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**Supply, Demand, Financing, and The
Future of Energy in the Middle East
and North Africa**

***DRAFT FOR COMMENT
AND REVIEW***

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V. SUPPLY, DEMAND, FINANCING, AND THE FUTURE OF ENERGY IN THE MIDDLE EAST AND NORTH AFRICA

The key to understanding the future of energy production and exports in the Middle East and North Africa is to accept the complexity of the issues involved and the fact that major uncertainties are unavoidable in making any projections of what will or will not happen at both the national and regional level. There is no easy way to separate short and long-term issues, or to separate geopolitical risks from energy issues, and impact of given issues differ sharply by nation.

The previous chapters have discussed estimates of future production and export trends based on market driven models, the various security risks affecting the MENA region, and the sources of internal instability that have a major impact. At the same time, it is clear that the following additional issues will have a long-term impact on MENA energy supply that will extend well beyond 2030:

- The future demand for oil and gas exports, future export prices, and the resulting flow of income into the region.
- The future economics of gas and LNG exports, and the impact of changes in gas liquids technology.
- The ability to fund the required investment to maintain and increase oil and gas production capacity, and the extent to which surplus of swing capacity will both moderate prices and ensure against sudden rises in oil and gas prices if a limited interruption should take place in Middle Eastern oil and gas exports.
- The future patterns of investment flows from inside and outside the region, and the region's willingness and ability to create a climate in which outside and private investment can meet the region's needs.
- The ability to create the improved mix of pipelines, ports, and other facilities necessary to ensure the secure and efficient delivery of large amounts of energy.

Future Demand for Oil and Gas Exports, Future Export Prices, and the Resulting Flow of Income Into the Region

Many of the short-term problems in predicting energy demand and regional energy production and exports have been discussed earlier. It is clear from the history of past trends that major shifts can take place that are not predictable even a year in advance, and that national medium and long-term energy development plans are often in considerable disarray. War, crises, weather, global economic conditions, and changes in export capabilities all combined to produce

major changes in the level of demand and supply for MENA oil exports, and sometimes can do so in matter of days. It is scarcely surprising, therefore, that uncertainty grows with time.

This is reflected in the history of various forecasts by the Department of Energy, the International Energy Agency, OPEC, and other sources. They have changed along with forecast of global economic development and changes in forecasts of what MENA states plan and can do to develop their energy resources and export capabilities,. For example, conventional wisdom called for sharp medium and long-term increases in Middle Eastern oil and gas exports, and a steady increase in oil and gas prices and export revenues, until the Asian crisis began in the fall of 1997. This conventional wisdom was based on the assumption of high levels of sustained economic growth, driven largely by Asia.

The 1998 estimates of the Energy Information Agency (EIA) of the U.S. Department of Energy (DOE) -- which were developed before the "oil crash" of late 1997, indicated that Asia would import about 24.2 million barrels of oil a day from the entire Middle East by 2020, and 23.9 million barrels a day from the Gulf. Asia would import about 54 % of total projected Middle Eastern exports in 2020, which would reach 44.5 million barrels a day. Asia would consume 57% of total Gulf exports of 41.8 million barrels a day. This would have meant mean an increase from 8.7 million barrels a day in 1995 to 15.1 million barrels a day, or 74%. The IEA and OPEC had somewhat different numbers, but projected similar trends.

To put these estimates in broader perspective, the MENA region provided 47% of all world exports in 1996, and the Gulf provided 41%. According to the 1998 EIA projections, Asian demand was to be part of a global increase in demand that would lead to massive overall increases in Middle Eastern and Gulf oil production capacity. The EIA estimated that Gulf production would increase from 18.7 million barrels per day in 1990, and 20.9 million barrels per day in 1996, to 21.6 (10.6-11.8) million barrels per day in 2000, 24.4 (10.6-14.1) million barrels per day in 2005, 28.6 (10.6-17.2) million barrels per day in 2010, 38.4 (13.5-24.1) million barrels per day in 2015, and 49.8 (18.2-33.7) million barrels per day in 2020. This was a potential increase in the role of Gulf production from 28% of all world production in 1996 to 42% in 2020.

Only a year later, the economic recession in Asia, and the “oil crash,” led to significantly lower estimates. The EIA estimated in 1999 that Gulf production would increase from 22.8 million barrels per day in 1997, to 23.9 (23.5-24.2) million barrels per day in 2000, 28.1 (25.8-30.2) million barrels per day in 2005, 29.6 (27.1-35.4) million barrels per day in 2010, 34.9 (28.6-42.8) million barrels per day in 2015, and 42.2 (35.3-52.3) million barrels per day in 2020. This projection would increase the role of Gulf production from 29.6% of world production to 37.6.

At the time the EIA made the 1999 forecast, however, many experts thought that Asian economic recovery, and that of other developing regions, would occur much more slowly than was the case during 1999. Furthermore, many experts felt that economic reforms would go much deeper and do more to prevent future economic problems. The result was a recovery that was both quicker and less stable than most experts predicted.

Forecasts can differ sharply, even in more “normal” periods. Chart V.1 compares recent EIA projections of Gulf oil production capacity for the year 2020 that were made during 1998-2003. The estimates differ sharply. The 1998 estimate is high because it is based work actually done during 1997, and reflects the impact of the high growth estimates of that year. The 1999 estimate is low reflecting the much more negative estimates made during the economic “melt down’ in Asia in 1998. The 2000-2001 estimates reflect the relatively rapid global economic recovery. The 2002 estimate is high because of the optimistic forecasts made during the boom year of 2001, while the 2003 estimate is low because it reflects the impact of the end of the IT boom in the US and a global recession in many other areas. The end result is a nearly 50% difference between the minimum and maximum estimated total for Gulf production capacity over a five year period.

It is interesting to note that all of these forecasts failed to anticipate non-market forces like the actual impact of UN sanctions on Iraq in all of the years before 2003, and assumed Iraq’s oil development during 2000-2020 would be driven purely by market forces. The EIA estimates of Saudi production also varied so sharply because the modelers used Saudi Arabia to provide the margin of additional production that their models indicated the market required on a global level. Saudi Arabia became the de facto “swing state” of world petroleum capacity. This kind of

volatility, however, is typical of the EIA made by other sources such as the IEA and OPEC. It is unavoidable unless the modeler assumes it is safe to ignore actual current global economic trends and make an independent guess at the future.

Chart V.2 provides a historical comparison of estimates of Gulf exports by destination. It shows that similar uncertainties inevitably occur in the estimates of export flows, although the variation in total flows is somewhat less dramatic. It is important to note that the variations in the amount of Gulf exports to each region are generally greater than the variations in total demand.

They also interact with more than general market forces. The estimates made about the availability of exports from other regions in any given year, plus assumptions made about the trend in regional economic growth and importer demand, sharply affect where the model sends Gulf exports and the estimate of how much is involved. In short, basic uncertainties about the global market in terms of both supply and demand produce steadily greater uncertainties in any estimate of both the source and destination of exports as time progresses.

The EIA forecasts do take such uncertainty explicitly into account, and examine high and low oil prices, cases as well as the reference case. As has been touched upon earlier, these cases examine worlds in which high prices lead most producers to limit the rate at which they increase oil production and oil capacity, and another world in which low oil prices produce lower oil revenues and push oil exporters to increase capacity and exports. One can argue the economic rationale for each case.

These cases have a major impact on the estimate over time. This is shown in Chart V.3, where total MENA production capacity in 2025 is 44.9 MMBD in the high oil price case and 63.2 MMBD in the low oil price case -- a more than 40% difference. Chart V.4 traces these differences over time for estimated actual production in the Gulf. It is clear that the range of uncertainty grows with time -- this time the highest estimate for 2025 is 62% larger than the lowest.

It is not possible to use the results published for models to directly compare estimates for the Gulf or MENA region. Chart V.5, however, compares the estimates of total OPEC

production made in five major sources. Chart V.6 provides a similar comparison for future oil prices. The highest price for 2025 is 73% higher than the lowest,

The range of different results does not mean there is something wrong with any given forecast or models, they reflect legitimate uncertainty. If currently modeling has any major limit, it may lie in the fact that modeling should also examine a scenario based on producer/exporter plans and capabilities rather than simply demand-driven cases. The reality is that modelers and models can illustrate rational futures but cannot possibly predict what actually happens. Furthermore, the differences between estimates shown in Charts V.1 to V.6 reflect several key factors, not easily modeled, but which must be considered in evaluating the impact of different future levels of MENA energy supply:

- Producer/exporters cannot predict the demand market any better than importer/users can predict supply. This tends to lead to cautious investment in production and export facilities when the global economy is weak and more investment when it is strong. However, many producers need to maximize energy export revenues in times of low prices and invest in increased capacity without paying close attention to the economic forecasts made at the time.
- MENA energy production and exports are not simply volatile in the short run, they are volatile in the long run. National decision makers must constantly revise their energy plans to take account of changing conditions and forecasts. This made it extremely difficult to predict just how important the failure of any one exporter in increase capacity will be, particularly because other may increase capacity in response to the same information and conditions.
- At the same time, the demand market must also adapt to long-term as well as short-term volatility. It can do this in a number of ways, and with steadily lower cost and greater flexibility over time. For example, the demand side can increase energy efficiency, shift to less energy intensive activities, use different forms of energy, and/or pay more and raise prices.
- Many oil companies challenge the basic validity of market driven models on the basis that MENA countries and other exporters cannot or will not pay for the level of export capacity projected in demand-driven models because they cannot afford to spend the capital required in anticipation of possible need, and will wait on demand to rise and then invest only if demand shows that the resulting increase in revenues will justify the investment.

These are not minor issues when one considers the level of global dependence on MENA oil, the impact of war or economic conditions on energy development plans, and the impact of future energy interruptions. It is easy to establish the overall importance of the MENA region, but almost impossible to then make meaningful detailed estimates of how importance given developments could be in the future. It is clear that Saudi Arabia remains the world's most important energy exporter, but not whether Saudi success or failure in meeting any given future

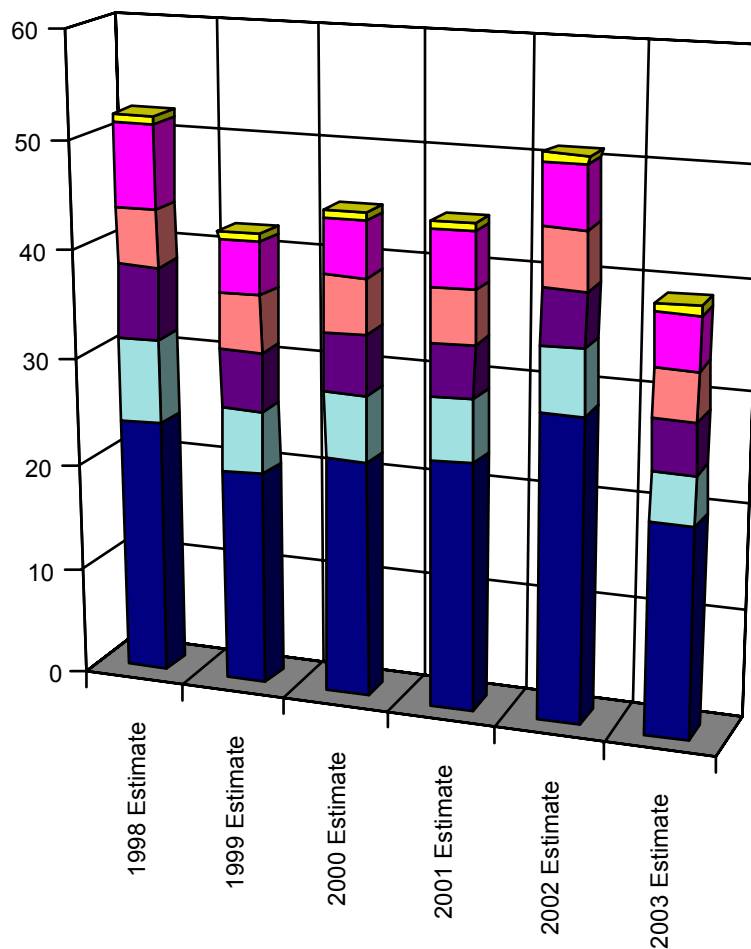
target for production and export capacity will be critical. History has already shown that a major exporter like Iraq can off-line for an extended period and the market soon adapts.

As has been explained in Chapter II, the modeling of energy interruptions also shows that most credible interruptions are likely to be limited in scope. They would have an impact on global importer economic growth, but not a critical one. Most low level interruptions would not produce effects that are more serious than the swings produced by market forces. Interruptions are only more critical than the impact of market forces if the interruption is so massive and/or prolonged that it could only result from a major war involving key exports or some political crisis that produced a regional oil embargo.

In addition, the history of the market shows that the short-term economic interests of importers may not be their long-term interests. Interruptions and market swings may drive importers to take actions that reduce both their dependence on imports and vulnerability to oil interruptions. Past oil interruptions and supply and price volatility have reduced importer dependence on MENA oil, made them learn how to adapt to sudden changes in supply and price, and forced them to diversify their sources of energy and improve conservation. Models assume that the world works best when goods are provided in ways that establish a reliable and steady state equilibrium between supply and demand. The real world does not come close to functioning in this manner. It is far more adaptable and secure when goods are provided in ways that *do not* establish a reliable and steady state equilibrium between supply and demand.

