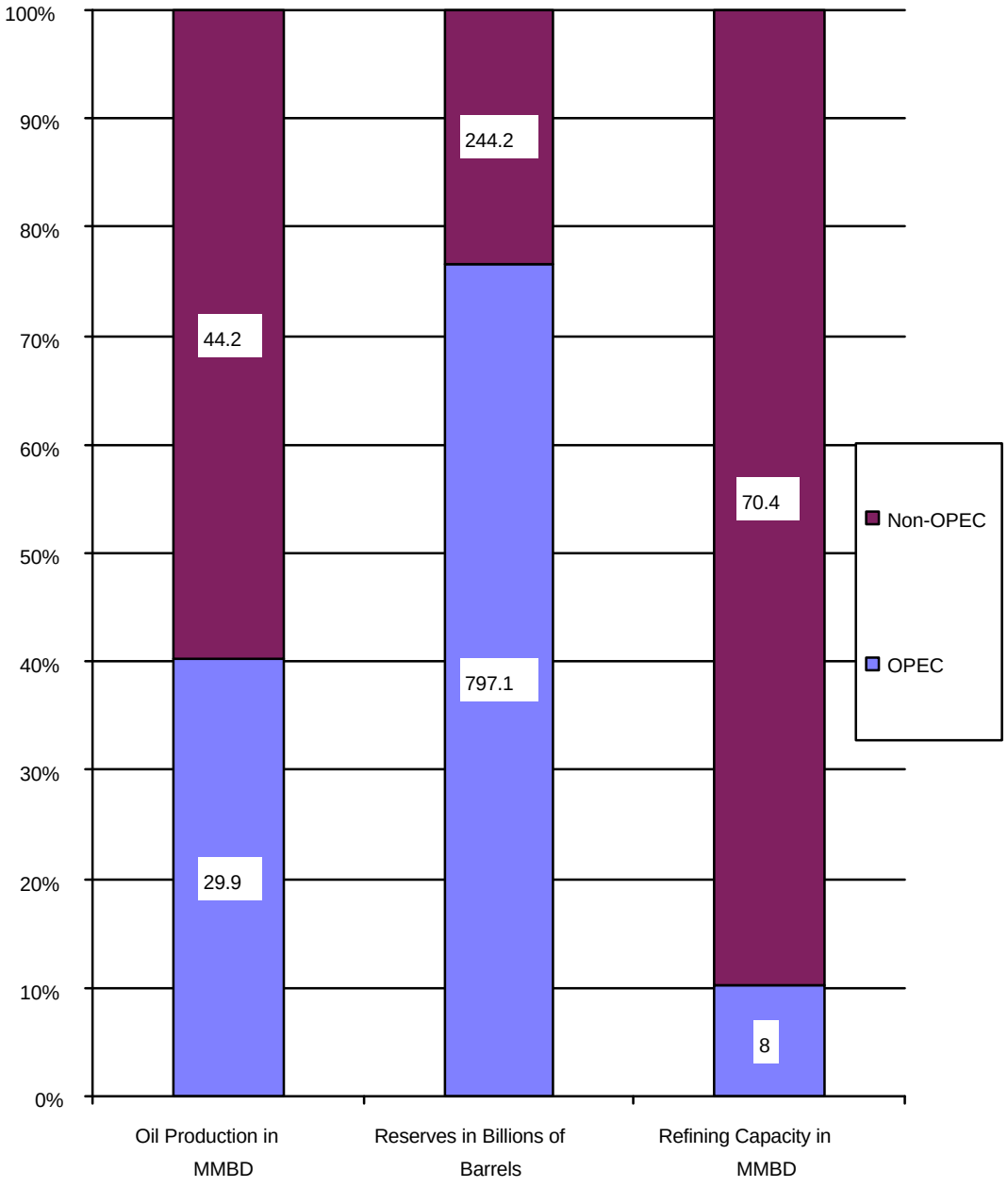
The Middle East and the Gulf Dominate Future Oil Supply: World Oil Reserves by Region as a Percent of World Total

(Based on Oil and Gas Journal Forecast for and a World Total of 1,037.6 billion barrels)



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 4.

OPEC versus Non-OPEC Production, Reserves and Refining Capacity



Source: DOE/EIA, Non-OPEC Fact Sheet, 3/98.

OPEC Status by Country

(Thousands of Barrels Per Day

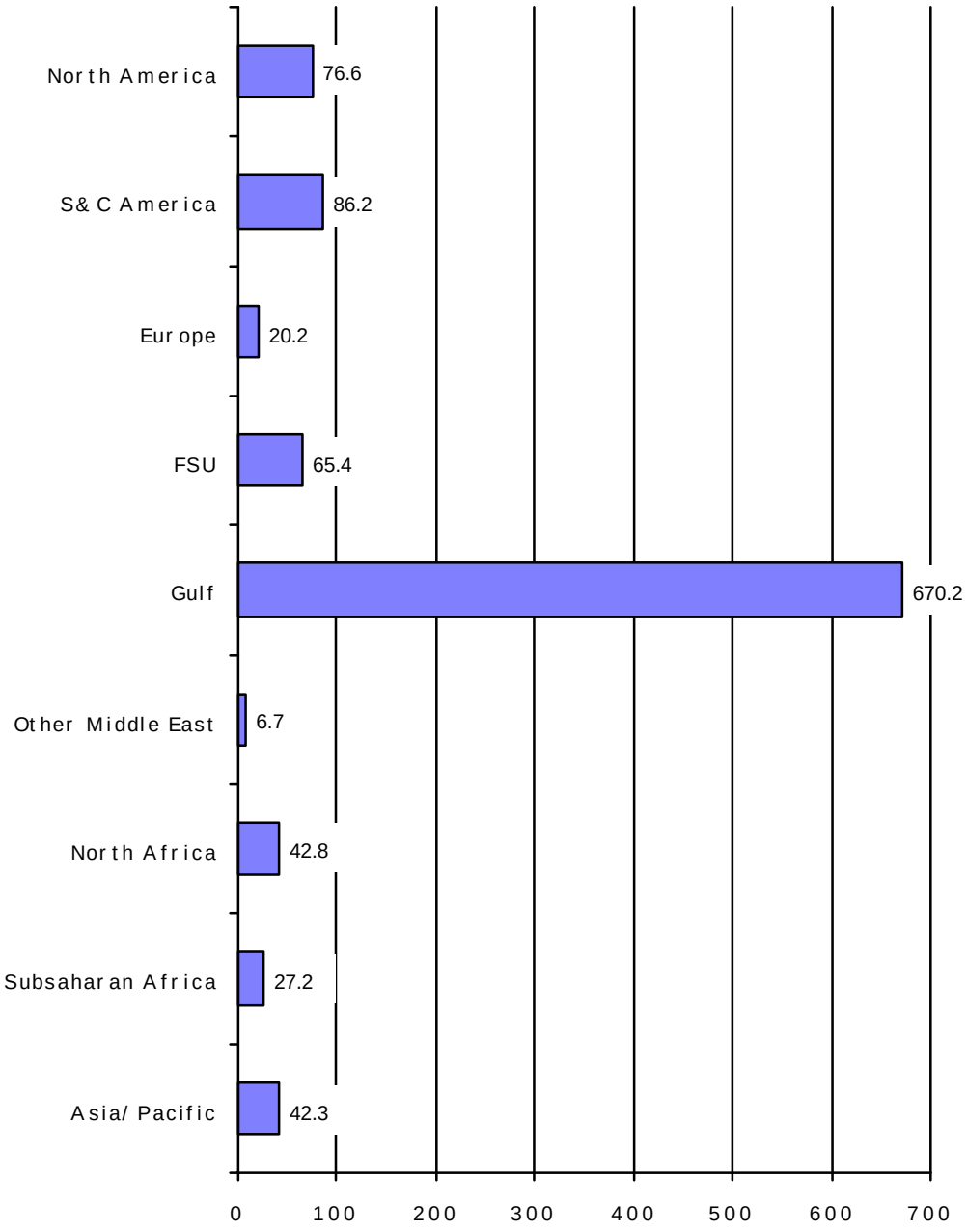
Country	1997 Quota	1998 Quota	1998 Cutbacks*	Crude Oil Production 1997	Crude Oil Production 3/98
Algeria	750	909	50,000	847	860
Indonesia	1,300	1,456	70,000	1,366	1,340
Iran	3,650	3,942	140,000	3,629	3,600
Iraq	1,200	1,314	0	1,182	1,820
Kuwait	2,000	2,190	125,000	2,038	2,210
Libya	1,390	1,522	80,000	1,446	1,450
Nigeria	1,865	2,042	125,000	2,217	2,270
Qatar	378	414	30,000	614	700
Saudi Arabia	8,000	8,761	525,000	8,562	8,460
UAE	2,161	2,366	125,000	2,236	2,400
Venezuela	2,359	2,583	325,000	3,275	3,370
TOTAL OPEC	25,033	27,500	-	27,457	28,480
Mexico	-	-	200,000	-	-
Norway	-	-	100,000	-	-
Oman	-	-	30,000	-	-
Yemen	-	-	20,000	-	-
TOTAL	-	-	1,945,000	-	-

* Combined from the March 22, 1998, March 30 OPEC, and June 4 Amsterdam agreements.

Source: Adapted by Anthony H. Cordesman from DOE/EIA OPEC Fact Sheet, June, 1998, and Oil Production Agreements of 1998, June 5, 1998.

The Middle East and the Gulf Dominate Future Oil Supply: World Oil Reserves by Region in Billions of Barrels

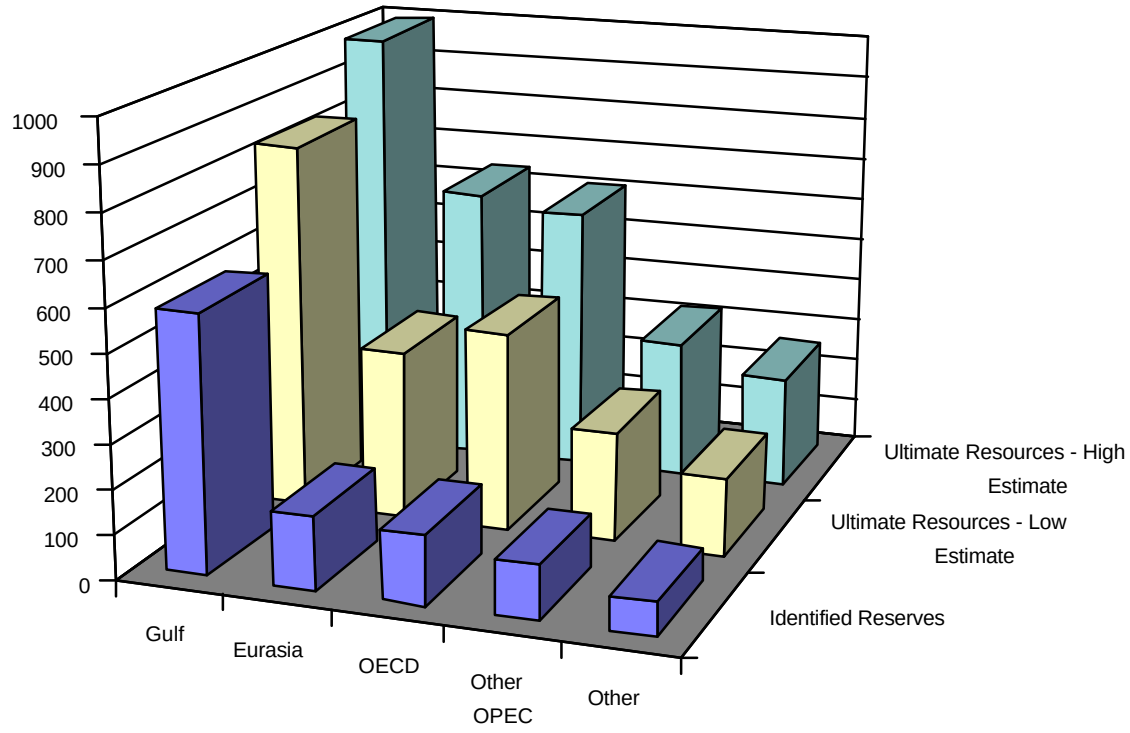
(Based on Oil and Gas Journal Forecast for and a World Total of 1,037.6 billion barrels)



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 4.