Chart V.1

Comparative EIA Reference Case Estimates of Gulf Oil Production Capacity by 2020
(EIA Reference Case in MMBD)

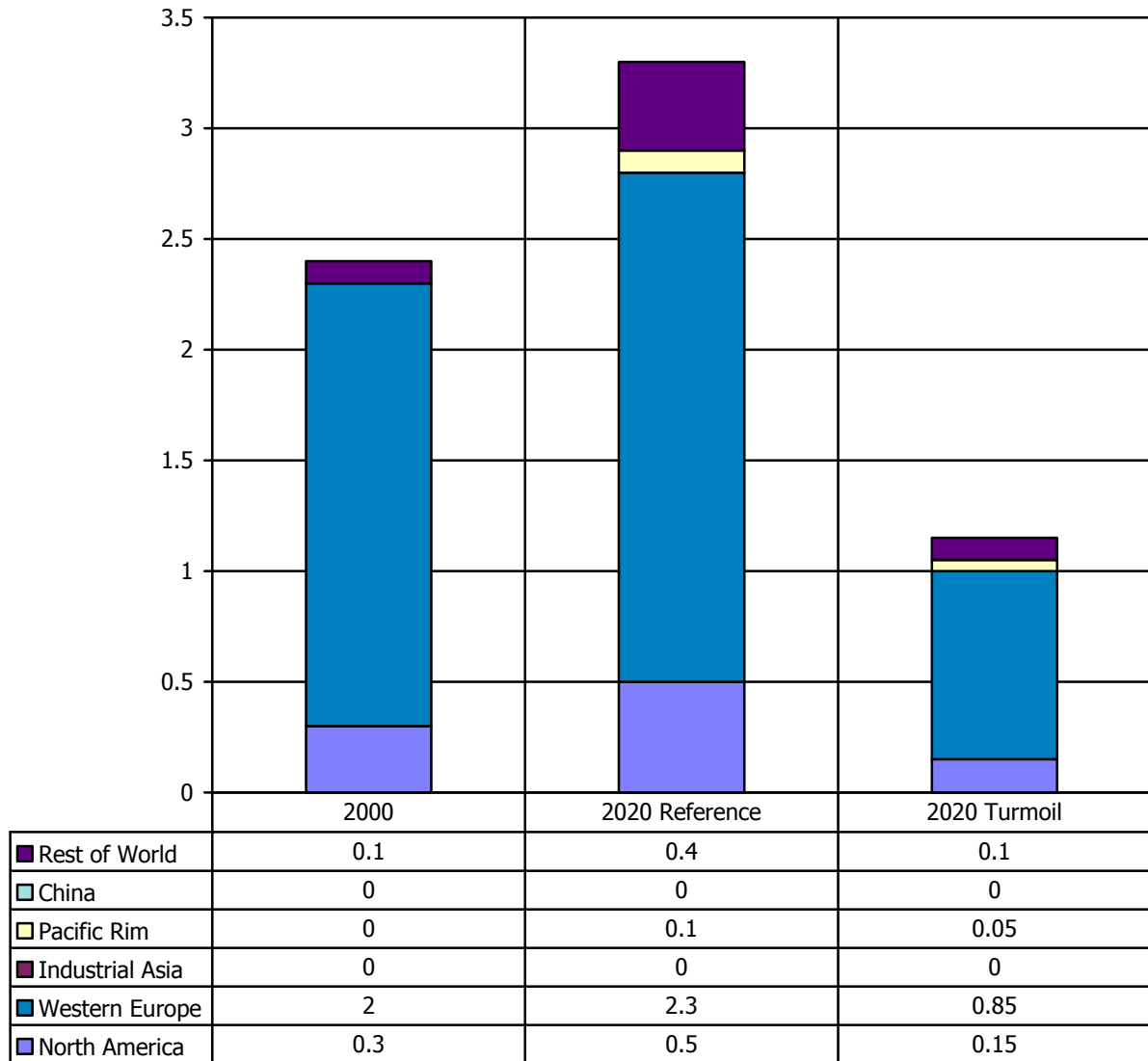


	1998 Estimate	1999 Estimate	2000 Estimate	2001 Estimate	2002 Estimate	2003 Estimate
■ Qatar	0.7	0.7	0.7	0.7	0.8	0.8
■ UAE	7.8	4.9	5.1	5.1	5.6	4.8
■ Kuwait	5.2	5.2	5.2	5	5.3	4.5
■ Iran	6.8	5.5	5.5	4.8	5.1	4.7
■ Iraq	7.8	5.9	6.2	5.8	6	4.6
■ Saudi	23.8	20	22.1	23.1	28.3	19.5

Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, 1999, 2000, 2001, 2002, and 2003 editions.

Chart V.2

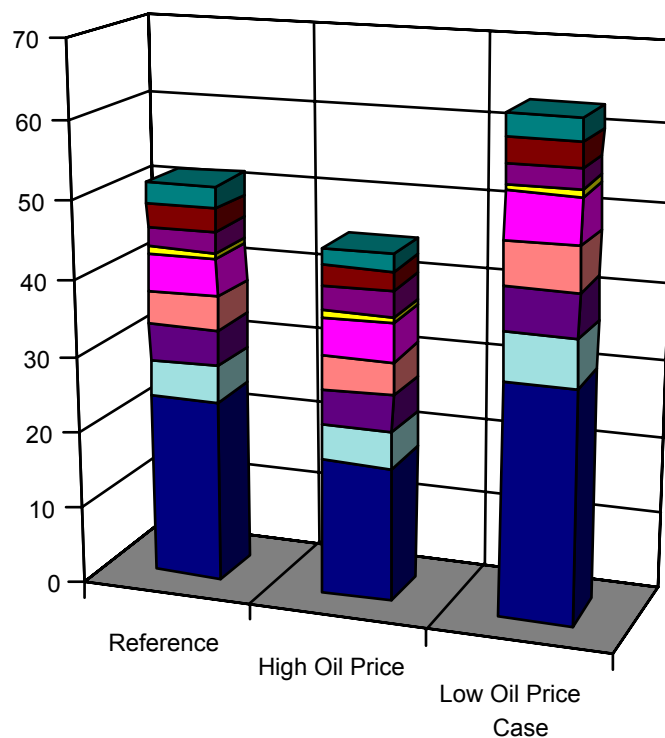
Comparative Estimates of Gulf Oil Exports in 2020
(In MMBD)



Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 1998, 199, 2000, and 2001 editions.

Chart V.3

Comparative EIA Estimates of MENA Oil Production Capacity in 2020 Under Different Oil Price and Economic Conditions
(EIA Reference Case in MMBD)

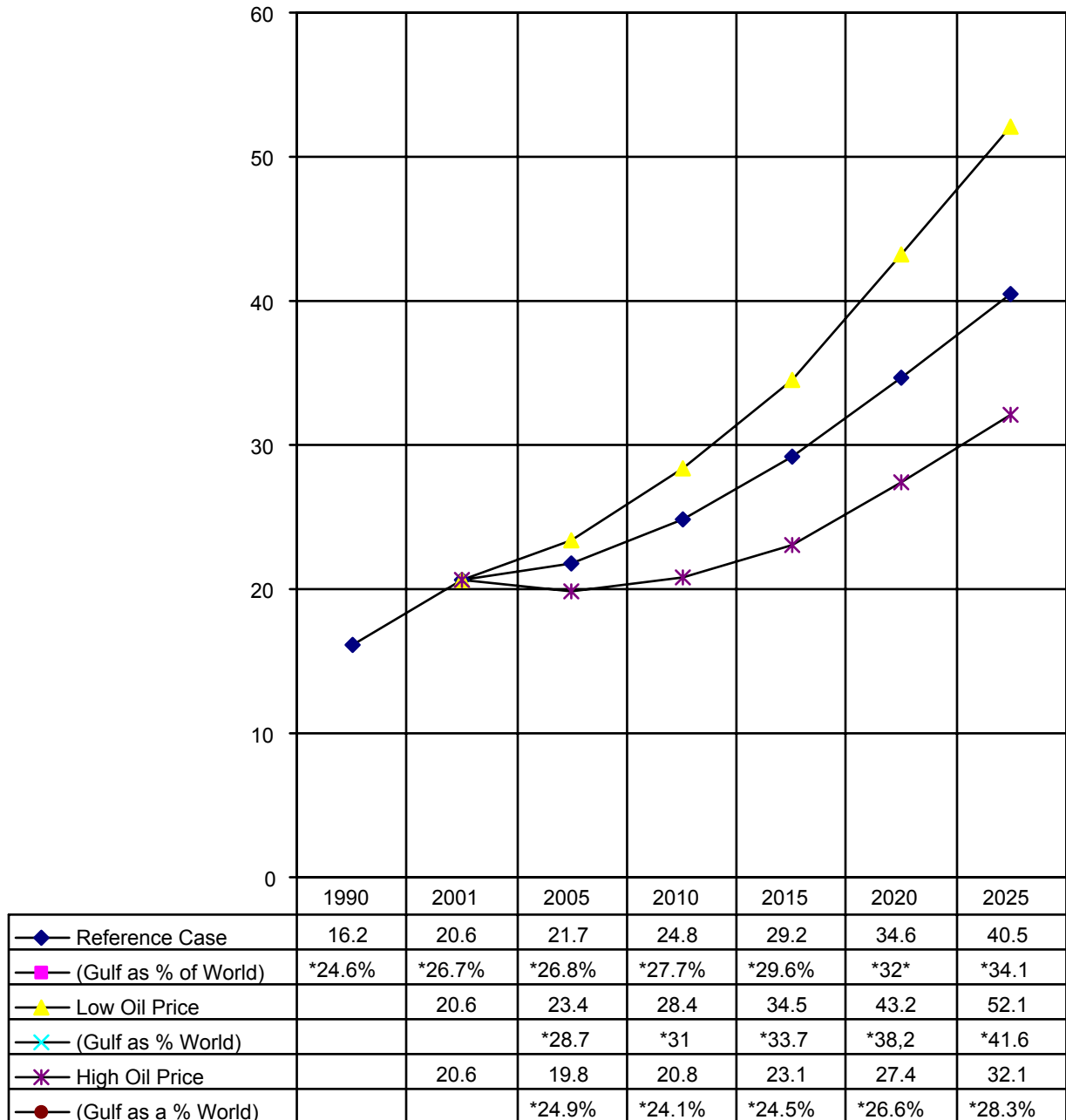


	Reference	High Oil Price	Low Oil Price Case
Algeria	2.8	2.2	3
Libya	2.9	2.4	3.1
Other ME	2.7	3.3	2.5
Sub-Total	*8.4	*7.9	*8.7
Qatar	0.8	0.8	0.8
UAE	4.8	4.9	5.9
Kuwait	4.5	4.3	5.7
Iran	4.7	4.6	5.7
Iraq	4.6	4.8	6.1
Saudi	23.8	17.6	30.3
Total Gulf	*45.2	*37	*54.5
Total	*53.6	*44.9	*63.2

Source: Adapted by Anthony H. Cordesman from EIA, *International Energy Outlook, 2003*, DOE/EIA-0484 (03), April 1998, pp. 239.

Chart V.4

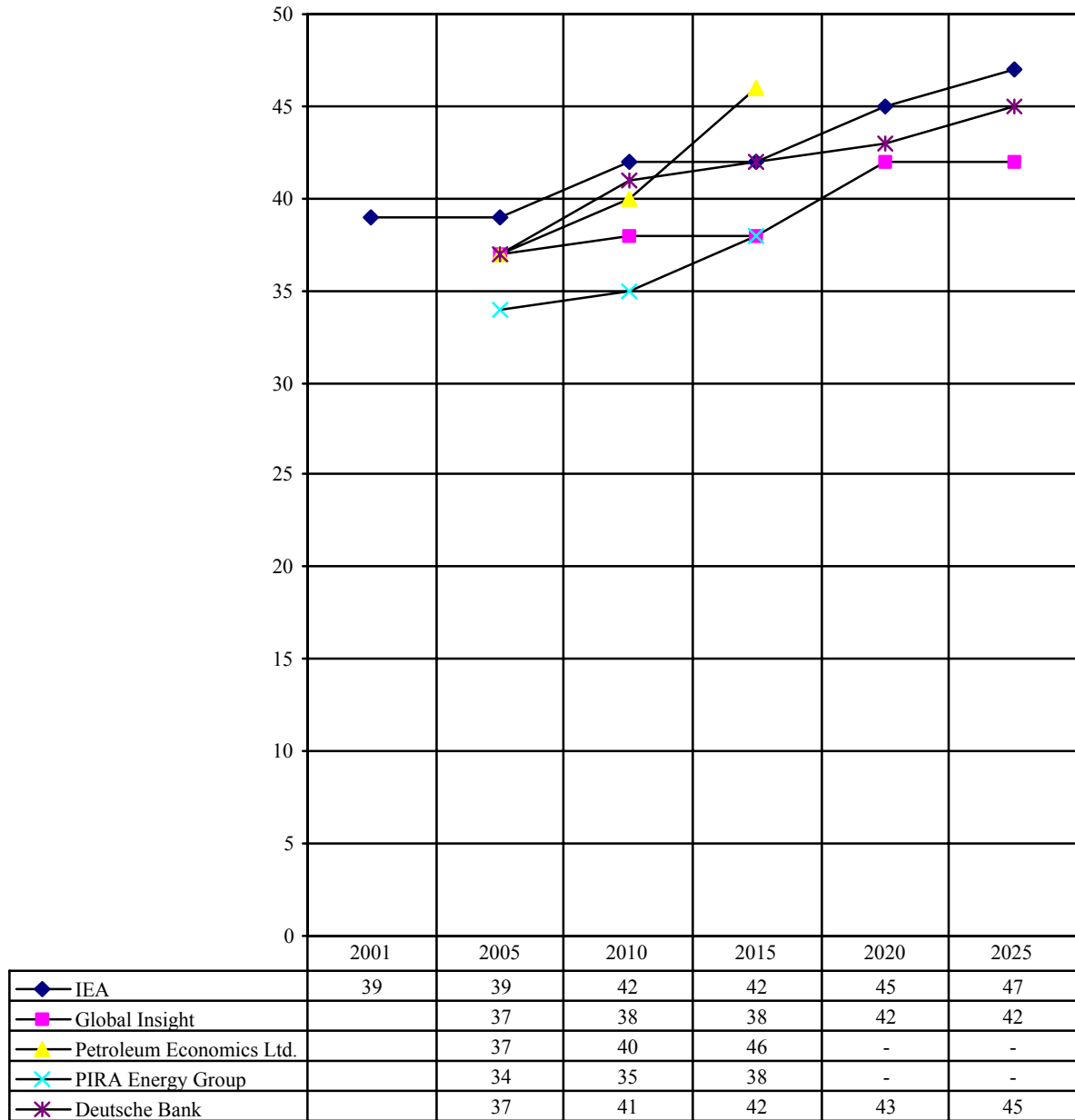
Comparative EIA Estimates of Actual Persian Gulf Oil Production Under Different Oil Price and Economic Conditions
(in MMBD)



Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 2003, DOE/EIA-0484 (03), June 2003, pp. 239.

Chart V.5

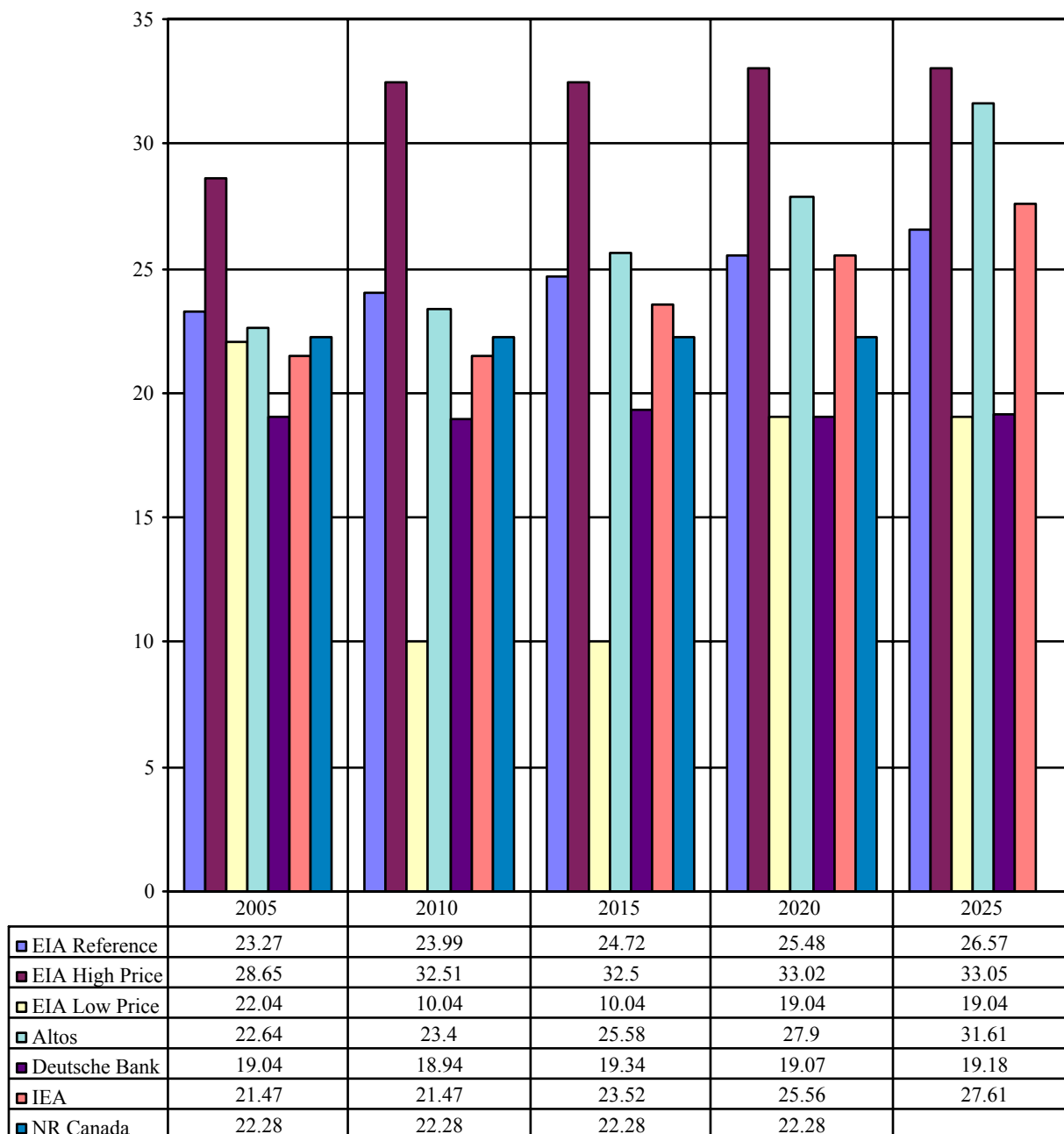
Comparative Estimates of OPEC Oil Production By Source
(in MMBD)



Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 2003, DOE/EIA-0484 (03), June 2003, pp. 45

Chart V.6

Comparative Estimates of World Oil Prices
(In 2001 Dollars Per Barrel)



Source: Adapted by Anthony H. Cordesman from EIA, International Energy Outlook, 2003, DOE/EIA-0484 (03), June 2003, p. 43.

The Impact of a Prolonged Period of Low Oil and Gas Revenues on Regional Stability

As has been discussed in Chapter II, there is no credible way to estimate the further uncertainties that could be caused by war or internal unrest other than to consider a few worst case scenarios like a new MENA oil embargo, a closing of the Strait of Hormuz, the loss of Saudi production or a Saudi failure to increase oil production capacity, and a sustained loss of exports from one of the other “big five” MENA exporters.

Even these cases can vary so much in date, intensity, and duration that they can do little more than illustrate the obvious: limit fluctuations in supply are not critical, and possible even desirable. Large-scale interruptions or losses of exports, particularly sudden ones, are critical and very undesirable. The problem is that there is no way to anticipate which kind of case will actually occur in the future, and meaningful modeling must wait on reality to establish suitable parameters and priorities.

A Slow Energy Development Scenario

There is another set of contingencies, however, that could have a major impact on MENA export capability over time. Most MENA exporters have so far been able to either fund the development of their own energy facilities, or to obtain outside capital for well-planned projects if they have not been at war or under sanctions. The four MENA nations that have been most affected by war or sanctions – Algeria, Iran, Iraq, and Libya -- have all managed to maintain a reasonable level of exports, and carry out enough development to sustain their exports – although Iraq has faced periods of low or no exports and production.

Chapter III, however, has shown that capital will become harder and hard to generate from within most MENA economies during the years to come, and that sustained periods of low production and/or oil revenues could have a serious cumulative impact on regional stability. Virtually all of the major oil producers already have serious short-term budget deficits or financing problems. All face serious future demographic pressures. All must make massive investments in greatly expanded infrastructure and social (entitlements) programs if they are to meet popular expectations and maintain internal stability. They must also invest in major job creation programs and the diversification of their economies.

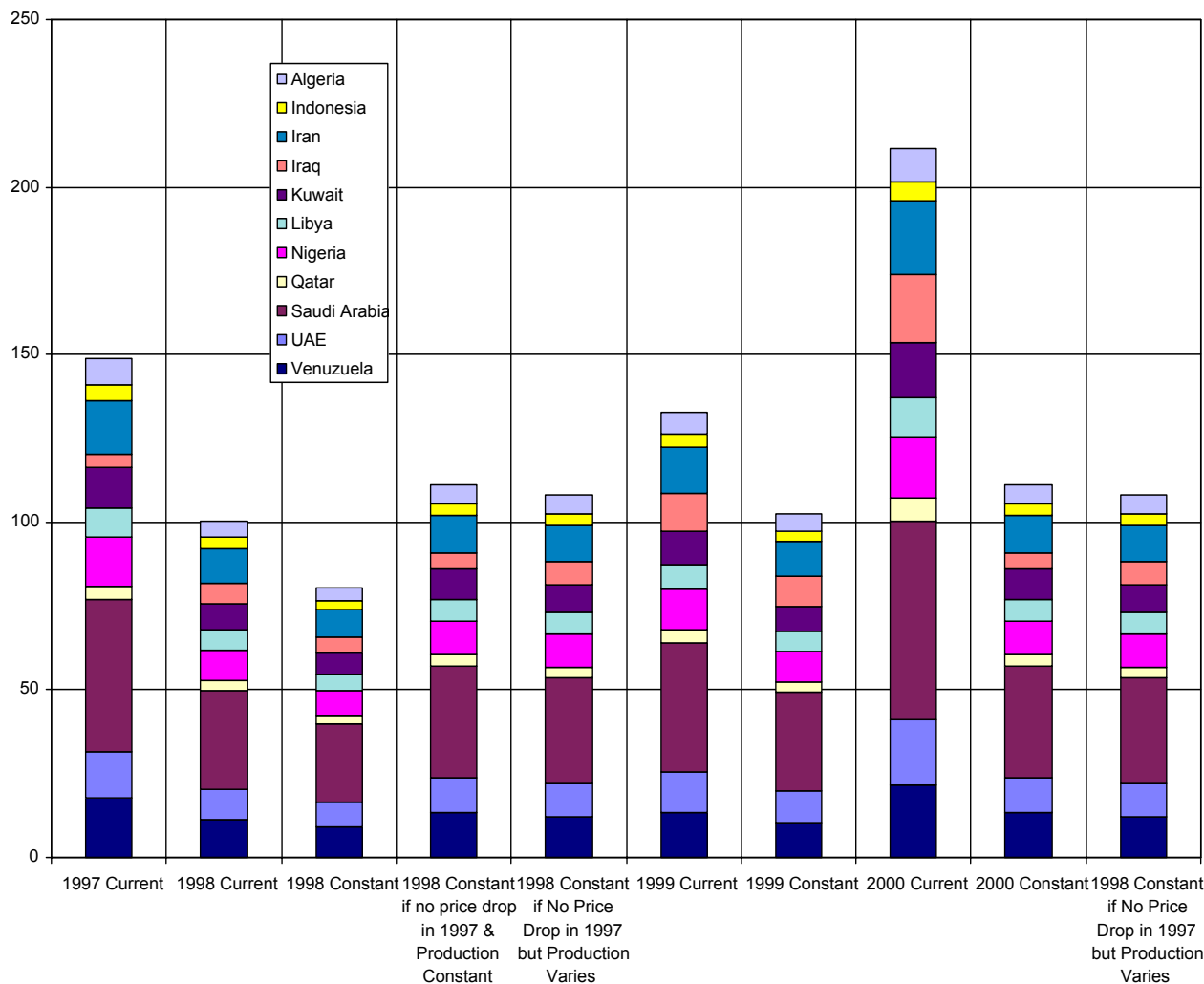
Three MENA oil exporters are likely to have a combination of high oil revenues and small populations that means they will be able to obtain enough oil and gas export revenues so that they can fund both energy investment and all of their other expenditures indefinitely into the future. These countries include Kuwait, Qatar, and the UAE – although even in these cases over-dependence on foreign labor and a lack of job opportunities already present problems. In every other case, MENA energy exporters face very serious problems, and some – such as Algeria, Bahrain, Egypt, Iran, Iraq, and Yemen – are already under serious stress. Oman and Saudi Arabia are scarcely far behind.

Chart V.7 provides a historical case study that illustrates just how much oil revenues can swing in a real world contingency, and how much they can impact on a region where many countries both draw 80% or more of their government revenues from energy export earnings and finance much of their economy through such revenues. During the period shown in Chart V.7, Algeria, Bahrain, Egypt, Iran, Iraq, Libya, Oman, Saudi Arabia, Syria, and the eastern Emirates of the UAE all came under severe economic pressure. All cut back or delayed major energy projects and some, like Saudi Arabia, had major cash flow and budget problems in spite of Saudi budget cuts. It also became clear during the crash in oil prices in 1997-1999 that even Abu Dhabi, Dubai, Kuwait, and Qatar made serious adjustments in their budgets when oil revenues were low.

The pressures to follow a similar path in any period of low or moderate oil revenues will grow steadily for at least a decade even if these countries began to carry out successful economic reform. They will grow indefinitely if they do not. Moreover, low oil revenues mean less spillover of revenues into the economies of non-oil exporting Middle Eastern states, less aid, and fewer payments from foreign workers. Their impact will go beyond the borders of the MENA oil exporting states and have a broader impact on regional stability.

Chart V.7

EIA Estimate of OPEC Earnings in 1998 by Major Country Under Different Price Assumptions in “Oil Crash” Did Not Occur
(In \$US 1990 Constant Billions)



Venezuela	17.7	11.1	8.9	13.2	12	13.6	10.5	21.8	13.2	12
UAE	13.7	9.3	7.5	10.4	10	11.9	9.2	19.1	10.4	10
Saudi Arabia	45.5	29.4	23.6	33.6	31.6	38.3	29.5	59.6	33.6	31.6
Qatar	4	3	2.4	3.3	3.2	4.1	3.2	6.6	3.3	3.2
Nigeria	14.5	9.2	7.4	10.2	9.9	12	9.2	18.5	10.2	9.9
Libya	9	5.8	4.6	6.5	6.2	7.4	5.7	11.7	6.5	6.2
Kuwait	11.8	7.9	6.4	9	8.5	10	7.7	16.2	9	8.5
Iraq	4.2	6.1	4.9	4.6	6.7	11.4	8.8	20.4	4.6	6.7
Iran	15.7	10.2	8.1	11.1	10.9	13.9	10.7	21.9	11.1	10.9
Indonesia	5.1	3.5	2.8	3.8	3.7	3.7	2.8	5.6	3.8	3.7
Algeria	7.5	4.9	3.9	5.5	5.3	6.5	5	10.1	5.5	5.3
Total	148.7	100.4	80.5	111.2	108	132.8	102.3	211.5	111.2	108

Source: Adapted by Anthony H. Cordesman from data provided by the EIA as of June 2000.