Comparative World Oil Reserves by Region

(Billions of Barrels)

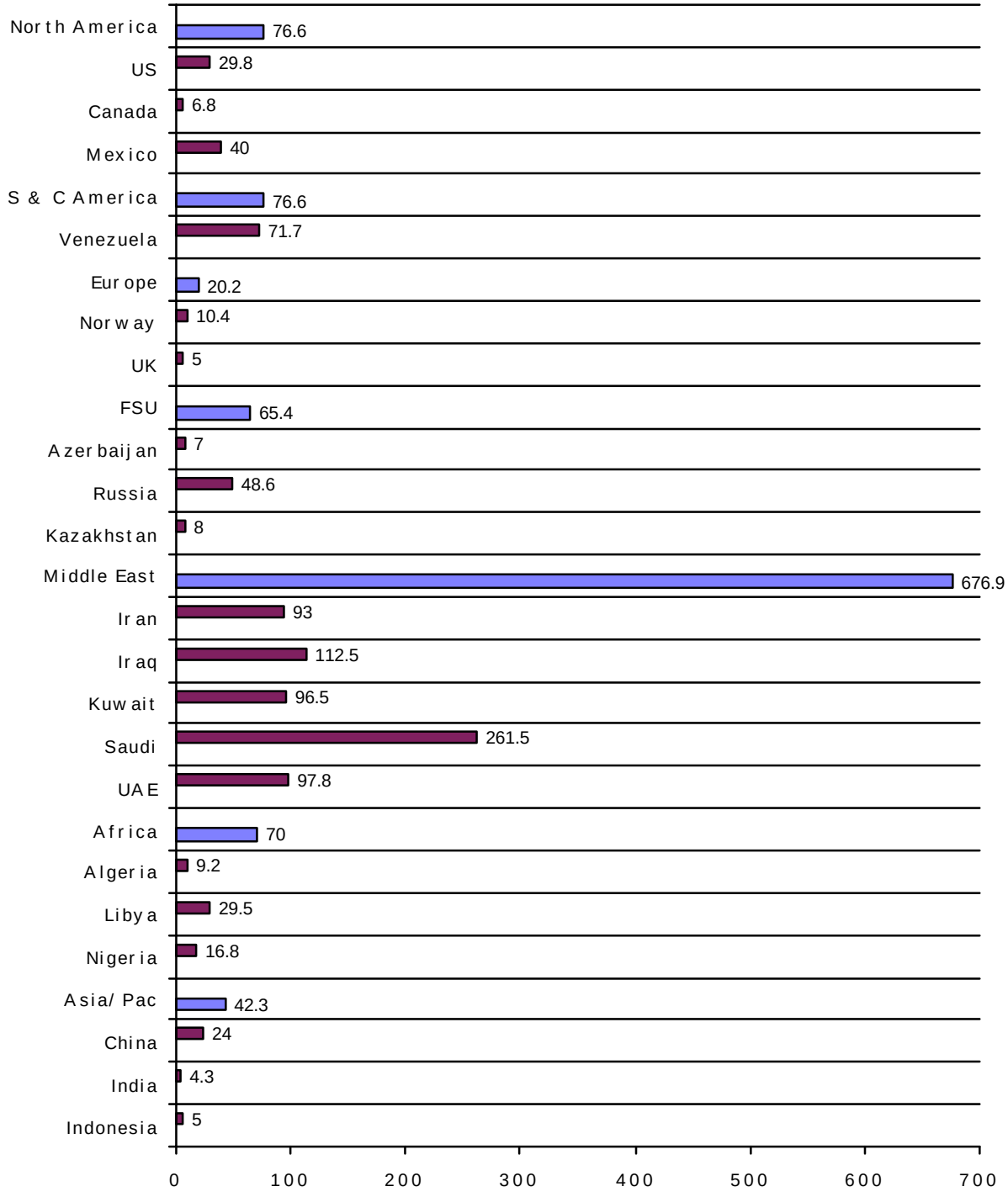


	Gulf	Eurasia	OECD	Other OPEC	Other
Identified Reserves	583	163.7	156.4	123.4	76.7
Ultimate Resources - Low Estimate	834.2	383.5	450.2	250.4	175.7
Ultimate Resources - High Estimate	992	636.6	605.7	317.1	255.6

Source: Adapted by Anthony H. Cordesman from DOE/EIA, International Energy Outlook, 1997, April, 1997, DOE/EIA-484(97), Reference Case, p. 35.

Reserves By Region & Major Producer Country

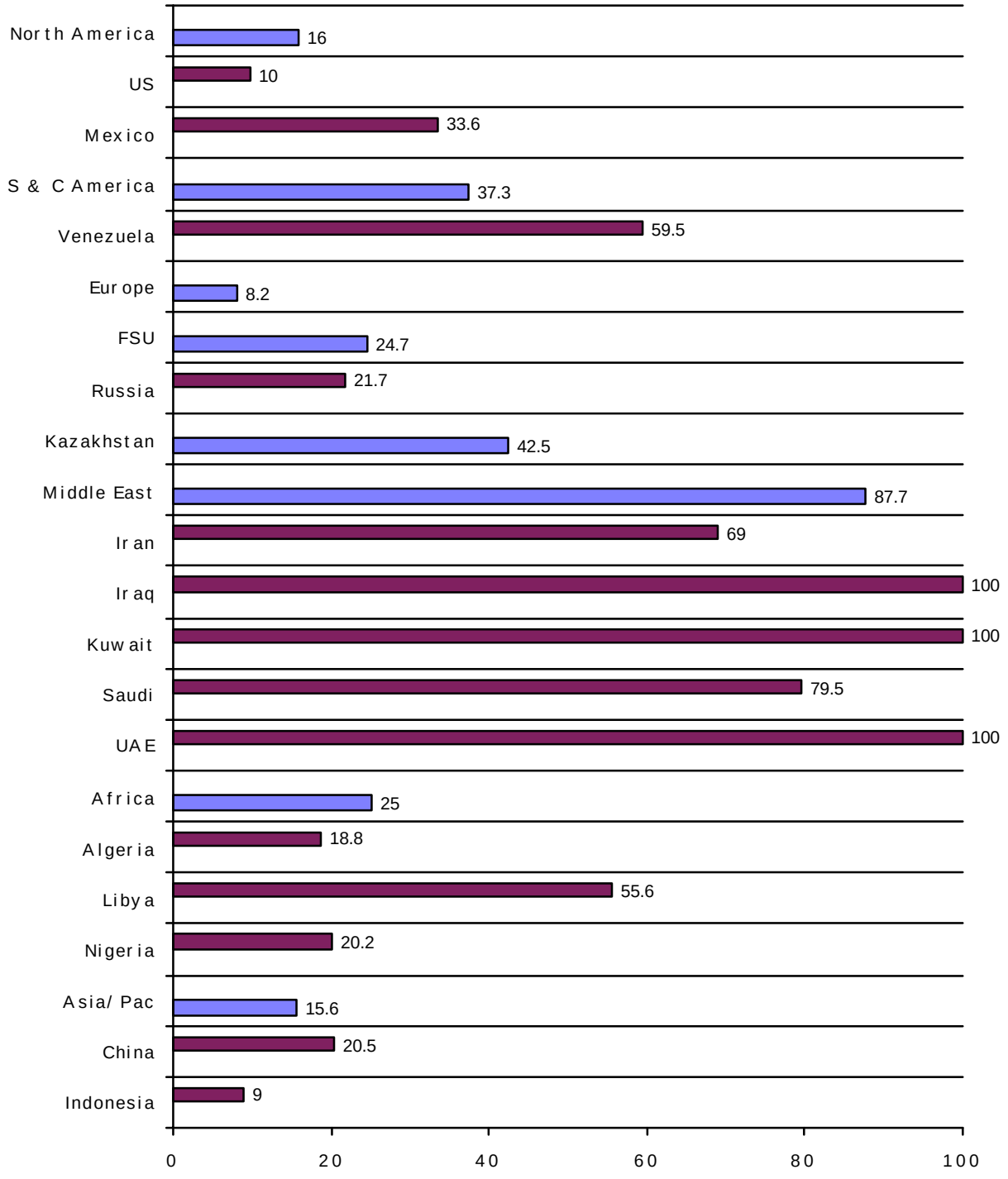
(Billions of Barrels in 1997)



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 4.

Reserve to Production Ratios By Region & Major Producer

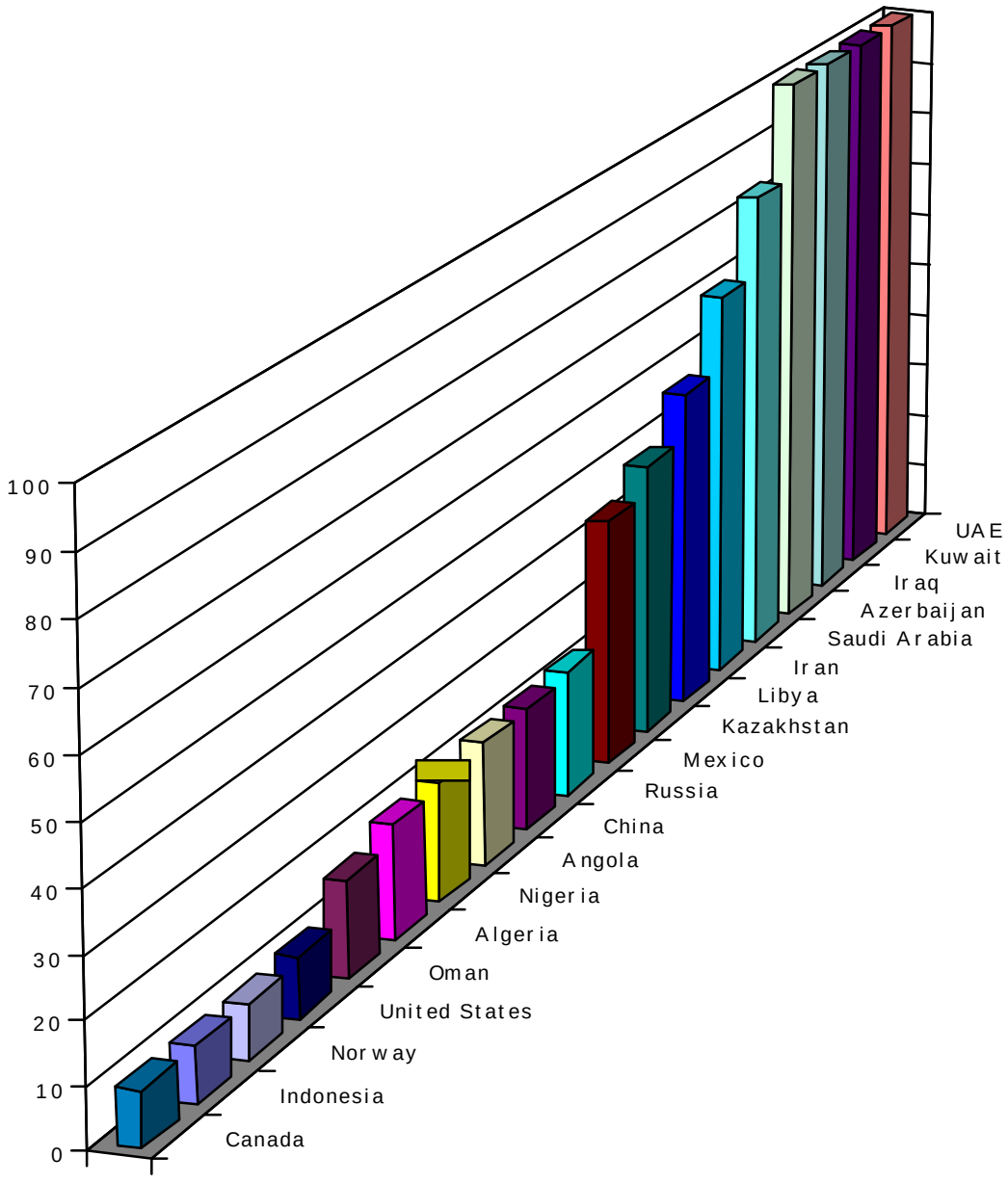
(Reserves/Production Ratios in 1997)



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 4.