The MENA Cash Squeeze

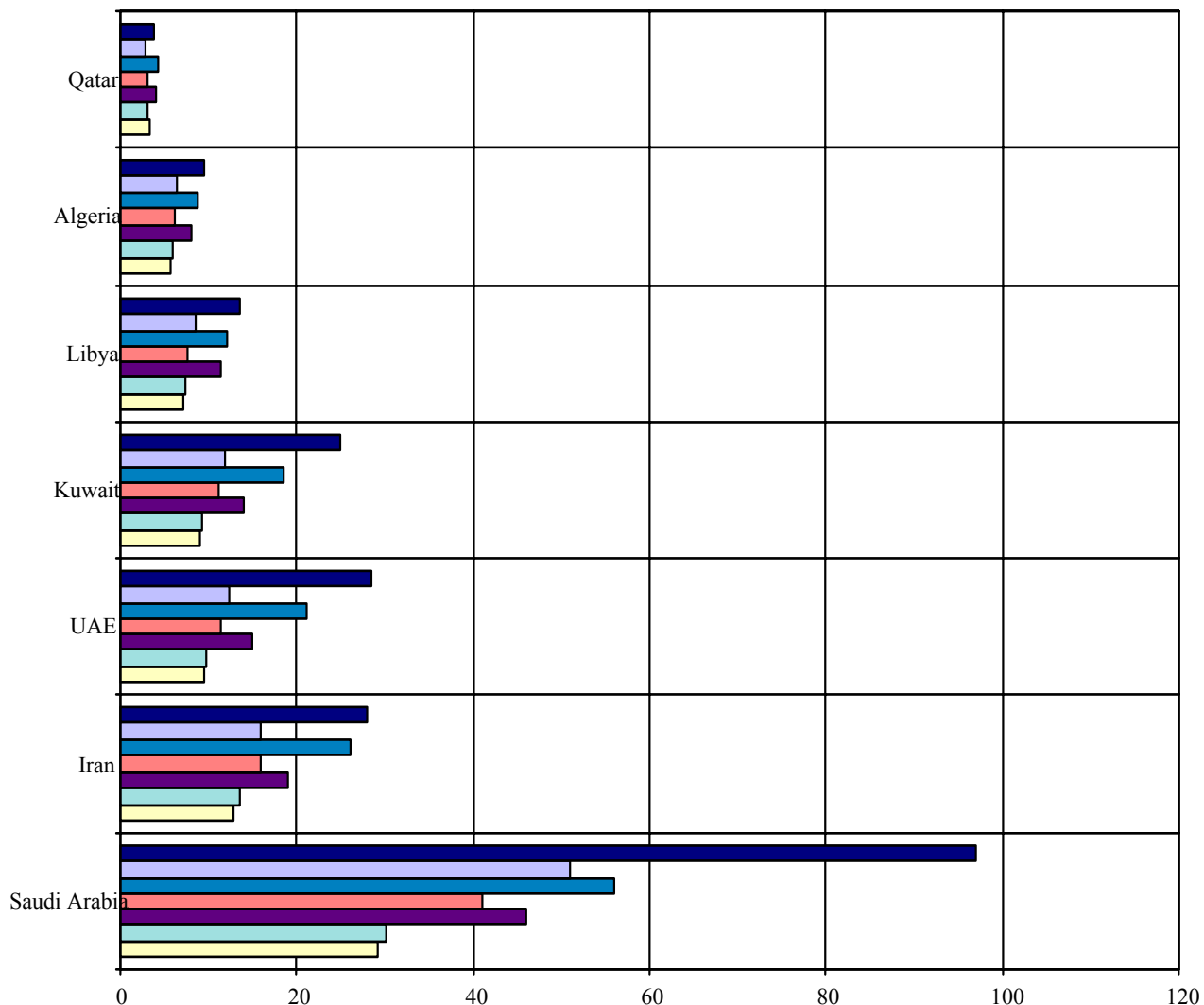
During the next 5-15 years, each of the MENA exporting states will face a growing dilemma in deciding between funding domestic programs and energy investment. The problems that will result are obvious: MENA states have to spend money to get money: reductions on energy spending may provide more money for internal security and meeting popular demands in the short run, but mean lower oil revenues in the mid and long-term. Regimes that come under severe stress, however, always put short-term stability and survival first. Moreover, states can also cut back on long-term maintenance, marginal modernization, and the rate of investment in new facilities. This will either produce a long-term decline in revenue or forgo the opportunity of future revenue, but at a political cost many states may find acceptable in order to find short-term sources of money.

There are other methods MENA states can employ to obtain money that would either compound their energy funding problems or interfere with the economic reforms they need to deal with their social, economic, and demographic problems. One is to draw down on any capital accounts accrued for future energy investment. Another is to drawdown on the money in banks and stock markets for “loans.” A third is to increase taxes and the burden on the private sector, and a fourth is to try to obtain private capital. In each case, such methods have been used in the past. In each case, they have helped to contribute to the economic problems in the region and its slow rate of growth.

Much will obviously depend on the size of future oil revenues, and the rate individual MENA countries do or do not reform and diversify their economies. Chart V.8 provides a rough and now dated estimate of future oil export revenues, but this chart is still valid in illustrating the fact that no one can now predict how much pressure and when MENA budgets could come up against enough of cash squeeze to seriously limited the rate of increased oil and gas production and export capability. Moreover, internal violence and/or war might interact with demographic and economic pressures, and produce much more serious budget, capital flow, and oil revenue problems in given countries. All that can be said is that it seems almost certain that some MENA countries will see intensified terrorism, experience at least low-level civil war, or clash with each other between now and 2025-2030.

Chart V.8.

Petroleum Finance Institute Estimate of Middle Eastern and North African Oil Revenues by Country: The Range of Future Oil Revenues in 1998-2020
(in US \$Constant Billions)



	Saudi Arabia	Iran	UAE	Kuwait	Libya	Algeria	Qatar
■ 2020 High	97	28	28.4	24.8	13.5	9.5	3.8
□ 2020 Low	51	16	12.4	11.8	8.5	6.3	2.9
■ 2010 High	56	26	21	18.5	12.2	8.7	4.2
■ 2010 Low	41	15.8	11.4	11.2	7.7	6.1	3
■ 2000 High	46	19	15	14	11.5	8	4
□ 2000 Low	30	13.4	9.8	9.3	7.3	6	3.1
□ 1998	29.2	12.8	9.5	9.1	7.1	5.7	3.4

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

Source: Adapted by Anthony H. Cordesman from projections by the Petroleum Finance Corporation.

Future Patterns of Investment Flows from Inside and Outside the Region

One potential solution to the problems the MENA region faces is to seek outside or private investment in energy facilities – although this inevitably means that regimes again must give up export revenues in some form. This helps explain why many energy exporting countries in the MENA area are currently examining ways in which to obtain increased foreign or domestic investment in some form, and some are examining ways to privatize some aspects of their energy facilities.

So far, many of these proposals have run up against a MENA country unwillingness to offer the most lucrative investment opportunities in the form of control over upstream crude oil and gas production or reserves, post-colonial fears of foreign ownership of energy resources, an unwillingness to offer realistic risk premiums in defining return on investment (ROI), resistance from national oil companies, and the host of petty barriers most MENA countries maintain that create disincentives to both foreign and domestic investment.

Some MENA countries have shown the region can succeed in attracting such investment or suitable loans by presenting realistic economic proposals. Qatar is a good example. Others are developing ways to attract foreign investment through complex buyback and other arrangements that avoid giving foreign firms direct control over their energy resources. Some countries, such as Saudi Arabia, have opened up their refinery and petrochemical sectors to private investment.

Saudi Arabia is also in the process of opening up its minerals industry to local and foreign private investments. Furthermore, in January 2004, Saudi Arabia approved a new income tax bill that cuts the tax rate on foreign investors from 45 to 20 percent in order to attract foreign investors.¹

At this point in time, however, no MENA country is on a path where it has fully privatized a major aspect of its crude oil and gas production, and few have created opportunities for private or foreign investment in important aspects of any of their energy production and export facilities. In many cases, MENA countries do not charge market prices for – or realistically tax -- fuel oil, gasoline, or even for the oil and gas feedstock provided to downstream users. Many – like Iran and Saudi Arabia -- have ambitious domestic gas distribution programs

that do not plan to charge enough to properly recover their pipeline and distribution costs, much less charge the kind of prices that would make up for the alternative of exporting the gas.

The problem of attracting domestic capital, and repatriating what many experts estimate is between \$800 billion and \$2 trillion worth of MENA capital held overseas, is one that affects every aspect of MENA economic development, not just energy.² So far, no MENA country has carried out all of the reforms will provide the incentives for the necessary flow and repatriation of private capital although many have made progress in reducing past barriers. Many governments have talked the talk, and have workable plans. The problem is that MENA regimes have great problems in walking the walk, and acting decisively on their plans. This may change in the future, as governments come under more and more pressure, but there is no way to predict where or when.

Historically, the MENA area has done badly in attracting foreign investment relative other regions, although it is slowly getting better. There is no way to accurately estimate the scale of such investment in energy facilities to date, except to note it has been limited, that it has been far more limited than MENA countries have hoped, and that most countries have relied on foreign loans rather than investment in obtaining foreign capital.

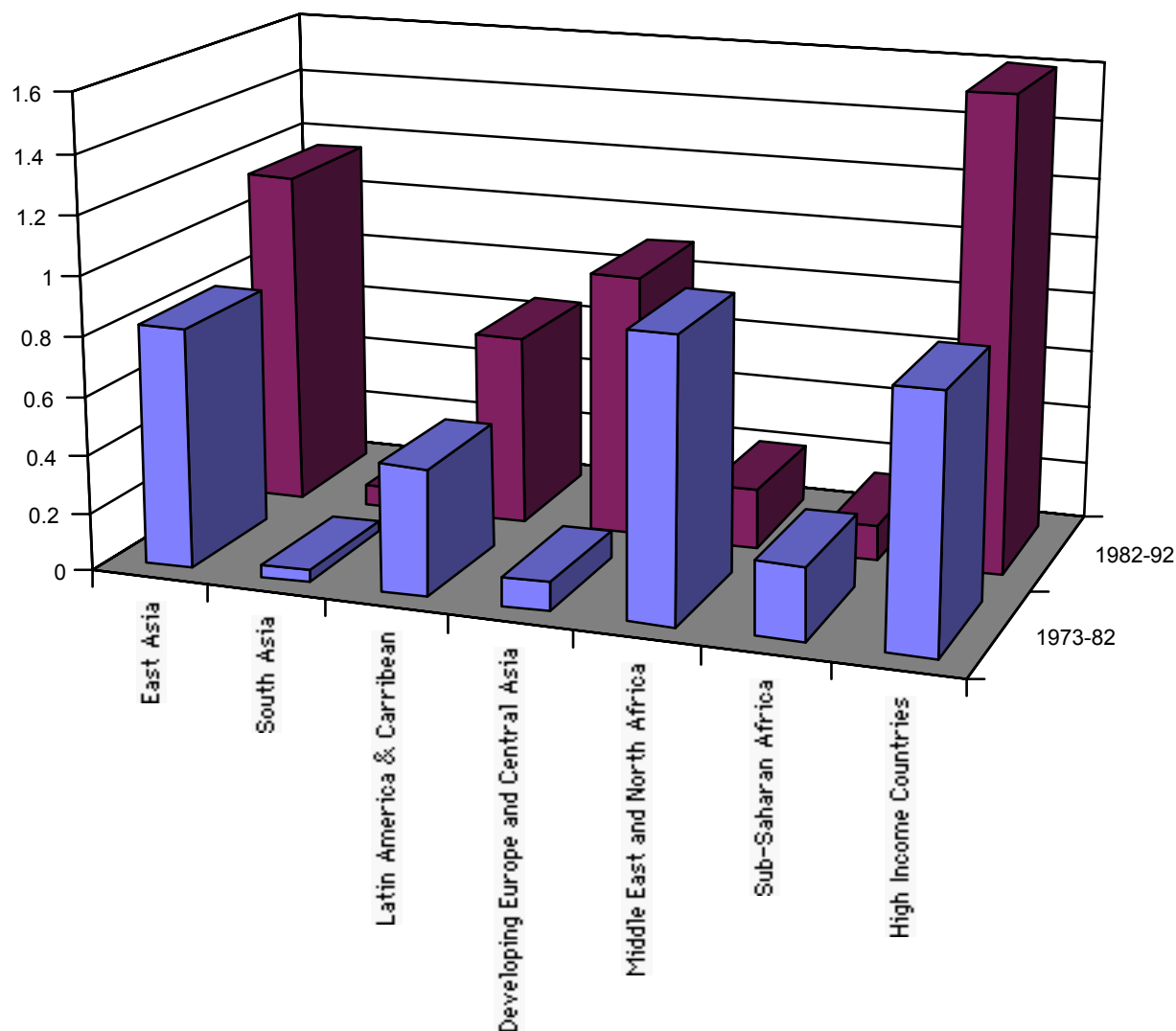
The problems that have limited foreign investment have been diverse and they varied by country, Key problems have been that the terms for investment have been too complex, and too filled with financial and political risk, negotiations have been cumbersome and ineffective, and MENA nations have sought to obtain investment in projects in the less desirable sectors of their energy economy and/or for overambitious projects of massive scale. The potential is there, but it is no easier to predict what the reality will be during 2004-2030 than it is for private investment, and the region continues to confuse a few flagship projects with serious structural reform,

- Chart V.9 shows that the Middle East and North Africa did an extremely poor job of attracting direct foreign investment once the initial “oil boom” was over.
- Chart V.10 shows that this situation did not improve during the period in the 1990s when foreign investment in “emerging markets” was relatively easy to obtain.
- Chart V.11 shows how small the dollar flow to the MENA area was in absolute and comparative terms. Although it did improve with time.
- Chart V.12 reinforces this point by showing foreign investment flows as a percentage in 2001.