The Life of Oil Reserves is an Issue for Everyone

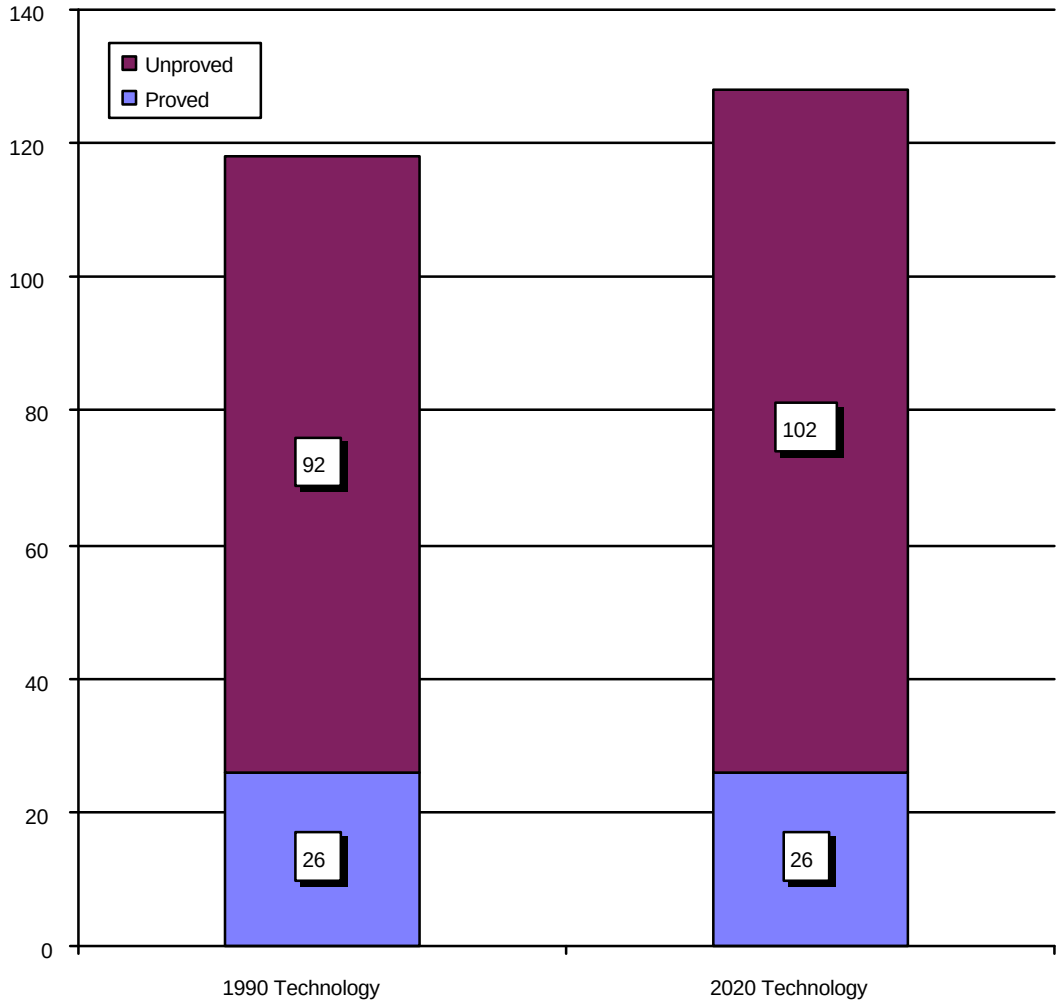
(Years of Proven Reserves at Average Rate of Production in 1996)



Note: Iran and Saudi Arabia probably have major additional reserves. Countries shown as 100 years have substantially larger reserve life, but it is impossible to determine how much.
Source: British Petroleum and the Economist, August 2, 1997, p. 80.

Oil Reserves Are Technology as Well as Price Dependent: US Reserves in the Lower 48 as a Test Case

(in Billions of Barrels)



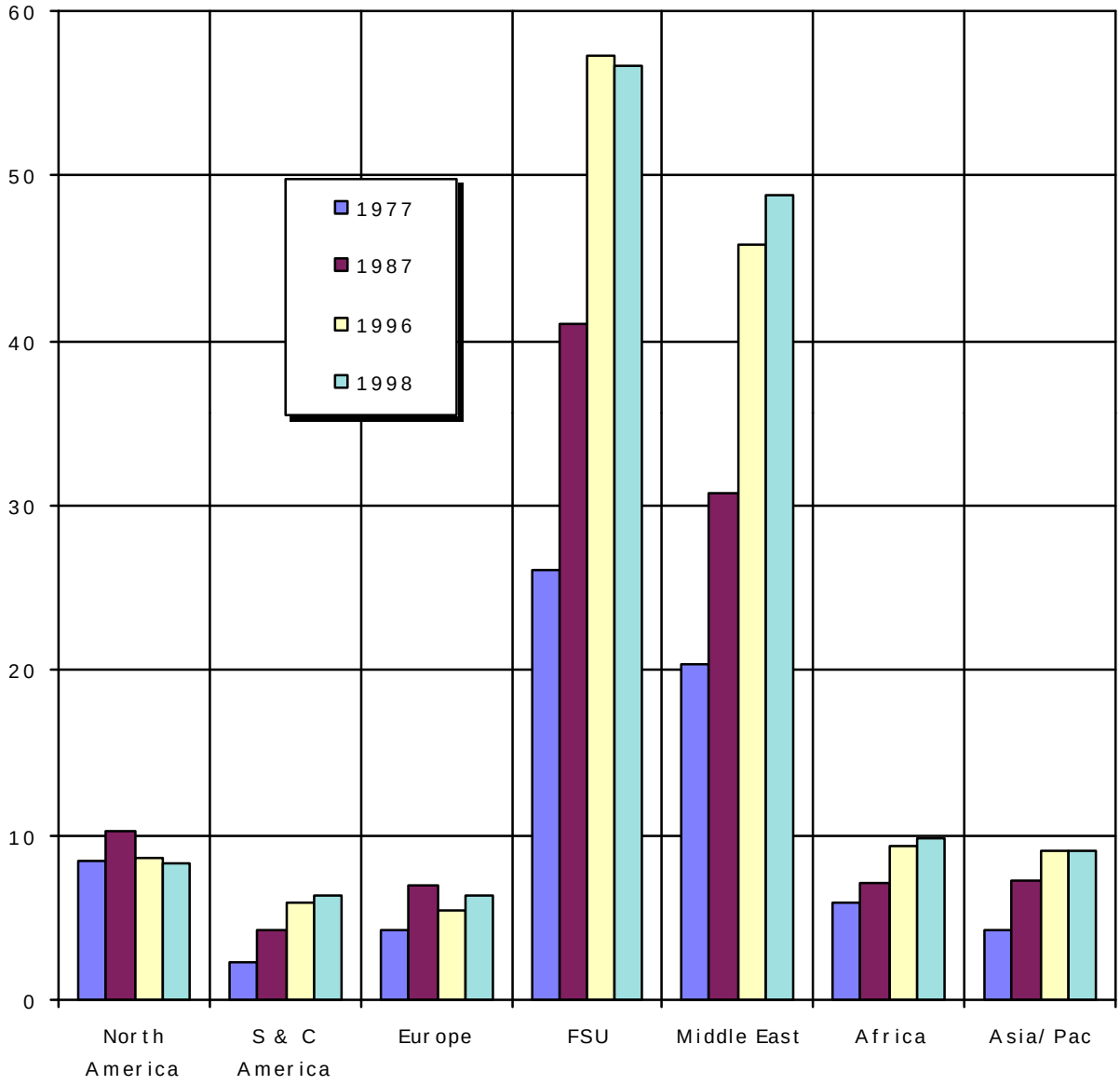
Source: Adapted by Anthony H. Cordesman from EIA, Annual Energy Outlook, 1998, p. 59.

Gas Reserves and Geopolitics

- **The Middle East plays a critical role in Gas Reserves, but the FSU has the largest reserves.**
    - **North American and Asian gas reserves are much higher as a ratio of current demand, but fall far short of FSU and Gulf.**
    - **Asia must become a major net gas importer from the Gulf, although the FSU will be a critical supplier.**
- **North African reserves again exceed Sub-Saharan reserves, but North African gas reserves are not high relative to world reserves or future demand.**
- **The FSU and Iran present a cumulative massive analytic problem because:**
    - **Data on oil reserves of Caspian states, Central Asia, and Iran are very uncertain.**
    - **Little meaningful data exist on the gas reserves of Russia, Caspian states, Central Asia, and Iran.**
    - **The economic value of given types of gas reserves is much more uncertain than for oil.**
- **The geopolitics of gas reserve are currently transportation limited!**
    - **New gas liquids technologies might change this.**
    - **Gas may substitute for oil in many exporting countries, increasing their oil export potential.**

Shifts in the Regional Balance of Gas Reserves

(Trillions of Cubic Meters)

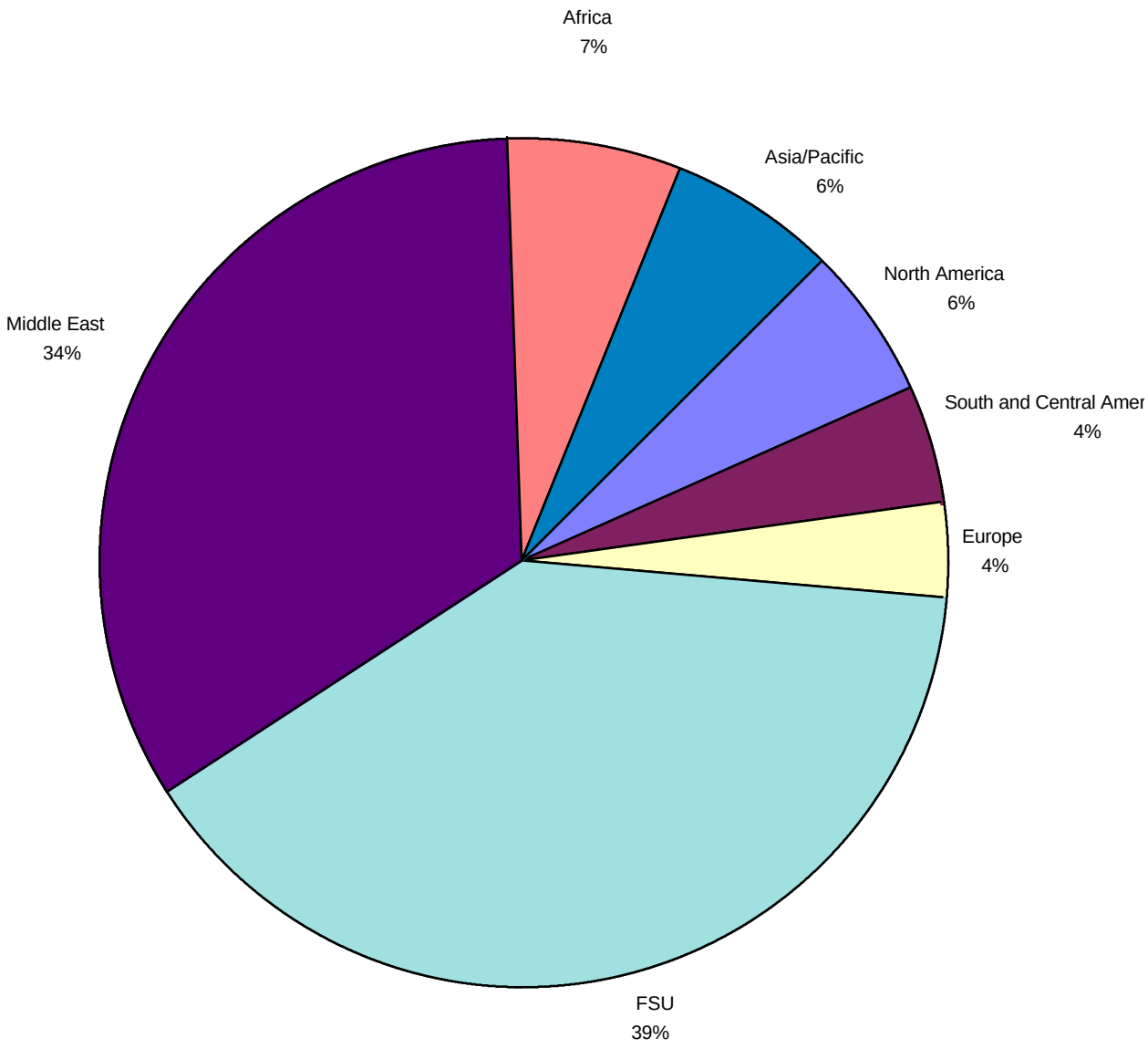


1977	8.44	2.22	4.21	26.05	20.36	5.88	4.19
1987	10.23	4.25	7.01	41.06	30.7	7.04	7.23
1996	8.53	5.9	5.42	57.28	45.79	9.3	9.11
1998	8.36	6.29	6.29	56.71	48.88	9.87	9.08

Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 20.

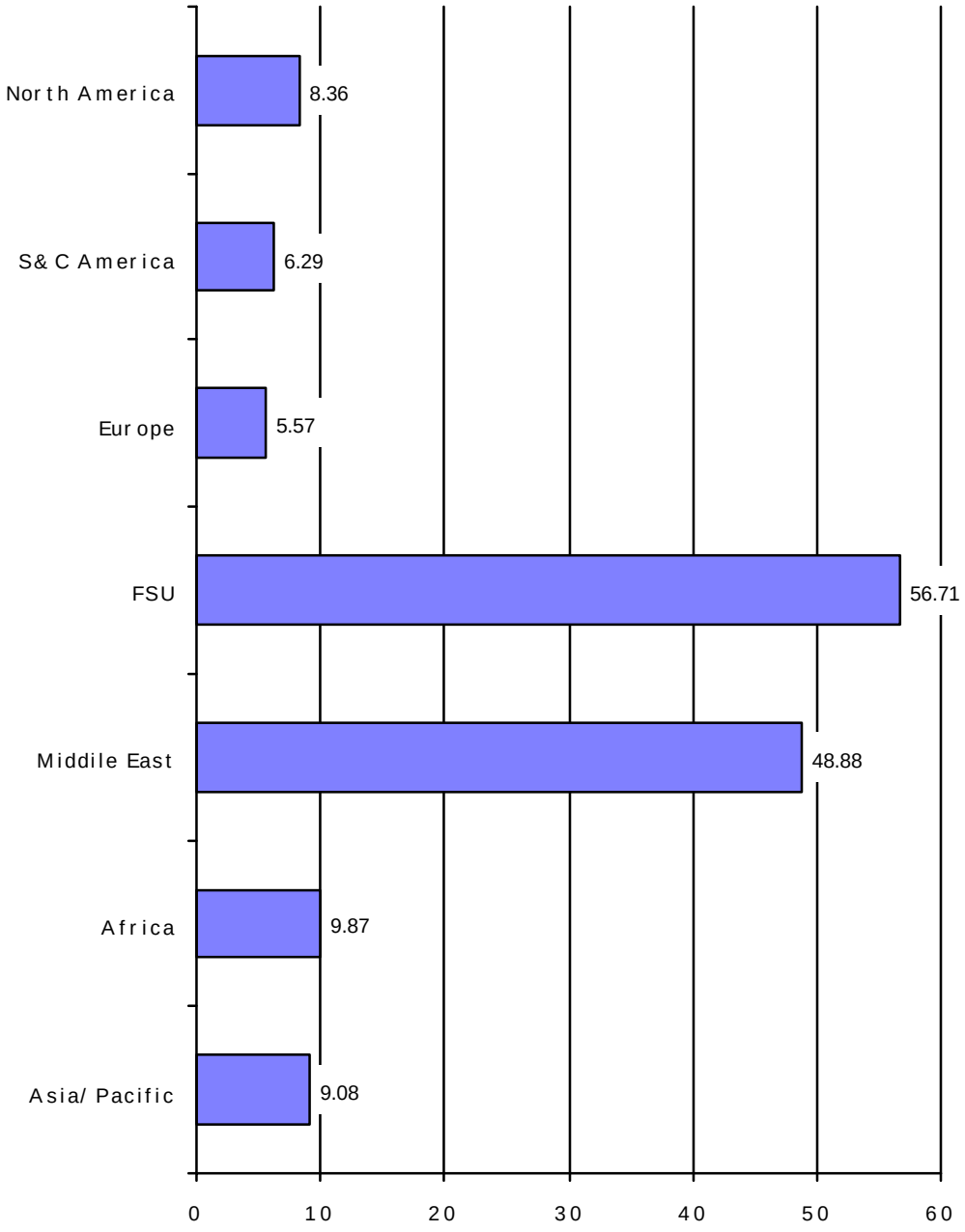
The Middle East and the Gulf Dominate Future Gas Supply: World Oil Reserves by Region as a Percent of World Total

(Based on Oil and Gas Journal Forecast for a World Total of 144.76 Trillion Cubic Meters)



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 20.

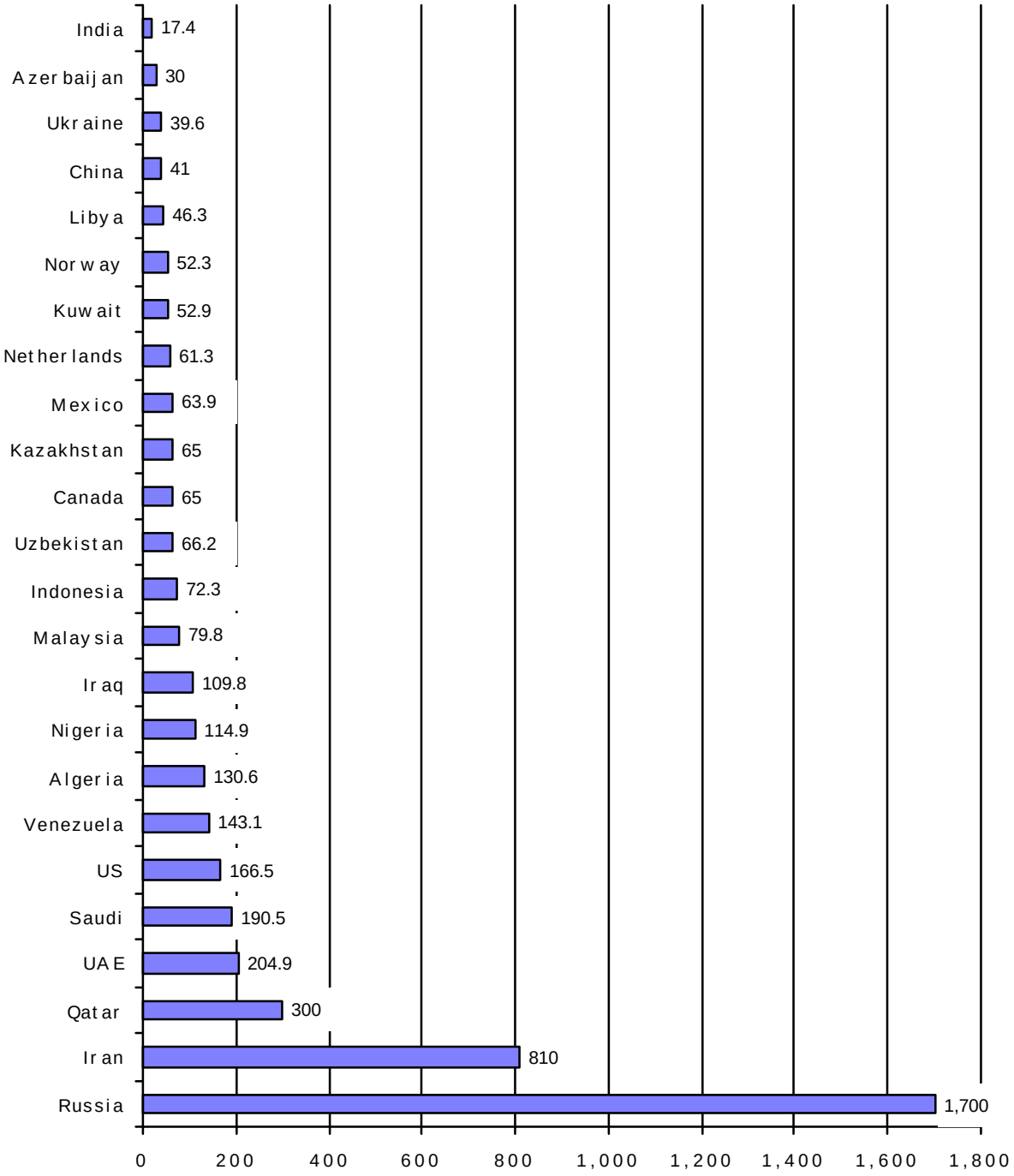
The FSU and the Middle East Dominate Future Gas Supply: World Oil Reserves by Region in Trillions of Cubic Meters



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 20.

World Gas Reserves by Key Nation

(Trillions of Cubic Feet in Reserves)



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 20.

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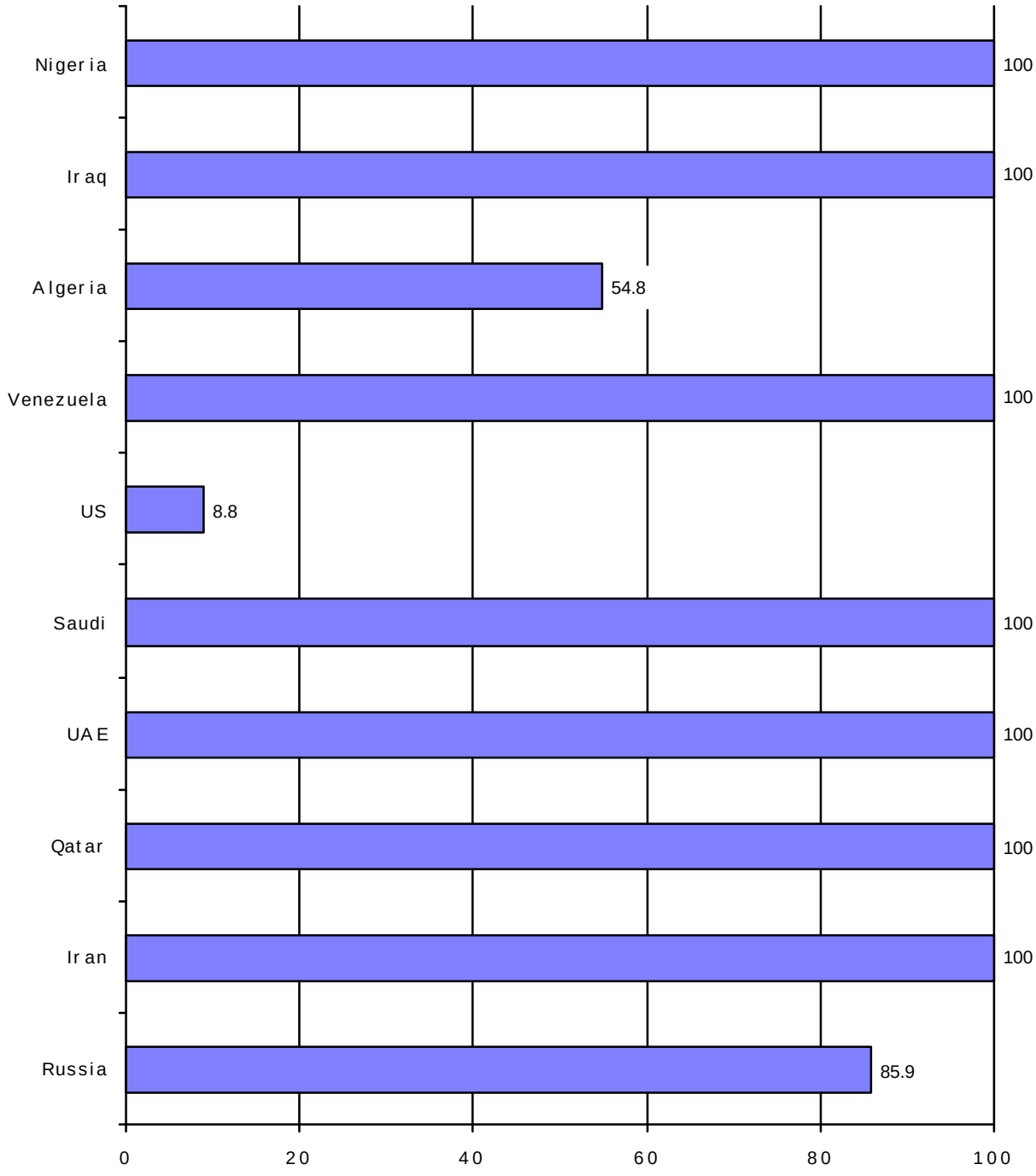
World Gas Reserve to Production Ratios by Key Nation

(Nations with At Least 100 Trillion Cubic Feet in Reserves)



Source: Oil and Gas Journal, and BP Statistical Review of World Energy, 1998, p. 20.