- Chart V.13 shows this point is equally valid if the data are compared in dollar terms.
- Chart V.14 shows that the patterns in foreign direct investment are even more erratic when examined by MENA country. Recent work by the UN Conference on Trade and Development (UNCTAD) also shows that the MENA area continues to lag behind the rest of the world, and there is no sustained upward trend. MENA FDI fell by 35% relative to 2001, to a regional total of \$4,800. It is also clear that the performance of Saudi Arabia, the country most critical to regional energy development, and one that had made increasing FDI a critical goal, had some of the worst performance of any nation in the region.³

Chart V.9

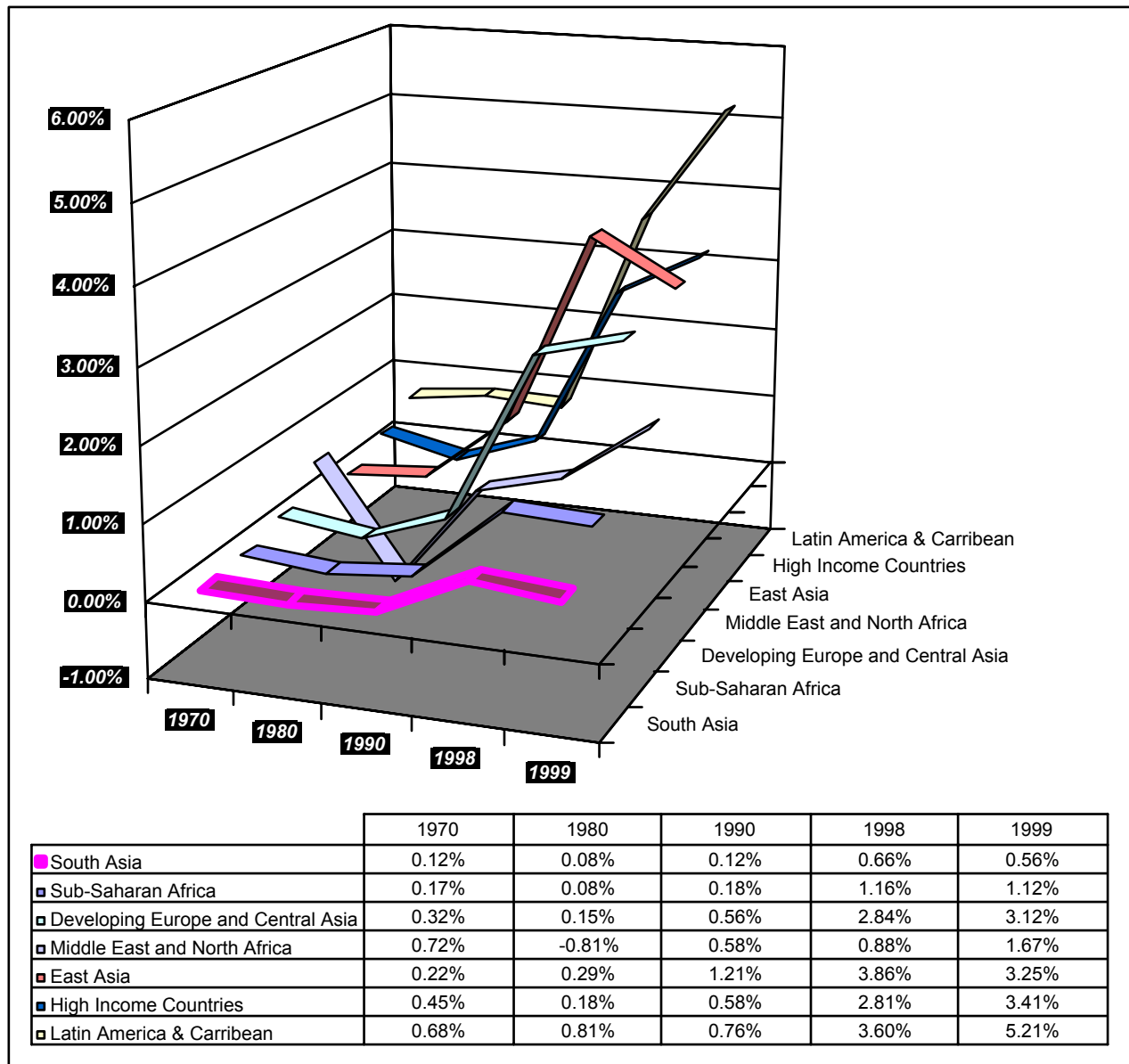
**The Positive Trend in Foreign Direct Investment in the Middle East
Reversed After the Oil Boom Years**
(Foreign Direct Investment Flows as a Percent of GDP)



	East Asia	South Asia	Latin America & Caribbean	Developing Europe and Central Asia	Middle East and North Africa	Sub-Saharan Africa	High Income Countries
■ 1973-82	0.82	0.04	0.43	0.1	0.95	0.25	0.85
■ 1982-92	1.15	0.07	0.65	0.9	0.2	0.125	1.6

Source: Adapted by Anthony H. Cordesman from World Bank, Global Economic Prospects and the Developing Countries, 1996, p. 22

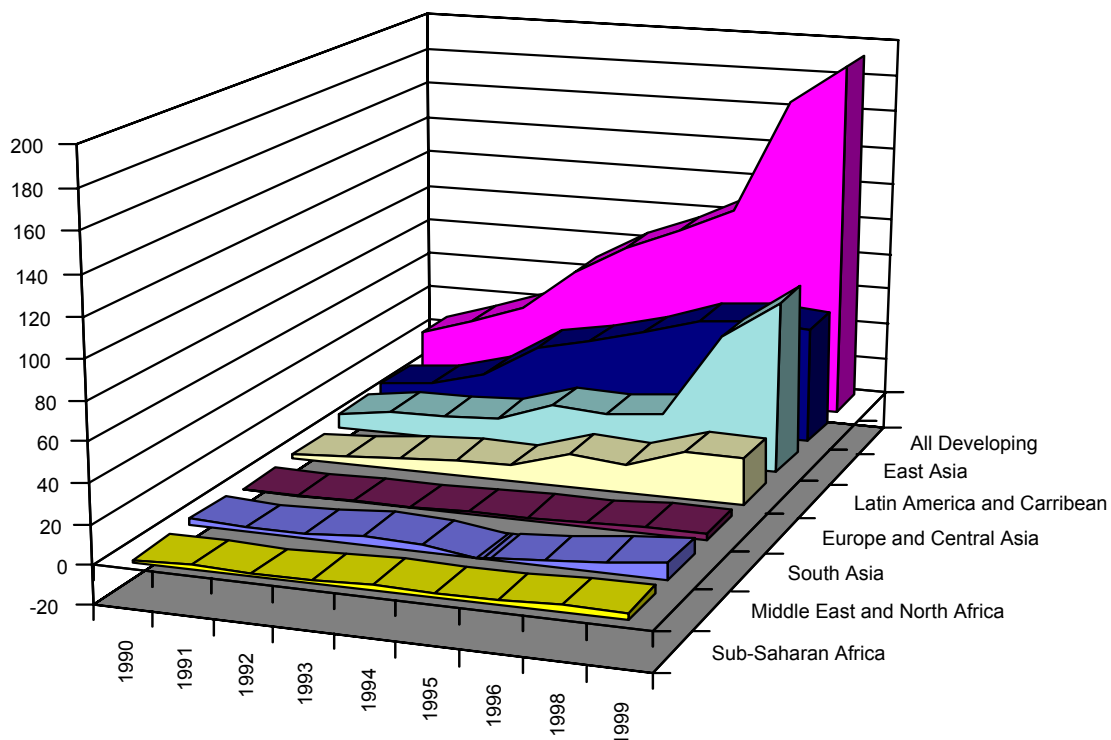
Chart V.10
Net Foreign Direct Investment as a Percentage of GNP



Source: Adapted by Michael Cohen from World Bank, *Global Development Finance*, 2000, pp 236-64.

Chart V.11**The Trend in Total Foreign Direct Investment in the MENA “Flat Lined” During 1990-1999**

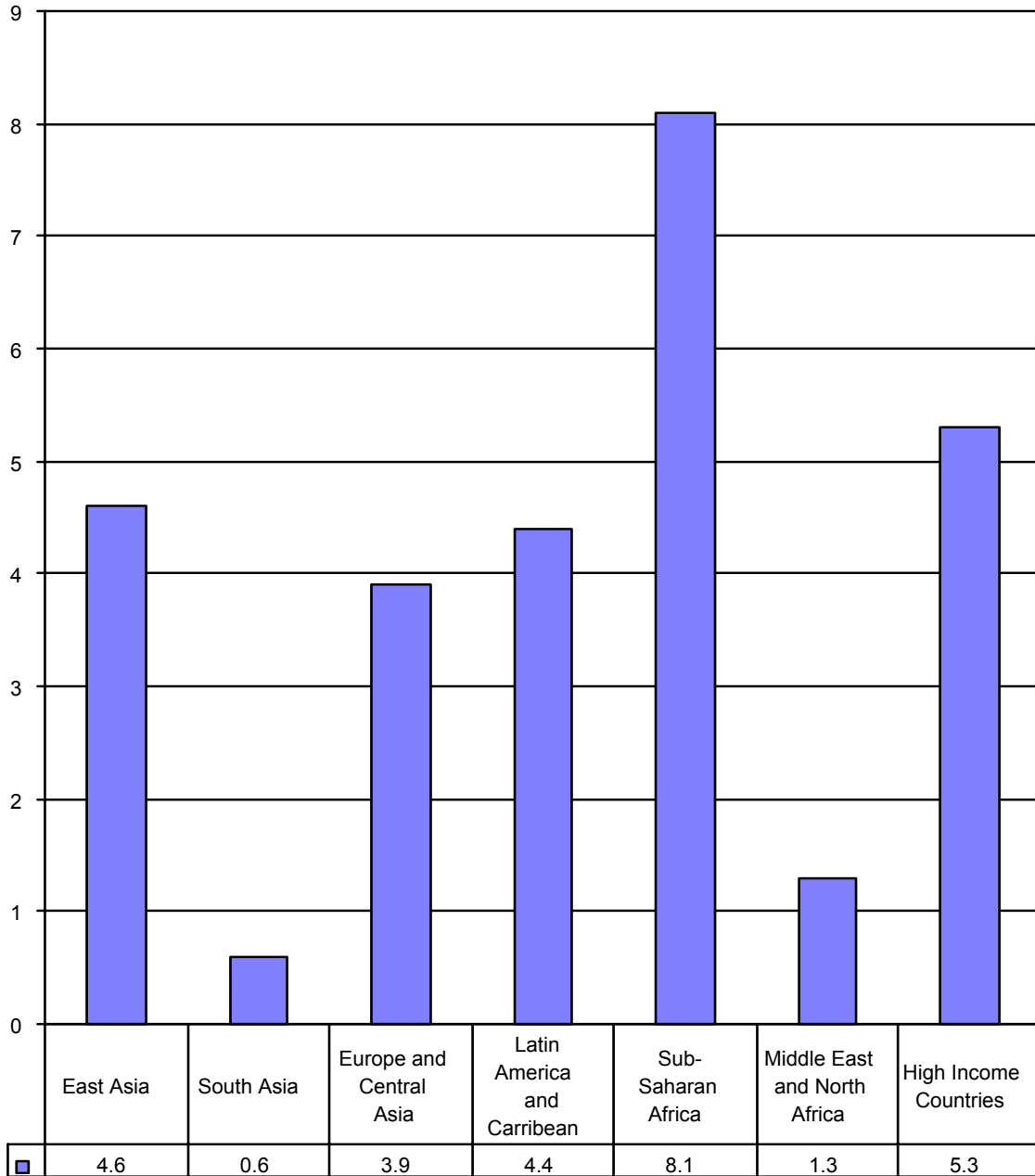
(\$US billions)



	1990	1991	1992	1993	1994	1995	1996	1998	1999
Sub-Saharan Africa	0.9	1.6	0.8	1.6	3.1	2.2	2.6	3.7	3.4
Middle East and North Africa	2.8	1.8	2.2	4.2	3	-0.3	2.2	5.1	8.1
South Asia	0.5	0.5	0.6	0.8	1.2	1.8	2.6	3.7	3.4
Europe and Central Asia	2.1	4.4	6.3	8.4	8.1	17.2	15	24.4	24
Latin America and Caribbean	8.1	12.5	12.7	14.1	24.2	22.9	25.9	69.3	89.4
East Asia	10.2	12.7	20.9	38.1	44.1	51.8	61.1	64.2	61.5
All Developing	24.5	33.5	43.6	67.2	83.7	95.5	109.5	170.9	192

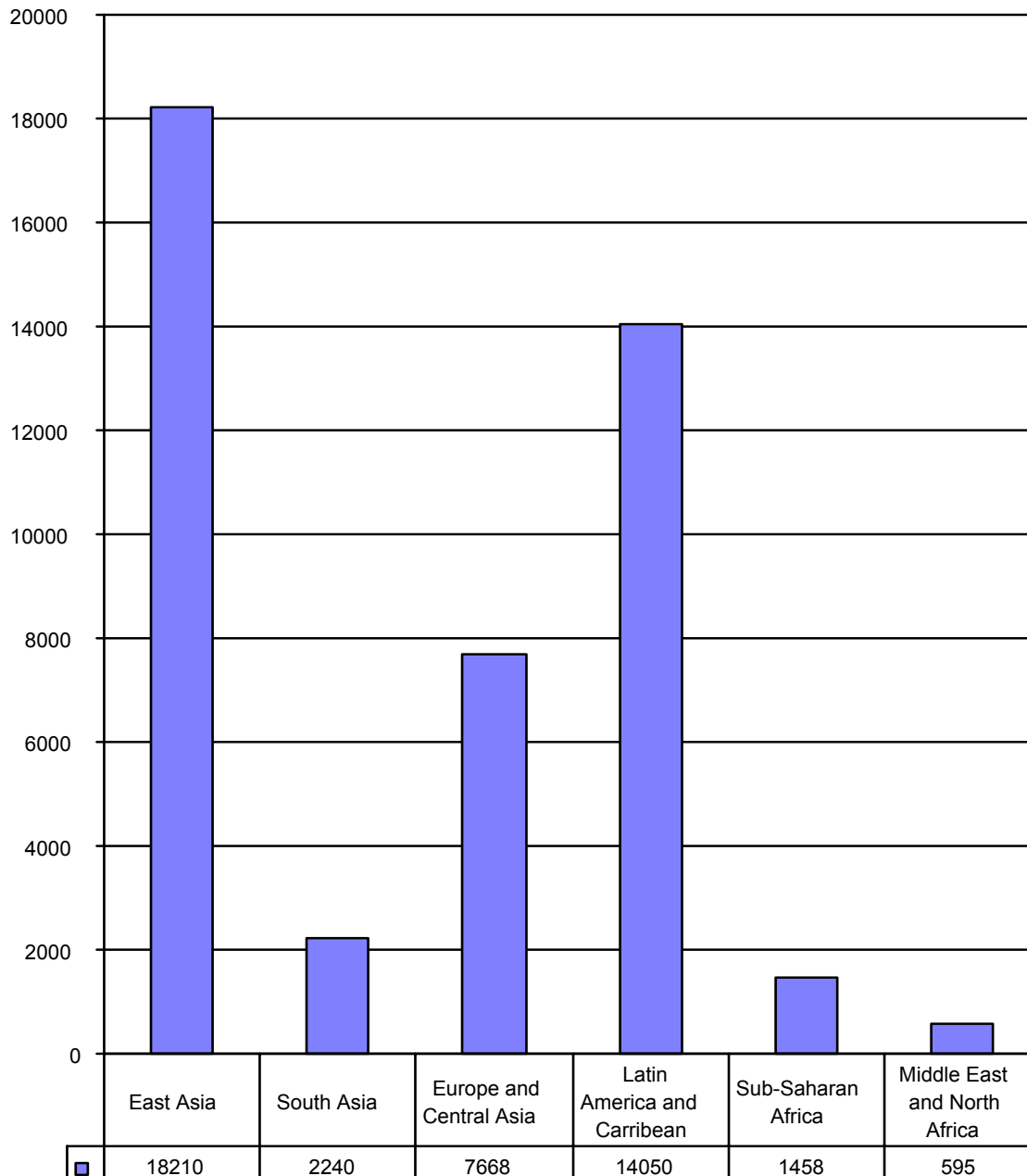
Source: Adapted by Anthony H. Cordesman from World Bank, *World Debt Tables*, 1996, p. 17, and *Global Development Performance*, 1997, p. 29. World Bank, *World Development Indicators*, 1999, p. 262. *Global Development Finance*, 2000, p. 236-264; World Bank, *World Development Indicators*, 2003, p. 330.

Chart V.12
Foreign Direct Investment Inflows as a Share of GDP by Region in 2001
 (Percent of Growth or Decline)



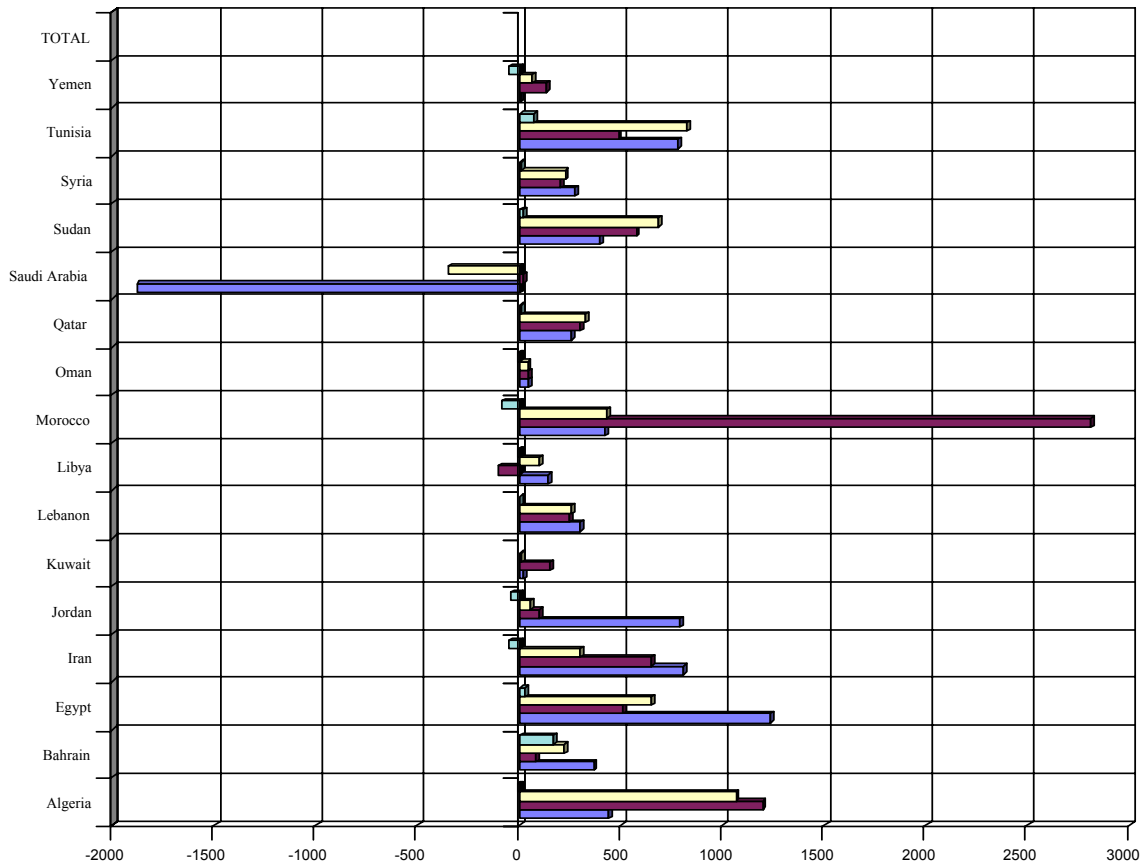
Source: Adapted by Anthony H. Cordesman from World Bank, *World Development Indicators*, 2003, p. 312

Chart V.13
Size of Foreign Direct Investment Inflows by Region in 2001
(\$US Millions)



Source: Adapted by Anthony H. Cordesman from World Bank, *World Development Indicators*, 2003, p. 332

Chart V.14
Size of Foreign Direct Investment Inflows by MENA Country in 2000-2002
 (\$US Millions)



	Algeria	Bahrain	Egypt	Iran	Jordan	Kuwait	Lebanon	Libya	Morocco	Oman	Qatar	Saudi Arabia	Sudan	Syria	Tunisia	Yemen	TOTAL
□ % Change 2001/02	-11	169	27	-54	-44	-	3	-5	-85	-5	10	-	19	9.8	69	-53	*-35
□ 2003	1065	218	647	297	56	7	257	96	428	40	326	-350	681	225	821	64	*4,781
■ 2001	1196	81	510	652	100	147	249	-101	2808	42	296	20	574	205	486	136	*7,364
■ 2000	438	364	1235	804	787	16	298	142	423	44	252	-1884	392	270	779	6	*3,587

Source: Adapted by Anthony H. Cordesman from World Bank, *World Development Indicators, 2003*, pp. 330-332 and Tom Evertt-Heath, "Deciphering the FDI Figures," *MEED*, October 2, 2003, p. 10.

The Ability to Fund MENA Energy Development in an Uncertain Future

Many in the oil industry discount these problems on the grounds that most MENA states have been relatively successful in using state revenues to fund energy investments in the past. It now seems likely, however, that a combination of foreign investment and domestic private investment must assume a much larger share of the burden if the region is to produce anything like the expanded oil, gas, and product exports estimated in Chapter I. In some cases, relying on market forces and the resulting oil revenues may still provide enough capital to rely on state investment if export revenues are high. However, it seems doubtful that a combination of market forces and export revenues will enable most MENA states to use state funds to finance the expansion of their export capabilities at the levels projected by the EIA and IEA.

A study by the International Energy Agency also indicates that the future level of energy investment required could be truly massive. This study projects the total investment needed to meet the world's energy needs between 2001 and 2030 at \$16 trillion US dollars. These costs are based on the IEA's reference estimates of 2002, and some 51% of the projected investment will be required simply to maintain the present level of supply and deal with depletion. The study also warns that the risks involved in such investment are formidable and changing; that much more capital must come from private and foreign sources than in the past, and that financing the required investments in developing countries will be the greatest challenge.⁴

The IEA estimates that the total cost of the global investment in the oil industry necessary to pay for an increase in global oil production from 45 MMBD in 2001 to 120 MMBD in 2030 will be almost \$3.1 trillion, with \$2.2 trillion or 72% devoted to exploration and development for conventional oil. Investment in on-conventional oil (including gas-to-liquids) is estimated to total \$205 billion, or 7% of total oil investment.

These costs are extremely conservative, and do not seem to reflect the costs of new exploration and EOR techniques. They could easily understate the true market costs by 50%. As has been touched upon earlier, massive additional investments will also be needed in tankers and pipelines, costing some \$260 billion or 8% of the total. Investment in addition crude oil refining capabilities will total \$410 billion or 13%. Some 66% of all such investment must occur in

developing countries like the MENA region although 45% of the investment will be necessary meet the needs of the US and other industrialized OECD countries.⁵

These investment costs could be much higher if the MENA region is not a stable supplier and cannot attract the necessary follow of investment. They depend heavily on the development of new supply, much of it offshore, from MENA countries, which are projected to provide more than two-thirds of the global increase in oil production between 2001 and 2030 – even if significant increases occur in the production of non-conventional oil from Canada and Venezuela. If investment in the Middle East did not succeed, the cost of meeting rising world oil demand through 2030 would be 8% higher, even though total consumption would be 8% lower because of rising oil prices.⁶

The cost of global investment in the natural gas supply chain is also estimated at about \$3.1 trillion between 2001 and 2030, with more than half going to exploration and development. This investment will be needed to both compensate for the natural decline or depletion of existing gas fields and to meet a near doubling of global demand equal to some 300 BCM a year – roughly equivalent to the present total gas production capacity of all OECD European countries. The IEA estimates that annual global investment spending on gas must increase from around \$80 billion in the 1990s, and \$95 billion in the current decade, to roughly \$120 billion annually between 2020 and 2030.

Global investment in transmission and distribution networks, underground storage, LNG liquefaction plants, ships, and regassification terminals is estimated at \$1.4 trillion. The investment in LNG is estimated to be much higher than in previous years because of a six fold increase in interregional LNG trade will be more than offset by further cuts in unit costs. Roughly half of the interregional trade in gas is projected to be in the form of LNG by 2030.⁷

The IEA estimated that public companies will not be able to finance such development in many developing countries, and that the private sector will have to provide a growing share of the necessary investment. It notes that,⁸

In many cases, only the largest international oil and gas companies, with strong balance sheets, will be able to make the required multi-billion dollar investments. Long-term take-or-pay contracts in some form will remain necessary to underpin most large-scale projects. The lifting of restrictions on foreign investment and the design of fiscal policies will be crucial to capital flows and production prospects, especially in the

Middle East, Africa, and Russia, where much of the increase in global production and exports is expected to occur...As a result of these factors, there is a great risk that investment in some regions and parts of the supply chain will not always occur quickly enough.

MENA Oil Development and Investment

The IEA makes it clear in its analysis that there are many different ways to estimate that costs of future energy development, and many different energy and global economic scenarios that can emerge between 2001 and 2030 – the period covered by its analysis. It also does not provide a break out that provides figures for the MENA region. It issues a separate estimate for the Middle East and for all of Africa, with no individual cost data for North African countries. The estimate of the investment costs for oil production and infrastructure for the Middle East alone, however, total \$525 billion for 2001-2030, which requires investment to rise from an estimate annual average of \$12 billion during 2001-2010 to an annual average of \$23 billion in 2020-2030.⁹

These estimates are heavily dependent on much of the increase coming from nations like Saudi Arabia, and a relatively slow rise in the cost of finding new production capacity in spite of a gradual shift to offshore production. As has been mentioned earlier, the cost factors the IEA uses are also extremely conservative. The IEA estimates that Saudi Arabia has an incremental production development cost of \$0.6 per barrel per day (BPD) from its onshore fields. In contrast, the average capital cost of onshore capacity in the Middle Eastern OPEC countries is around \$4,600 per BPD, compared with \$10,200 worldwide per BPD, and around \$22,000 per BPD in the North Sea,

As is the case with the EIA, the IEA estimates that much of the growth in world energy supplies that underlies the growth of the world economy will come from low cost Middle East oil, and that the growth in MENA oil exports will dominate global growth in oil exports during 2001 and 2030. This is based on IEA estimates that the Middle East retains 66% of the world's proven oil reserves of some 686 billion barrels, of which Saudi Arabia, Iran, and Iraq have 464 billion.

As has been discussed in detail in previous chapters, the IEA estimates that Middle Eastern production of crude oil and natural gas liquids will surge to 28.3 MMBD in 2010 and 52.4 MMBD in 2030, an annual average rise of 3%. This, however, is only part of the investment

story. The IEA estimates an average annual decline of around 5% in existing production. This means that some 65 MMBD of incremental production capacity must be found between 2001 and 2030, and some 60% of this must be found to replace depleted capacity. This again illustrates the exceptional strategic importance of nations like Saudi Arabia and Iraq, with massive unexploited reserves, versus those exporting nations that either have declining reserves or high and steadily rising incremental production costs.¹⁰

The IEA only estimates totals for Africa, but much of the increase in oil production will come from Algeria and Libya, as well as states like Nigeria and Angola. The IEA estimates that oil sector investment in Africa will have to total some \$360 billion during 2001-2030, or an average of over \$12 billion a year. About 85% will be needed for oil exploration and development, in order to raise African production from 8 MMBD in 2002 to 13 MMBD in 2030. Another \$42 billion will be needed to double the capacity of Africa's refining industry to 7.3 MMBD by 2030. These estimates are based on oil exploration and development costs of \$1.7 to \$4.5 per BPD, and the lowest costs are the onshore development costs in North Africa states like Algeria and Libya.¹¹

There are, of course, many uncertainties in these estimates, and they assume – as in most projections in the previous chapters – that MENA nations respond efficiently to market forces and are not affected by external or internal instability and conflicts. The IEA has, however, run projections that illustrate what will happen if investment in the Middle Eastern share of global oil supply only maintains existing production levels. This “Restricted Investment Scenario” is contrasted with the reference case in Table V.1 below:

Table V.1**The Role of the Middle East in Global Oil Supply in Different Investment Scenarios**

<u>Category</u>	<u>2000</u>	<u>2010</u>	<u>2020</u>	<u>2030</u>
<u>Price in \$ Per Barrel</u>				
Reference	28	21	25	29
Restricted Investment	-	27	30	35
<u>Regional Demand in MMBD</u>				
<u>OECD</u>				
Reference	47	52	56	60
Restricted Investment	-	49	52	53
<u>Non-OECD</u>				
Reference	28	37	48	60
Restricted Investment	-	36	46	57
<u>Total World Oil Demand (MMBD)</u>				
Reference	75	89	104	120
Restricted Investment	-	85	97	110
<u>Total World Oil Supply (MMBD)</u>				
<u>Middle East OPEC</u>				
Reference	21	26	38	51
Restricted Investment-	-	24	27	31
<u>Rest of World</u>				
Reference	54	62	66	69
Restricted Investment	-	61	70	79

Source: International Energy Agency, World Energy Investment Outlook, 2003 Insights, IEA, Paris, 2003, pp. 179-182

Like all of the estimates discussed earlier, one key message of Table V.1 is that the strategic importance of energy exports from the MENA area is not sensitive to credible scenarios based on anything approaching current conditions relating to the impact of market forces, global demand, and the availability of alternative sources of energy and technology. At the same time, the Restricted Investment case does show what could happen either as a result of inadequate investment or regional instability and conflict.