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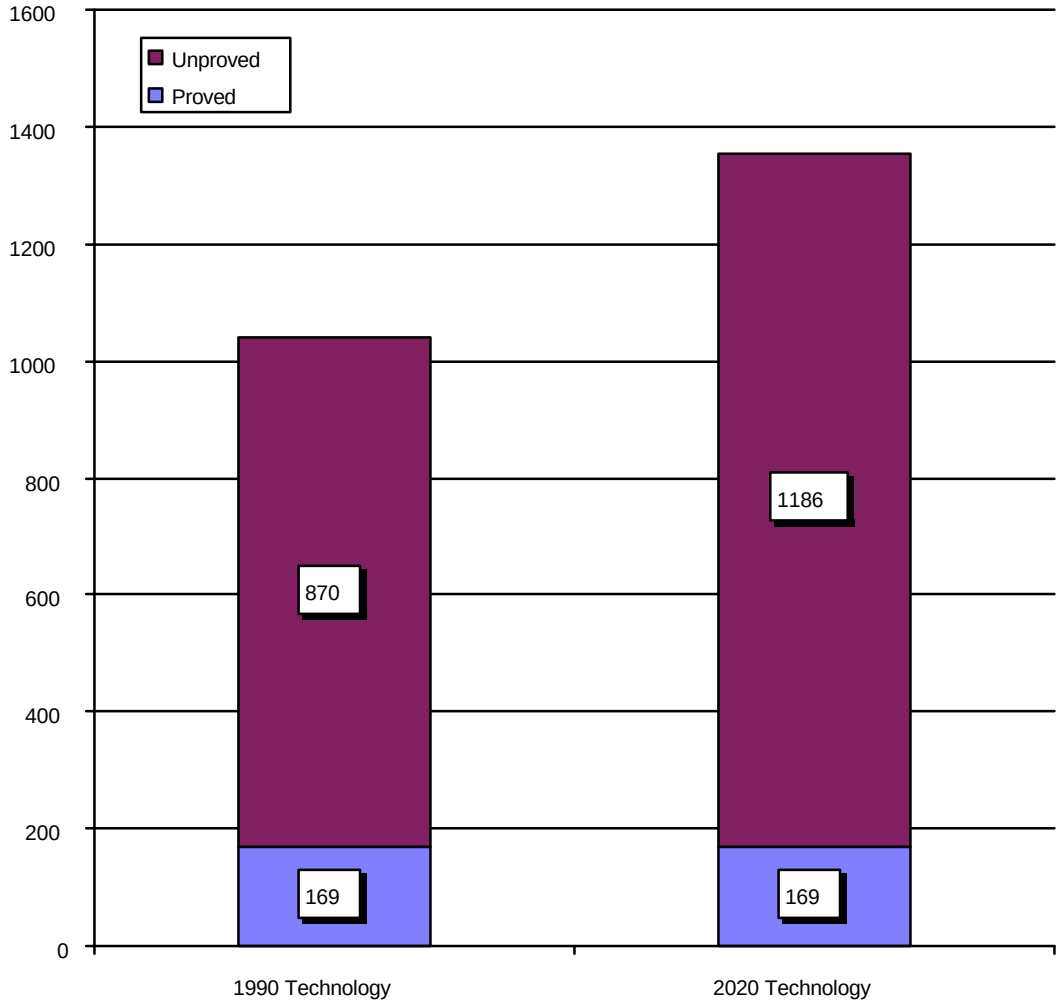
Gas Reserves Are Also Technology as Well as Price Dependent: US Reserves in the Lower 48 as a Test Case

(in Trillions of Cubic Feet)



Source: Adapted by Anthony H. Cordesman from EIA, Annual Energy Outlook, 1998, p. 59.

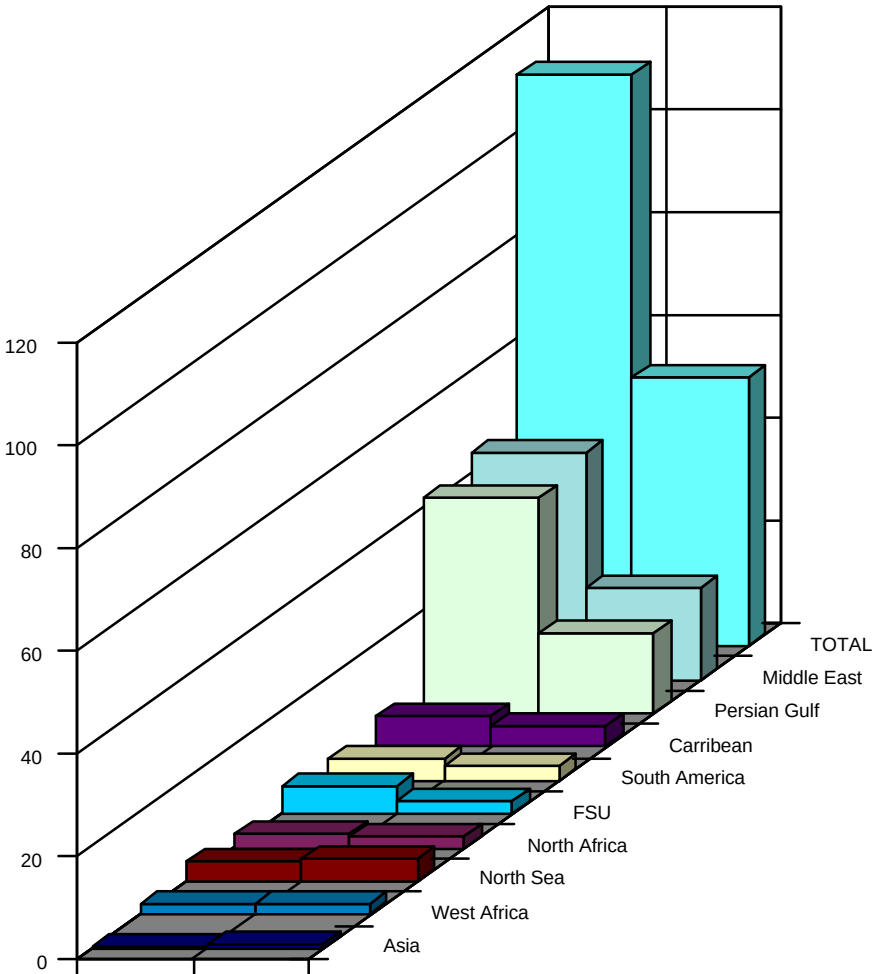
Uncertainties Affecting Key Suppliers and Exporters

Key Areas of Uncertainty in Global Supply

- **Global and regional economic growth and energy demand.**
- **Russian stability and ability to produce.**
- **Chinese ability to find new oil and gas reserves and sustain production. Search for alternative sources of energy.**
- **Algerian stability.**
- **Sanctions Affecting Iran, Iraq, and Libya.**
- **Creation of new energy transportation infrastructure: Pipelines, ports, tankers, etc.**
- **The impact of domestic energy demand on export capacity, particularly in the Middle East.**
- **Possible impact on China on US coal exports.**

World's Growing Dependence on the Gulf and Middle East: Projected Total Global Oil *EXPORTS* by Source in 1995 and 2020

(MMBD, EIA Reference Case)

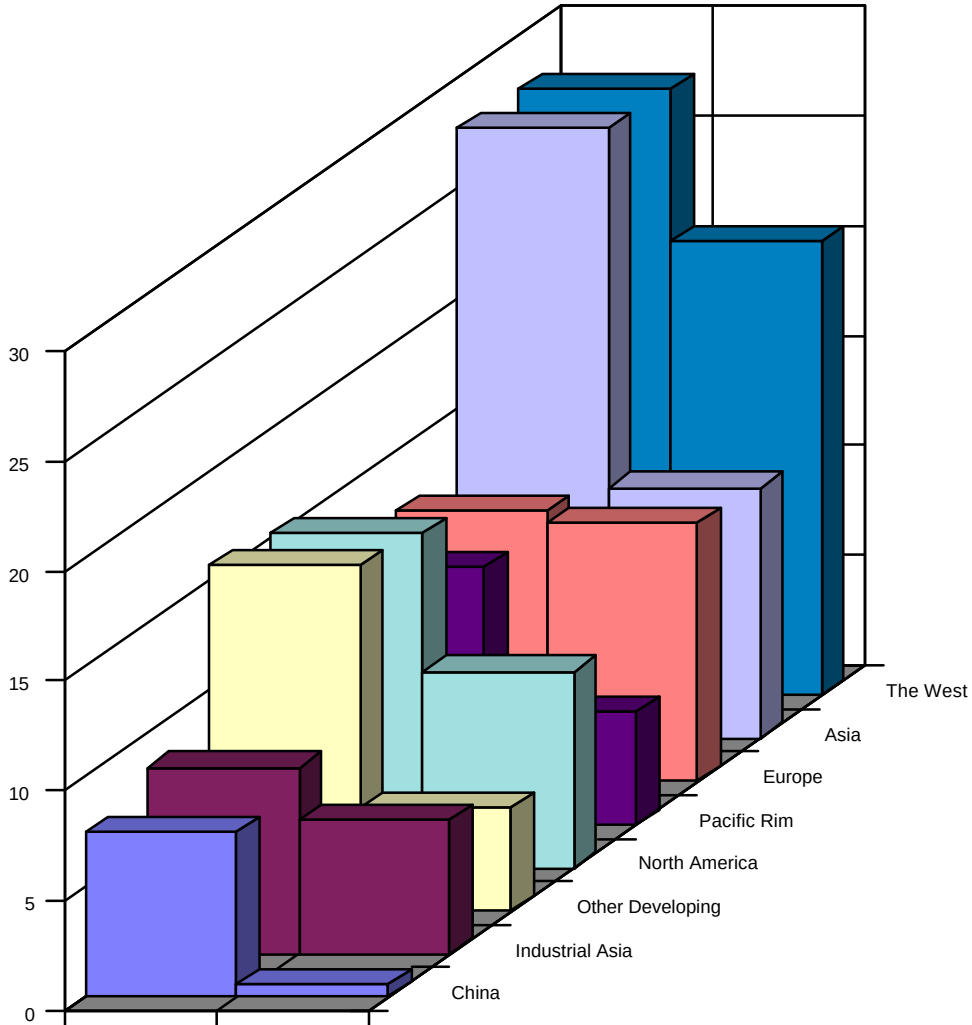


	2020	1995
Asia	0.3	0.7
West Africa	2.3	2.1
North Sea	4.1	4.6
North Africa	2.5	2.3
FSU	5.6	2.6
South America	4.3	2.6
Carribean	6	4.2
Persian Gulf	41.8	15.4
Middle East	44.3	17.7
TOTAL	111.2	52.2

Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, DOE/EIA-0484 (97), April 1997, p. 36.

World's Growing Dependence on the Gulf and Middle East: Projected Total Global Oil *IMPORTS* by Source in 1995 and 2020

(MMBD, EIA Reference Case)

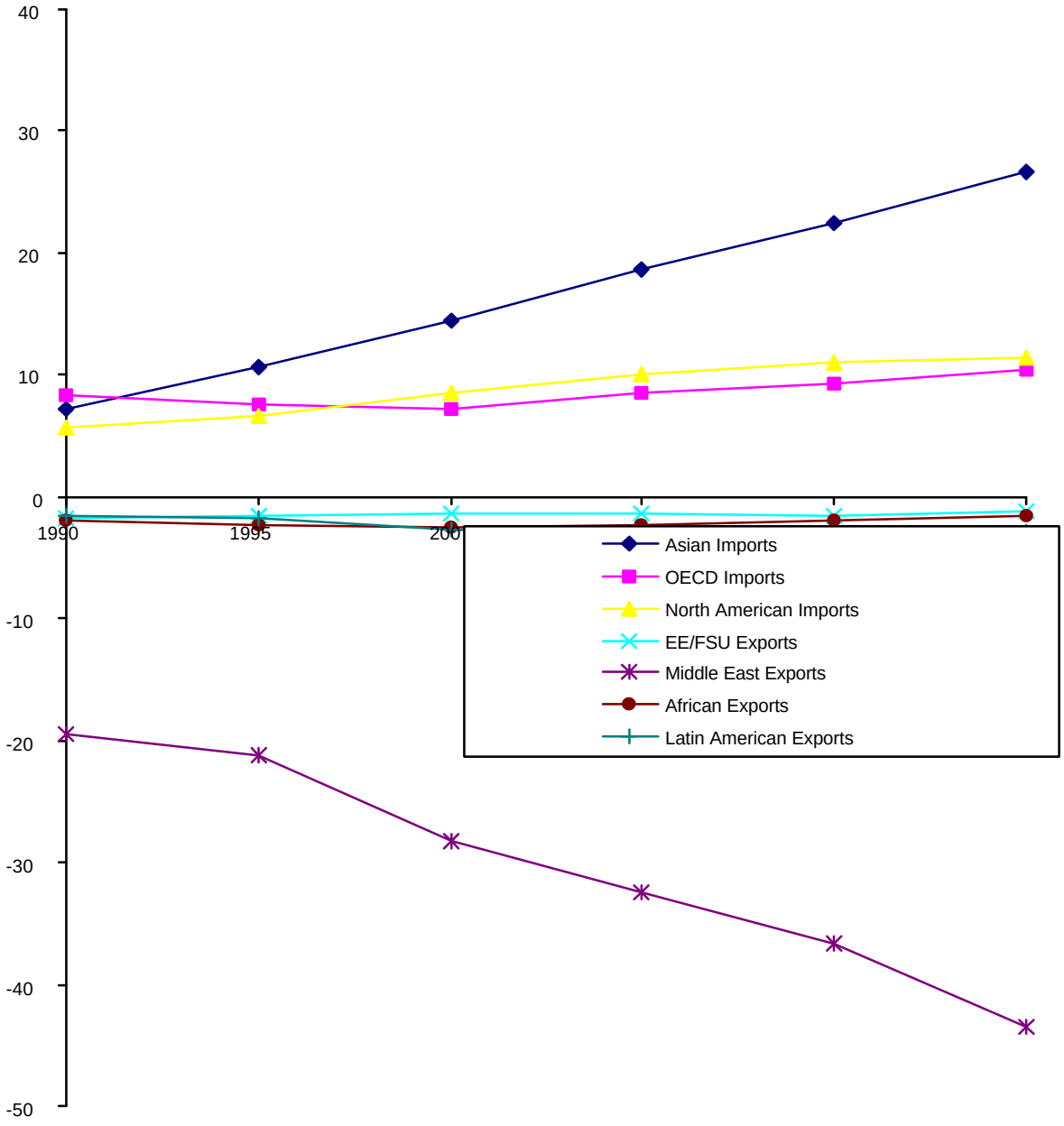


	2020	1995
China	7.5	0.6
Industrial Asia	8.5	6.1
Other Developing	15.7	4.7
North America	15.2	8.9
Pacific Rim	11.7	5.1
Europe	12.3	11.7
Asia	27.7	11.4
The West	27.5	20.6

Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, DOE/EIA-0484 (97), April 1997, p. 36.

Rising Asian Demand is Met by Rising Middle Eastern Production: Net Balance of Regional Imports and Exports: 1995-2015

(Millions of Barrels per Day, EIA Reference Case)

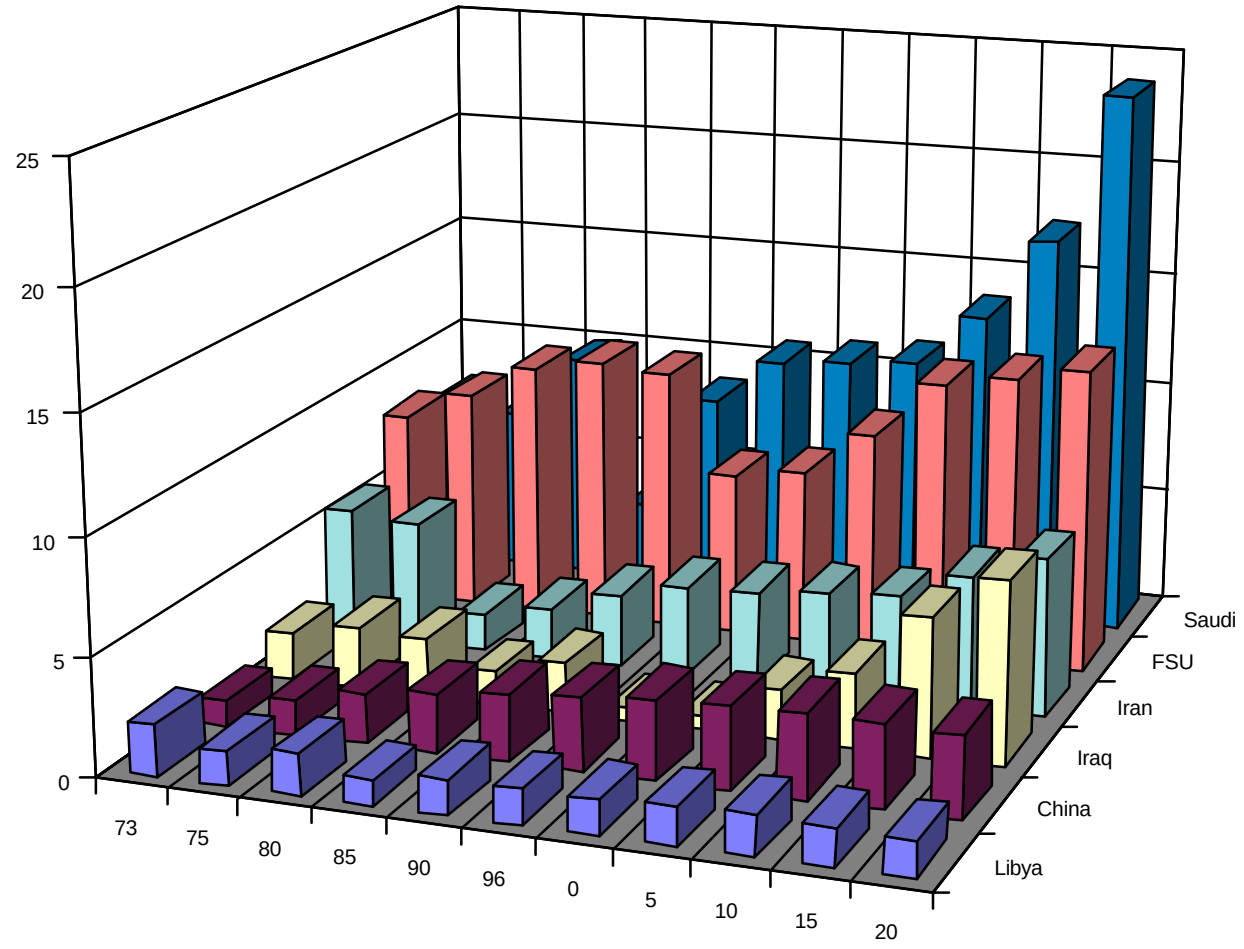


	1990	1995	2000	2005	2010	2015
Asian Imports	7.2	10.6	14.5	18.7	22.5	26.7
OECD Imports	8.3	7.5	7.2	8.5	9.3	10.5
North American Imports	5.7	6.6	8.5	10.1	11	11.4
EE/FSU Exports	-1.7	-1.5	-1.4	-1.3	-1.5	-1.2
Middle East Exports	-19.4	-21.3	-28.2	-32.5	-36.6	-43.6
African Exports	-1.9	-2.3	-2.5	-2.4	-2	-1.5
Latin American Exports	-1.6	-1.8	-2.7	-3.1	-3.2	-2.9

Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1996, pp. 116-122.

Large Amounts of Oil Production and Exports Are at Risk in Key Exporting Countries: 1995-2015

(EIA Reference Case Estimate in MMBD)

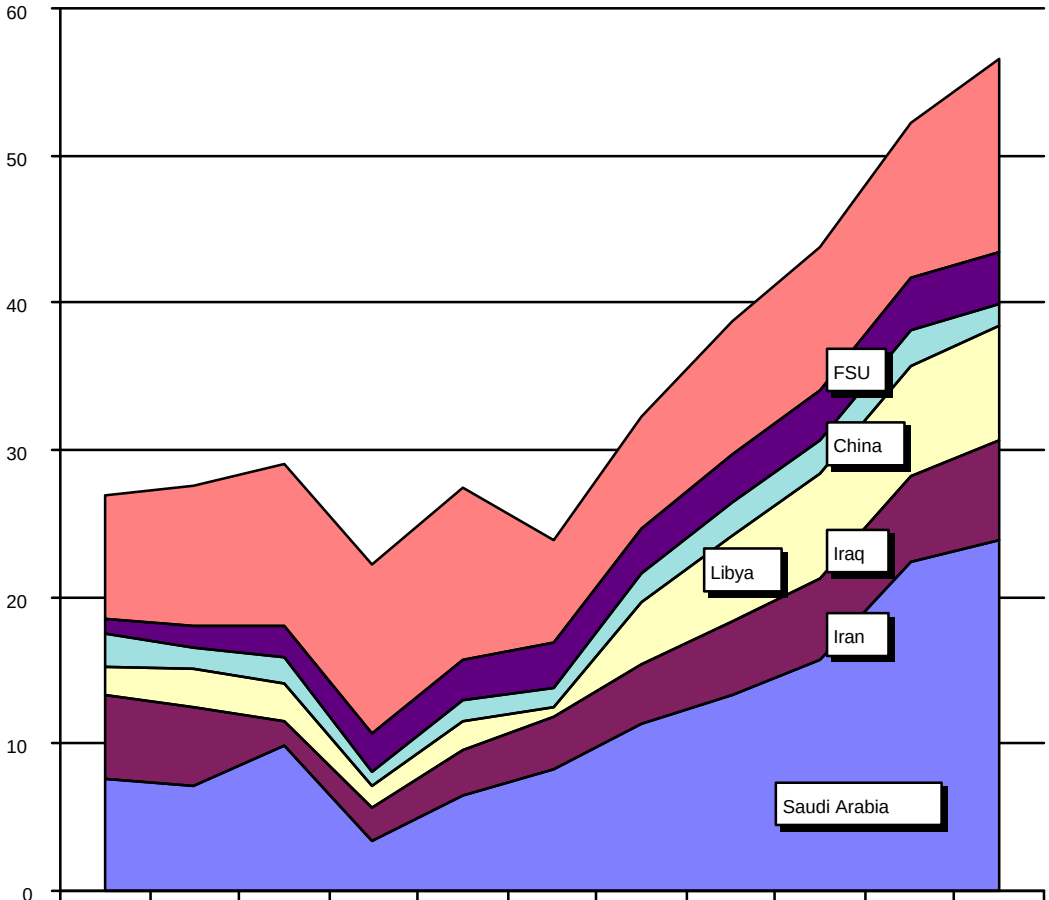


	73	75	80	85	90	96	0	5	10	15	20
Libya	2.175	1.48	1.787	1.059	1.5	1.5	1.5	1.6	1.7	1.6	1.5
China	1.09	1.49	2.122	3	3	3.1	3.4	3.5	3.6	3.6	3.5
Iraq	2.018	2.62	2.514	1.433	2.2	0.6	0.6	2.1	3.2	5.9	7.8
Iran	5.681	5.35	1.662	2.25	3.2	3.9	4	4.3	4.5	5.7	6.8
FSU	8.32	9.532	11.11	11.585	11	7.1	7.5	9.5	12.1	12.6	13.2
Saudi	7.596	7.075	9.9	3.388	8.6	10.6	10.9	11.2	13.5	17.2	23.8

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.