World oil demand only grows by 1.2% per year in the Restricted Investment case, and total demand is 110 MMBD in 2030, versus 120 MMBD in the reference case because of higher oil prices. The total share of oil in world energy balances drops from 38% to 35% because of increased conservation and a shift to other fuels.¹² The OECD cuts oil demand most – by 10% -- because it is best able to find substitutes. The FSU and Eastern Europe cut demand by 8% and developing countries by 6%. Ironically, the net cost of global investment in oil production rises by 3% in spite of the lower production levels because of the higher costs of production.

The impact on the Middle East is more on supply and on oil revenues than on demand. Middle Eastern oil production still increases from 21 MMBD in 2001 to 31 MMBD, but the total is 10 MMBD lower by 2030 than in the Reference scenario. Middle Eastern OPEC nations also drop from 45% of supply in 2030 to 28%, with a major (6%) increase in the share of unconventional oil, in production from other OPEC countries (5%). The rate of depletion outside the Middle East also increases significantly. Middle Eastern countries also lose a great deal of oil revenue – a total of \$400 billion over the period from 2001-2030.¹³

It is important to note that in examining the Restricted Investment case, the IEA does mention political and military instability as major risks, in addition to the risk of underinvestment. It also identifies eight major market related risks:¹⁴

- *Reassure availability*: If reserves prove to be smaller than expected or difficult to recover because of operational difficulties, the need to find and develop new resources would be greater. Such new projects would not be developed so quickly as those projected in the Reference Scenario, since investors would have lower confidence in resource availability and the associated risks would make projects less attractive.
- *Infrastructure*: Inadequate infrastructure could constitute another barrier. If access to production sites is difficult, or roads, railways, pipelines or export facilities are not available, upstream projects could be delayed or cancelled.
- *Labor availability*: Operational and financial performance could be affected by a shortage of qualified labor.
- *National financing constraints*: In countries with national oil companies, financing new projects could become a problem where the national debt is already high and considerations of national sovereignty discourage reliance on foreign investment. The call of the national budget on future oil revenues could increase new financing costs. Strong guarantees could be difficult to find or involve a high insurance premium. Sovereign risk in many Middle Eastern countries is still high. A combination of these factors could delay or prevent investments.
- *Foreign investment policies*: The producing countries' policies on opening up their oil industries to private and foreign investment, the legal and commercial terms on offer and the fiscal regimes will have a major impact on how much capital Middle East producers will be able to secure.
- *Oil prices*: Prices will affect the ability of producing countries to finance investments from their own resources and, therefore, their need to turn to private and foreign investment.
- *Oil pricing and depletion strategy*: Governments could choose to delay development of production capacity in order to achieve higher profits by driving up international prices. Some may slow the development of their resources in order to preserve them for future generations.
- *Competition for financial resources*: In countries with state owned companies and a rapidly growing population,¹⁵ education, health and other sectors of the economy could command a growing share of government revenues and constrain capital flows to the oil sector. Even in countries open to foreign investment, and therefore less dependent on government revenues, the needs of an expanding population could lead governments to increase taxes, lowering the profitability of projects and so deterring investment.

The importance of these risks obviously varies on a country-by-country basis, but it is all too clear from the previous analysis that none of them can be disregarded.

MENA Gas Development and Investment

The IEA raises similar issues relating to gas. As has been discussed in previous chapters, the IEA projects a major increase in world gas production. These projections are summarized in Table V.2 below. The IEA estimates that the total cumulative investment necessary to meet these production levels between 2001 and 2030 will be \$3,145 billion. Out of this total, \$280 billion must go to the Middle East, with \$140 billion for exploration and development, \$65 billion for transmission and storage, \$64 billion for new LNG facilities, and \$12 billion for distribution. Once again, the IEA does not break out a separate total for North Africa. The cost

for all of Africa is projected to total \$226 billion, with \$153 billion for exploration and development, \$34 billion for transmission and storage, \$37 billion for new LNG facilities, and \$3 billion for distribution.¹⁶

The Middle East share of gas development will be far smaller than its share of oil development, but it will grow the most quickly of any region in absolute terms. The Middle East will also be the largest component for LNG investment, and the IEA estimates that roughly 70% of the investment in Middle Eastern gas (\$196 billion) will go primarily for exports to the US and other OECD countries while 35% will go for exports to non-OECD governments (\$84 billion). As a result, the capital requirements will grow rapidly, averaging some \$10.6 billion a year by 2020-2030, it will average \$8.8 billion a year over the period from 2001 to 2030, roughly twice the spending level in 2000, and an average of \$4.7 billion of this total with need to be invested in the upstream sector. The rate of decline in existing gas fields that must be compensated for in order to meet these goals is projected at an annual rate of 4%.¹⁷

These costs are not proportionate to the scale of the increase in Middle Eastern gas production because, as is the case with oil, Middle Eastern gas production has some of the lowest incremental costs of any region in the world – around \$0.2 per Mbtu or \$7.5 per thousand cubic meters of gas produced. The Middle East cannot export to many of its customers by pipeline, however, and the IEA estimates that about 18% of all investment will go to liquefaction plants, although many plants will come on line early in the period and annual average costs will drop from \$1.9 billion during 2001-2010 to \$1.2 billion during 2010-2020, rising back to \$1.6 billion during 2020-2030.

Investment in transmission capacity will average \$2 billion a year and go largely to domestic consumption. As has been discussed earlier, domestic gas consumption has become a major regional source of energy and way of freeing oil for export. Gas provided some 45% of primary energy needs in 2001 (211 BCM), with about a third going to power generation. Total regional use of gas is expected to double by 2030, largely to meet the needs of the power sector. At the same time, exports are projected to increase far more quickly and rise from 242 BCM in 2001 to 861 BCM in 2030. Iran is expected to lead these exports, along with five other Gulf

countries. Iran, Iraq, Kuwait, Qatar, Saudi Arabia and the UAE have 97% of all of the Middle East's proven gas reserves.

If the IEA is correct, this means a fundamental shift in the impact of Gulf and Middle Eastern oil production. Exports *outside the region* are projected to rise from 30 BCM in 2001 to over 360 BCM by 2030, and from 13% of total production to 42%. These increments will come largely from Iran, Qatar, Oman and the UAE, with some from Yemen. In the medium-term, with Iraq becoming an exporter in the longer term. Most will be in the form of LNG, although new export pipelines may be built to Europe and Asia.

As for investment risks, they are almost identical to those discussed earlier for oil. The investment challenge is somewhat greater for gas; however, because Iran is the key to the rapid increase of gas exports and Iran presents special political problems, both in terms of internal instability and US sanctions. In addition, the technical and financial risks are less familiar, and because large-scale LNG projects have a somewhat higher risk premium in terms of gas and war. There also are problems for private investment because most local banks do not have a history of large loans. The one exception is Saudi Arabia, but loan exposure rarely rises about \$500-\$500 million per project. The IEA also notes that the Middle East does not have a history of charging fair rent for the pipeline and distribution cost of gas and this too affect the willingness of the private sector to invest.¹⁸

The IEA does not provide a great deal of detail on North Africa in its estimate of future gas investment needs. It does note, however, that three out of four of the nations responsible for almost all of Africa's gas production in 2001 were North African: Algeria (84 BCM), Egypt (23 BCM), Libya (6 BCM); a total of 113 BCM versus 16 BCM for Nigeria. Production is expected to increase from 134 BCM in 2001 to 589 BCM in 2030. The total investment cost is projected at \$216 billion, and average annual capital costs as rising from \$3 billion in 1991-2000 to \$4,8 billion in 2001-2010 to \$10 billion in 2020-2030. Upstream development will dominate these costs, with average annual exploration costs rising from \$2.8 billion during 2001-2010 to \$7.5 billion during 2020-2020. More than \$26 billion will be needed, however, to build liquefaction facilities during 2001-2030, and raise capacity from 47 BCM to 230 BCM.

The IEA also projects that exports will rise from 64 BCM in 2001 to 145 BCM in 2010, to 212 BCM in 2020, and 299 BCM in 2030. LNG production is expected to rise fourfold during 2001-2030, a rise of 140 Mt/year of additional liquefaction capacity. Exports to Europe by pipeline are expected to triple from the present 30 BCM in 2001 to 90 BCM in 2030. The basic risks again are similar to those discussed earlier under oil with the exception that corruption is seen as a far higher risk in African gas projects than in Middle East oil and gas projects.

Table V.2**The IEA Estimate of the Role of the MENA Region in Global Gas Production: 1990-2030**

Region	1990	2001	2010	2030
OECD North America	643	783	886	990
OECD Europe	210	306	300	276
OECD Pacific	27	42	65	125
Total OECD	880	1,131	1,251	1,391
Russia	640	580	709	914
Other transition economies	196	161	205	308
Total Transition Economies	835	742	914	1,222
China	17	34	55	115
East Asia	77	150	213	409
South Asia	29	62	89	178
Latin America	61	101	217	516
Middle East	99	252	421	861
Africa	70	134	246	589
Total Developing Countries	354	723	1,241	2,667
Total Non-OECD	1,190	1,464	2,156	3,889
World	2,070	2,595	3,407	5,280
Middle East as % of World				
Increase in Middle East over previous decade in %		-		

Source: Adapted from International Energy Agency, World Energy Investment Outlook, 2003 Insights, IEA, Paris, 2003, p. 189

Energy Development vs. Human Development: A Growing Conflict in Public Investment and Expenditure Priorities

The previous chapters have shown that there will be a growing conflict between the needs of MENA states to provide services for a growing population and invest in economic reform and diversification, and the need to expand energy production capacity, energy infrastructure, and energy export facilities. It is also a grim reality, as the Arab Development Reports make clear, that the history of economic reform in the MENA region is the history of good plans and intentions and faltering or failed executions.¹⁹ MENA regimes suffer from additional problems. They tend to back peddle on reform the moment oil revenues rise to moderate levels, and many face resistance from nationalists, Pan-Arab socialists, state-oriented technocrats, and Islamists. Virtually every state wants to maximize revenues, but also has powerful elements that want to conserve resources for the future.

What is clear is that the era of being able to safely rely on state oil and gas revenues to fund maintenance and modernization is at least at risk. Many MENA governments may not have to abandon state industries, state investment, and state control over energy resources, but fundamental changes will be needed to find ways to attract foreign and domestic private investment or many states will have energy expansion and development problems.

One key problem in estimating how serious the resulting problems will or will not be is that there are no reliable analyses and forecasts of the costs necessary to provide all of the increases in petroleum and gas facilities that are planned or required to meet the demand for exports and increased production capacity. It is clear, however, that massive investment will be required in ports, pipelines, supporting utilities, and in tanker fleets.

At present, infrastructure investment also takes place on a country-by-country basis in response to those market forces that affect a given MENA region, with little overall regional cooperation. Joint development efforts are increasing but there are also major political and governmental barriers to the efficient development of export facilities, in developing common facilities for exports and infrastructure. The pipeline politics of the Caspian and Central Asia are the most obvious cases in point, but the lack of clear future plans to move oil out of Iraq the limits on the cooperative plans for infrastructure development in the Southern Gulf affect much

larger amounts of oil and gas. The lack of any cooperative plans for pipelines from the Gulf to ports in the Indian Ocean is particularly striking.

In short, it is no safer to assume that present policies and market forces create an “invisible” hand that ensures that national distribution effort will be both adequate and secure than it is to make such assumptions about production capacity. Much more detailed analysis is needed to examine the real-world probabilities that the market can fund the necessary energy transportation and distribution systems, and the implications that the kind of massive increases in energy production projected in Charts V.1 to V3 have for Middle Eastern and North African pipelines, ports, distribution facilities, and tanker fleets. Similar analysis is needed of their impact on energy vulnerability

VI. GEOPOLITICS, DOMESTIC DEVELOPMENT, AND THE FUTURE OF ENERGY IN THE MIDDLE EAST

It is tempting to conclude this analysis with yet another set of policy recommendations about reducing dependence on imported energy, finding alternative energy sources, or encouraging reform in the Middle East and North Africa. These are all noble goals, but it is time to be realistic about the nature of world energy supplies and what can and cannot be done without a major (and currently totally unanticipated) break through in energy technology or massive dislocation of the global economy. It is now thirty years since the oil embargo of 1973, and countless similar policy recommendations have come and gone with little real world effectiveness.

The forces involved in shaping world energy balances—and the overall trends in energy exports in the MENA region are simply too vast and too complex for slogans and simple solutions to work, particularly because natural market forces already are constantly in play at a global level in an effort to find new energy sources or reduce dependence on energy imports whenever this is economically possible. As the US has learned from experience, the Bush Administration is no more able to articulate an energy policy that has the slightest chance of significantly reducing US strategic dependence on MENA energy exports than the Ford or Carter Administrations, and the same has been true of the rest of the OECD and of virtually every nation in Asia. The assumption that either governments or policy planners can alter this level of reality is roughly equivalent to the assumption that one can sculpture an iceberg with the Titanic.

Moreover, the previous chapters have shown the MENA region is experiencing a level of political, social, economic, and demographic change on a scale so large where no energy policy can now be both national and effective. An effective energy policy must also address MENA energy developments to the extent this is possible. The most obvious solution is to encourage political and economic reform, but experts in the region and outside nations have done so for decades. The reality is that they have only had limited impact and some trends – particularly demographic pressure and the threat of terrorism – are growing worse not better.

Complexity and regional inertia are no reason to abandon efforts to encourage reform, and one must clearly distinguish between the long list of problems examined in this study and the conclusion they will inevitably lead to some form of regional crisis. There is still a good prospect that many MENA states will “muddle through” in the sense that no crisis will occur that has a lasting impact on the region’s energy development. Outside nations can assist in this process although the key to change must come from within MENA states and intellectuals have already spent far too long trying to export both the causes and solutions to their problems. Outside efforts can have limited and gradual impact. Responsibility for success, however, lies with the leaders and peoples in each MENA state, and any effort by them to deny this, or wait for outside aid, is a certain recipe for failure.

There is still a reasonable chance that Middle Eastern and North African energy production and exports will continue to cumulatively meet growing world demand at an acceptable price. There is also a chance that no period of regional political turmoil or conflict will be long or broad enough to produce the kind of major supply and price problems that go beyond the unpredictable swings in supply and price that are the result of market forces. In fact, “Muddling through” is the most probable future.