Cumulative Risk: Estimated Total Demand for Exports from Countries with Sensitive or High Risk Oil Production Capacity Affects 50% of World Supply

(EIA Reference Case Estimate in MMBD)

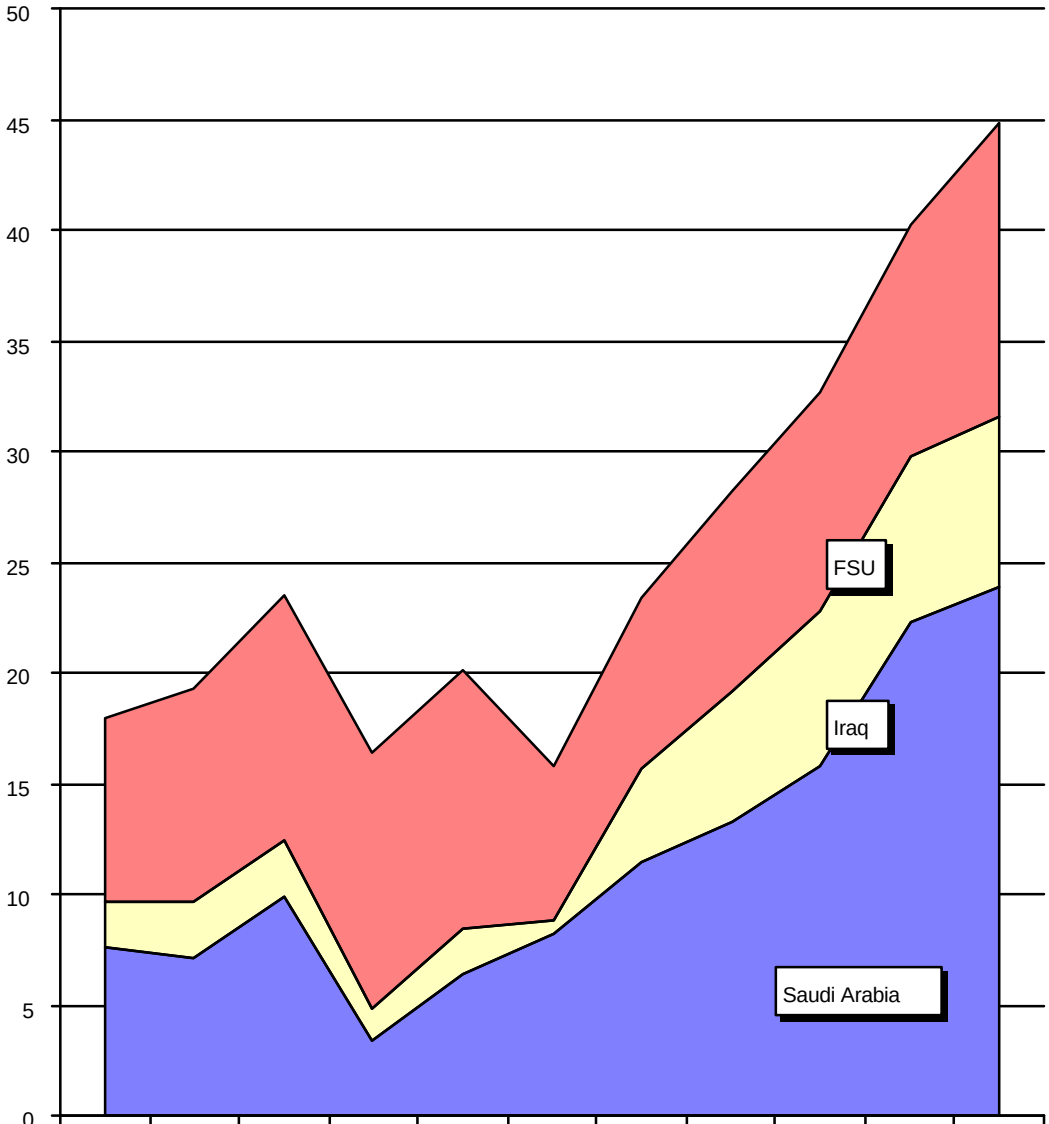


	1973	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
FSU	8.32	9.532	11.11	11.59	12	7	7.7	9.1	9.8	10.6	13.2
China	1.09	1.49	2.122	3	3	2.99	3.1	3.2	3.3	3.5	3.5
Libya	2.175	1.48	1.787	1.059	1.375	1.39	1.8	2.2	2.4	2.5	1.5
Iraq	2.018	2.62	2.514	1.433	2.04	0.56	4.3	5.8	7	7.4	7.8
Iran	5.681	5.35	1.662	2.25	3.088	3.643	4	5.1	5.5	5.9	6.8
Saudi Arabia	7.596	7.075	9.9	3.388	6.41	8.231	11.4	13.3	15.8	22.3	23.8

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.

The FSU, Saudi Arabia, and Iraq are the Three Most Critical Future Exporters

(EIA Reference Case Estimate in MMBD)



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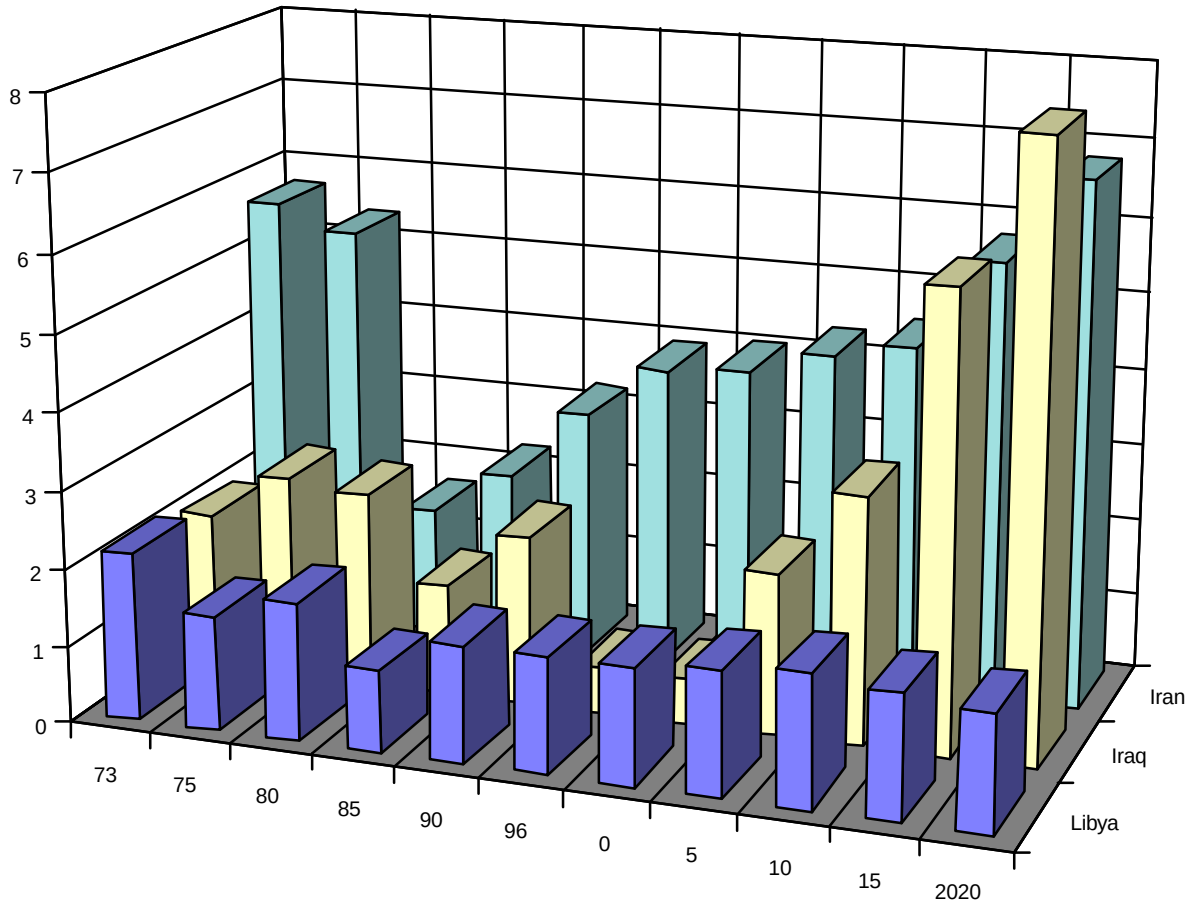
Today's "Rogues" Had Damn Well Better Be Tomorrow's Suppliers: 1995-2020

(EIA Reference Case Estimate in MMBD)



	73	75	80	85	90	96	0	5	10	15	2020
Libya	2.175	1.48	1.787	1.059	1.5	1.5	1.5	1.6	1.7	1.6	1.5
Iraq	2.018	2.62	2.514	1.433	2.2	0.6	0.6	2.1	3.2	5.9	7.8
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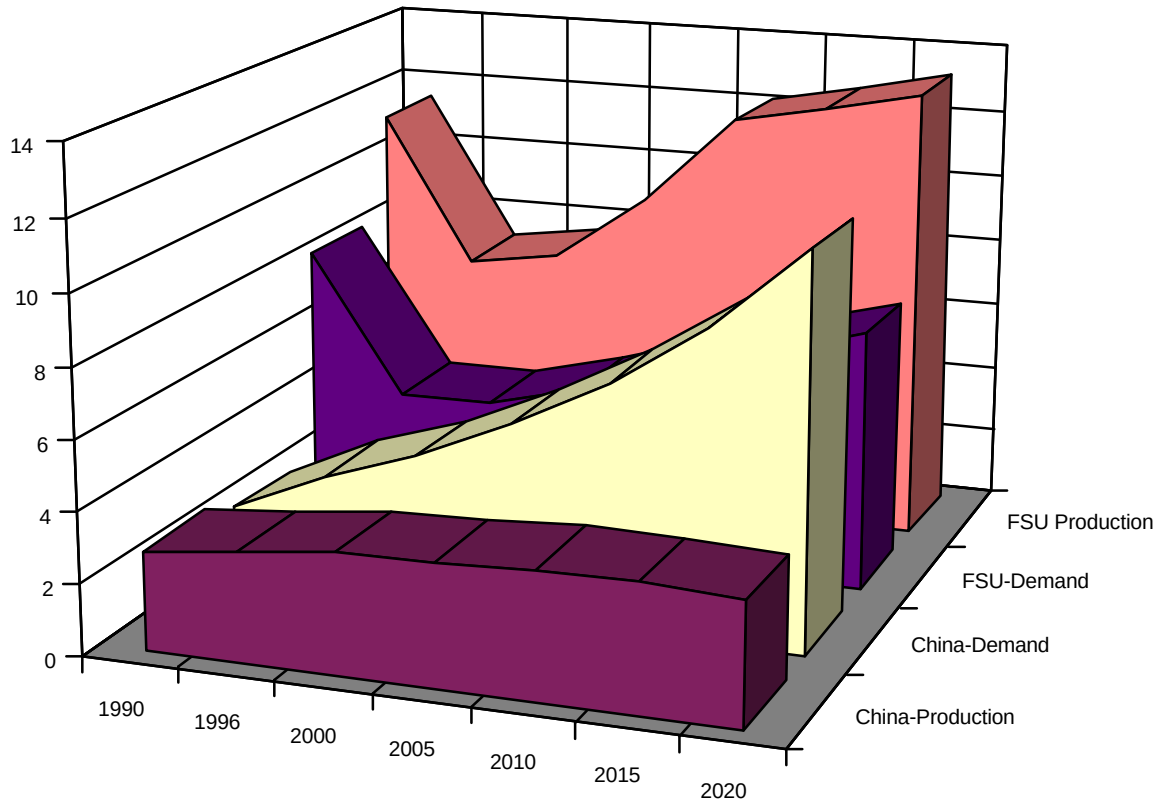
Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, DOE/EIA-0484 (97), April 1998, pp. 175, and EIA, Monthly Energy Review, April, 1997, pp. 130-131. Note that total world production is 69.7 MMBD in 1990, 73.0 MMBD in 1995, 81.4 MMBD in 2000, 90,5 MMBD in 2005, 98.1 MMBD in 2010, and 106.9 MMBD in 2015.

Pattern of Oil Exports Could Sharply if the FSU Does Not Meet Estimated Production Levels and China Cannot Exploit New Fields: Prices Rises Likely

(Estimated Demand vs. Production Capacity in MMBD, EIA Reference Case)

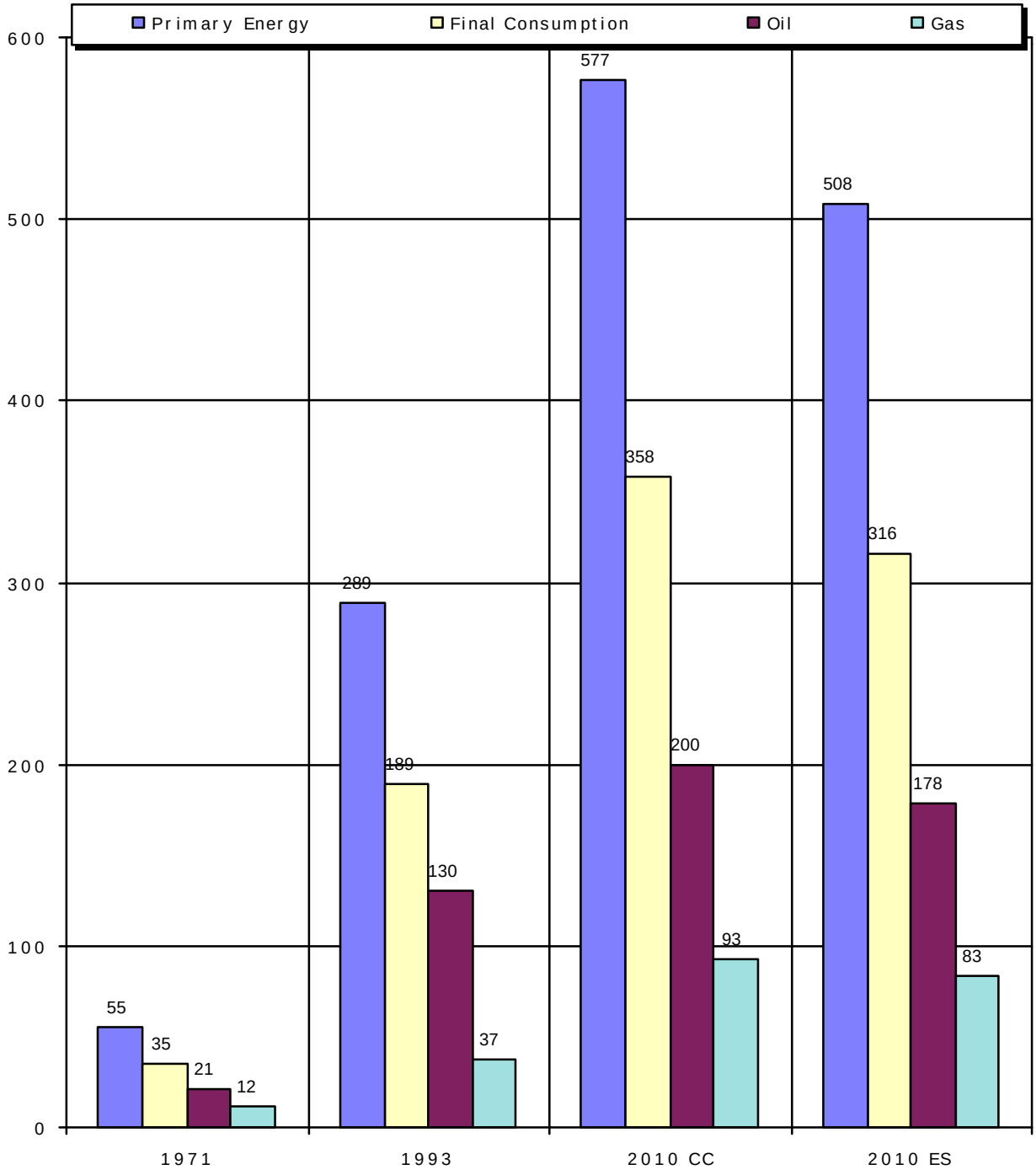


	1990	1996	2000	2005	2010	2015	2020
China-Production	2.8	3.1	3.4	3.5	3.6	3.6	3.5
China-Demand	2.3	3.5	4.4	5.6	7	8.8	11.2
FSU-Demand	8.4	4.4	4.4	5.1	5.9	6.7	7.5
FSU Production	11.4	7.1	7.5	9.5	12.1	12.6	13.2

Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, pp. 136, 175. Note that total world production is 69.7 MMBD in 1990, 73.0 MMBD in 1995, 81.4 MMBD in 2000, 90.4 MMBD in 2005, 98.1 MMBD in 2010, and 106.9 MMBD in 2015.

Domestic energy Demand Can Radically Change the Energy Available For Export: Middle Eastern Domestic Energy Demand As a Test Case

(IEA Estimate in MTOE)



CC = Capacity Constrained or maximum production ES = Energy Savings, or reduced energy use.
Source: Adapted by Anthony H. Cordesman from IEA, World Energy Outlook, 1996, pp. 153-158.

IEA/OECD Estimate of Middle Eastern Domestic Energy Demand

(IEA Estimate in MMBD)

Basic Energy Demand Trends

Category	1971	1993	2000	2010	
				Capacity Constraints	Energy Savings
Primary Energy Consumption (MTOE)	55	289	-	577	508
Final Consumption	35	189	-	358	316
Solids	0	1	-	2	2
Oil	21	130	-	200	178
Gas	12	37	-	93	83
Electricity & Heat	2	21	-	62	54
Energy Intensity (TOE/$1000)	-	0.7	-	0.8	0.7
Energy Per Capita (TOE)0.8	2.0	2.0	-	2.7	2.4
Fuel Shares in Primary Demand (%)					
Solids	1	2	2	2	-
Oil	70	64	56	50	-
Gas	29	34	39	46	-
Hydro & Other	1	1	2	2	-

Growth in Energy Primary Demand & Intensity: 1975-1993

	GDP	Primary Energy	Energy Intensity
Iran	0.4	5.9	5.4
Saudi Arabia	3.4	12.1	8.7
Other 11 Countries	1.0	7.0	5.9
Total Middle East	1.3	7.6	6.2

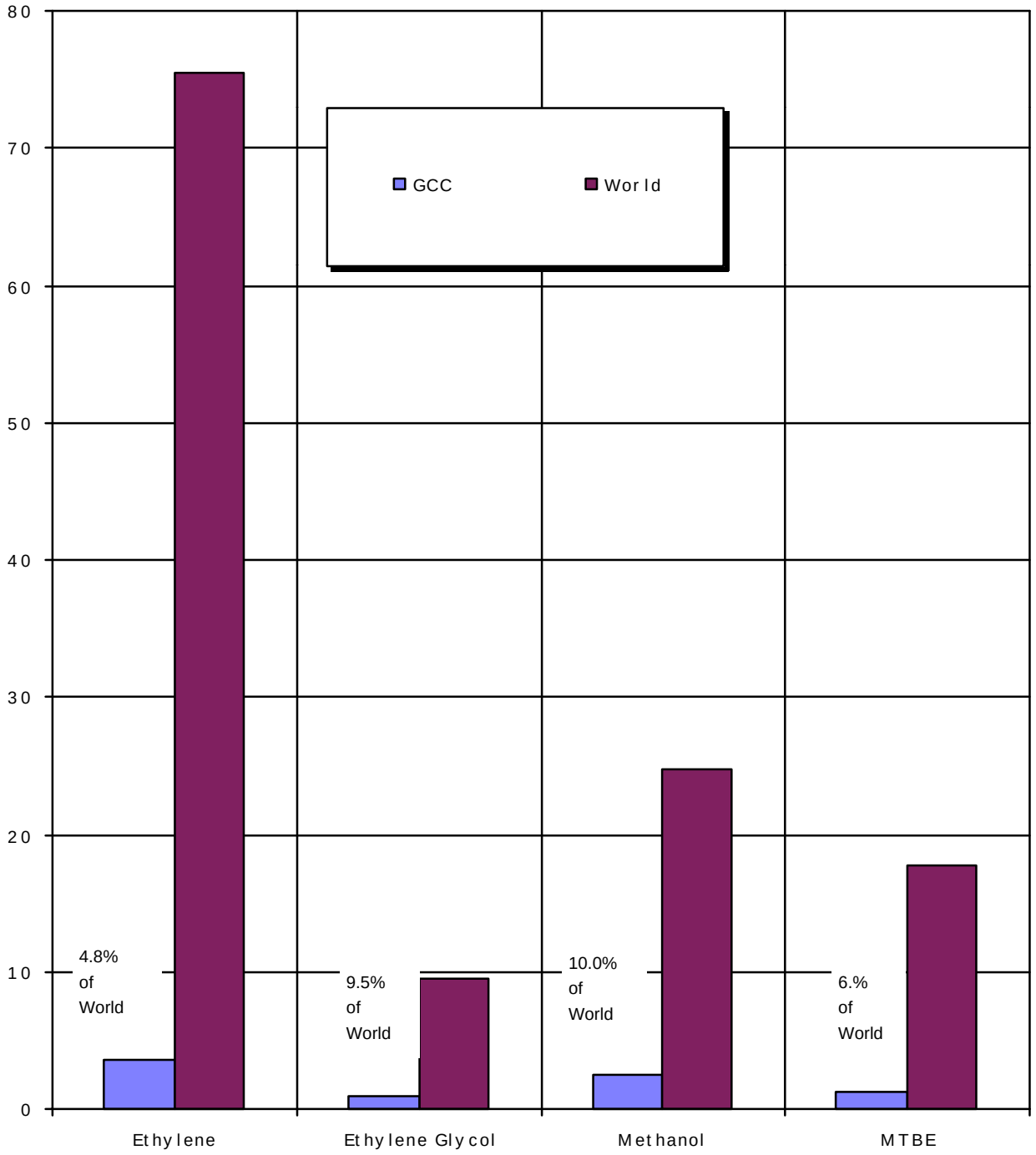
Final Energy Consumption Growth Trends

	1993-2000	2000-2010	1993-2010
Capacity Constraints	3.5	4.0	3.8
Energy Savings	2.9	3.2	3.1

Source: Adapted by Anthony H. Cordesman from IEA, World Energy Outlook, 1996, pp. 173-177.

Downstream Operations Can Also Have Major Geopolitical Impacts: Gulf Cooperation Council vs. World Petrochemical Design Capacities: 1993

(Thousand Tons)



Source: Adapted by Anthony H. Cordesman from IEA, World Energy Outlook, 1996, pp. 179-181.