Such an “optimistic” future scarcely means there will be no panics, no shortfalls, no price rises, and no crises. It does mean is that the level of past problems and crises will not grow drastically worse, and that that the MENA region would cope with its problems well enough to develop enough energy exports, and that history would repeat itself in ways that the West and other importers can live with,

The Key Forces Shaping the Regional Geopolitics of Energy

The fact remains, however, that there are serious threats that could threaten regional stability and the security of energy exports and other credible futures. As has been discussed earlier, some of these risks are increasing. Proliferation and long-range strike systems can greatly increase the damage that regional conflicts might do to energy supply. Revolutions and conflicts will increasingly occur in an environment where the overall volume of exports will continue to increase and where the impact of interruptions or price increases may have more drastic effects on the world economy.

The tragic events of September 11, 2001, have become a symbol of the threat posed by terrorism and Islamic extremism. These threats, however, have never been directed primarily at the West. They are rather threats to every regime in the MENA region that is seeking to move forward through economic, political, and social reform. Islamic extremism and terrorism interact with the region's economic and demographic problems, and cases like Iran have shown that such radicalization can have a lasting impact on national energy development. Whether the end result has a more negative impact than the secular militarism of a nation like Iraq is something only time can tell.

The Second Intifada is another factor - like proliferation and Islamic extremism - that may have a medium- or long-term impact on energy development. Arab and Iranian hostility to the U.S. because of U.S. support for Israel has grown steadily since the Second Intifada began in September 2000. This threatens U.S. strategic partnerships with key Arab states like Egypt and Saudi Arabia and interacts with the problem of terrorism and Islamic extremism to create a potential "clash of civilizations" between the West and MENA region.

There could also be another kind of future in which economic problems prove more serious than conflict. A prolonged period of moderate increases in demand and low prices could create another future in the MENA region. Such a future could lead to systematic underinvestment in maintaining and expanding energy investment over time, creating new problems when Asia and the world economy recover. It also could lead to a situation where the "oil wealth" of the past turns into de facto "oil poverty."

Governments would lack the export revenues needed to maintain subsidies and entitlements and investment. This would interact with internal political and succession problems, growing demographic problems, cultural change and the problem of Islamic extremism, and a long-standing failure to diversify the economy. The oil exporting states already face a world where oil revenue is well under 50% of the peak of the oil boom in per capita terms. This figure could drop to 35% by 2000-2005, particularly if oil and gas production and reserve findings continue to increase in other regions.

All these risks have serious implications for energy policy. The West cannot shape an energy or political policy that makes the necessary changes in the MENA region from the

outside. The key changes necessary to achieve security and internal stability must come from within. Reducing population growth, economic reform that shifts reliance **to** the private sector, replacing subsidies and patriarchal government with a free economy and more of the elements of a modern state, are all decisions that must be made from within individual MENA states. They cannot be imposed from the outside and there is no regional solution.

Western and Asian governments can help, however, particularly in terms of aiding regional military security and in trying to bring an end to the Arab-Israeli conflict. They can only deal with internal stability problems, however, if they are willing to commit themselves to a slow and consistent policy of persuasion in encouraging regional political and economic reform and helping MENA nations expand and diversify their economies. Western and Asian investment may ultimately accomplish far more in this area than governments, but only if economic and demographic reform inside the region moves forward enough to allow the MENA region to fully join the world economy. The plain truth is that no combination of outside policies can protect a failed regime or a failed nation from the consequences of its own actions.

Possible Futures

The MENA region must undergo fundamental changes. A stable future depends on key political events like the success of the Arab-Israeli peace process, the moderation of the Iranian revolution, the creation of a stable and peaceful Iraq, and an end to the civil war in Algeria. Many key leaders are aging and the highly personal patriarchal systems of government they have established are unlikely to survive them. Regional stability depends on the survival or succession of stable and progressive regimes in key states like Bahrain, Egypt, Jordan, Libya, Kuwait, Morocco, Oman, Saudi Arabia, and the UAE.

A stable future also depends on the ability of the region to fund and actually implement the level of energy development that it, and the world, need over the coming decades. There are strong indications that this will require major changes in the way most countries finance their energy development and in the role of foreign investment. These issues have been discussed in the energy sections of this analysis, but even the most successful development of the region's energy resources may not fully meet its economic needs and bring regional stability.

A stable future requires MENA exporting states to be willing to implement sustained economic reform, to come to grips with the need to reduce population growth, and to reduce dependence on foreign labor. The region must either further reduce its population growth rate or breed itself into poverty. Similarly, every oil-exporting state must improve the management of their economies, diversify, and shift to far greater reliance on free markets, or risk economic collapse.

The pressures and challenges the region, and on its individual states, can create many possible futures. One such future is that the region will do enough to “muddle through,” largely preserving the status quo. In this case, political change will be limited and economic growth will barely keep up with population growth, if at all. Internal tensions will grow worse, civil conflict will continue, and some low-level fighting will take place between states.

Another possible future is that most exporting states will react in a positive manner, and will steadily implement the reforms they need in ways that avoid sudden political and domestic shocks. This kind of future is still open to the Southern Gulf oil exporting states and Libya. The political, demographic, and economic pressures on Algeria, Iran, Iraq, and Syria are so great that even partial success – “muddling through” – may be difficult.

The high-risk future involves a mix of different variables that can interact in very unpredictable ways. These variables include a succession crisis or internal instability in Saudi Arabia, instability in Iran and a transfer of power to revolutionary extremists, and continued reaches and authoritarianism in Iraq. They also include the problems in the Arab-Israel peace process, and continuing civil conflict in Algeria and Libya.

The most likely future is not one type of future for the region, but rather a mix of such futures that varies sharply by country. Most MENA states have, after all, muddled through for decades with considerable success. Many “problem states” have remained problems for the same period. A number of Middle Eastern and North African states are seriously debating reforms and beginning to implement them. The fact that there are many risks and problems is by no means a prophecy that most things that can go wrong will go wrong.

Scenario 1: Moving Towards Growth and Stability

The MENA region scarcely faces a Malthusian nightmare. Moderate political leadership, basic economic reforms, and aggressive efforts to reduce population growth and/or over-dependence on foreign labor could move virtually every MENA state towards sustained real economic growth in terms of both its GDP and per capita income within five to ten years. Rough working estimates by the World Bank indicate that sustained growth could average twice the population growth rate in half a decade – although, these estimates were made at a time when it was assumed that Asian economic demand would keep oil prices moderate to high.

Economic and demographic reform will not be easy in any part of the Middle East, but it would be least difficult to implement in the Southern Gulf, and would affect three key oil-exporting states: Kuwait, Saudi Arabia, and the UAE. Iran would require a definitive shift towards political moderation to implement effective reform, and Iraq would require a fundamentally different form of leadership elite that could focus on national development and provide more equity to Iraq's Shi'ite majority and Kurdish minority.

North Africa presents more difficult challenges. Algeria would have to solve its political crisis and put a firm end to its civil war. Libya would require both a fundamentally different leader and a leadership grounded in reality. North Africa has much less average oil and wealth per capita, and its average per capita income has dropped from a peak of \$2000 in 1985, in constant 1995 dollars, to around \$1,600 in 1997. By contrast, the average per capita income has dropped from a peak of \$3,600 in 1985 to around \$2,700 in 1997.²⁰

Morocco and Tunisia have, however, at least begun the process of political and economic reform, and Algeria's plans provide a basis for action are a beginning. The Egyptian private sector has made serious progress, and is an indication of just how much the right kind of reform might accomplish.

While the Arab-Israeli states are peripheral to the geopolitics of energy, much depends on the ability to end the Second Intifada and rebuild the peace process. There is enough political linkage between tensions caused by the Second Intifada, and the ability to concentrate on development in the rest of the region, so that it is far from clear that a best case scenario can really take place in the region's energy exporters without a success and stable Arab-Israeli peace.

At the same time, such a peace must also be accompanied by coherent economic reform. Israel may be much wealthier than its Arab neighbors, a strong and vibrant private sector, but state and political interference and a swollen public sector are as much of an enemy to Israel as Iran or any Arab state. Jordan has talked about and planned economic reform, but has not implemented it. Syria's economy is mired in a state-dominated past. The Palestinians lack governance and have no real economy. Lebanon is a glorified Ponzi scheme – all construction and infrastructure, and no real productivity and exports. Major changes would be required in the leadership and political elites of at least Syria and the Palestinian Authority.

It should be noted this “best case” scenario has several other requirements. Nations must avoid new major conflicts or civil wars, and military expenditures and arms imports must remain relatively low. (They have shrunk from about 17% of GNP in 1985 to around 8% today, and from around \$28 billion in 1985, in constant 1995 dollars, to around \$14 billion).²¹

The other states of the MENA region also need to follow Iran's lead in making aggressive efforts to reduce population growth – which ultimately may have to be kept well below 2%. The region must privatize and reform in ways that allow countries with minimal foreign investment to attract well over \$1 trillion in added private and foreign investment between 1998 and 2010, at least \$500 billion of which must go into energy investment, infrastructure, utilities, and water.

At the same time, the West needs to be careful about focusing too exclusively on peace, democracy, improved human rights, and/or reductions in corruption will solve the region's basic problems. These are important human values, and progress in these areas is necessary to achieve progress in other areas. The previous analysis has shown, however, that the most important changes necessary to achieve the “best case” are economic and demographic reform. In fact, there is little about the history of the MENA region to indicate that it matters very much whether a country has a president, dictator, socialist, king, or sheik. The results are remarkably similar in terms of overall development and the resulting impact or per capita wealth.

Scenario 2: Muddling Through

As has been mentioned earlier, the “muddling through scenario” is likely to be the real-world case for most states. Some countries – Israel, Kuwait, Qatar, and the UAE – will probably

either make enough progress to partially resolve their development problems or earn enough oil wealth to minimize their impact. Egypt, Iran, Morocco, Oman, Saudi Arabia, and Tunisia require substantially better leadership and efforts at reform, but can probably muddle through with some degree of growth or minimal further strain. Algeria, Bahrain, Lebanon, and Syria are more marginal cases, politically, economically, and demographically. They are likely to muddle downwards as muddle through. Iraq, Libya, the Sudan, and Yemen are high-risk cases.

Muddling through does not imply that there will not be low intensity and civil conflict, terrorism, and individual failed states. It does mean that regional states will continue to need to maximize their oil and gas export revenues, and will find the necessary investment in expanded production. There may be occasional blips or interruptions in some aspect of oil exports, and it is questionable whether sufficient capital will go into development to reach the DOE estimates of oil production listed earlier. In broad geopolitical terms, however, “muddling through” means the MENA region would be a reasonably reliable supplier over time, and become even more dependent on imports from outside the region - - ensuring a need to recycle petro-dollars or petro-yen.

Scenario 3: Failed States

True worst-case scenarios are pointless. Not only is everyone already dead at the start of such scenarios, they have never been born. In the case of the MENA region, such worst case scenarios include the prolonged internal collapse of a major exporter like Saudi Arabia, wars that cause prolonged total interruptions in all Gulf oil exports, nuclear or WMD attacks on critical exporting facilities, plus the odd meteor or earthquake. Such futures are possible – particularly over a period as long as 1998 to 2030. However, such futures are scarcely *probable* and they virtually defy meaningful cost-effective contingency planning.

Other “worst case” risks are more probable, and are still quite serious. These contingencies can cause the kind of energy “crisis” which can have a slow and cumulative effect in raising real energy prices and slowing global economic growth. They can cause serious human tragedies in parts of the MENA region, and lead to serious short-term panics or cuts in growth. Such contingencies include a mix of events in which regional states fail to deal with their internal problems, become involved in serious regional conflicts, or “institutionalize” problems that block effective investment and development of their resources. These cases include:

- The Second Intifada becomes systematic, long-term break down in the Arab-Israel peace process with a backlash that limits U.S. ability to deter and terminate conflict in the Gulf, increases terrorism and Islamic extremism throughout the region, and limits outside investment.
- The failure of Iranian political and economic reforms, and of Iran's oil and gas development.
- Nation-building in Iraq fails. The resulting turmoil limits Iraqi exports and increases in export capacity, and the U.S. and British invasion of Iraq fails to bring a stable peace or effective economic and energy development.
- Internal civil conflict or tension becomes serious in Saudi Arabia, or there is a shift to a kind of Islamic extremism that discourages further increases in oil export capacity and tries to use oil exports as a political weapon.
- State sponsored or proxy terrorism affects some mix of MENA states, possibly using weapons of mass destruction, of a kind that would have a major impact on energy investment and/or the willingness and capability to export.
- Regional proliferation takes place at a level that leads to a major arms race and create a structure of deterrence sufficiently uncertain to make investment a major risk, possibly coupled to some actual use of a few weapons against an oil-exporting country(ies), with the resulting panic.
- A new, intense, and prolonged civil war in Algeria and/or Libya takes place that affected exports or blocked effective investment and development of export capacity.
- Naval/air conflicts occur in a critical "bottleneck" in areas like the Strait of Hormuz that had a serious short-term impact the flow of tankers.
- Prolonged U.S. economic sanctions that affect energy investment in key exporting states.
- A failure by the West to sustain the necessary power projection forces, regional political pressures that make them difficult or impossible to use, and a regional failure to develop any effective regional security structure.

It is important to realize that the risks in such a "worst case" scenario are not that any one problem is probable in the form that is listed above, but rather that the cumulative probability that one or more events of the *kind* listed above will occur over the period before 2030. The resulting range of uncertainty is not a reality that planners and forecasters like, but it is a mathematical fact of life – and a constant historical reality. When it comes to risk assessment in the MENA region, the cumulative probability that one of many less probable events will actually occur over time is generally higher than the probability that one of a small set of more probable events will occur.

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⁴ International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 25-27.

⁵ International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 27-30.

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⁸ International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 30-31.

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¹² International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 179-182.

¹³ International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 181-184.

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¹⁵ Middle East population is expected to grow by more than 2% per year between now and 2030—the fastest growth of any WEO region.

¹⁶ International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 187-188.

¹⁷ International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 188-190 and 227-232.

¹⁸ International Energy Agency, *World Energy Investment Outlook, 2003 Insights*, IEA, Paris, 2003, pp. 188-190 and 231-232

¹⁹ For the latest report, see United Nations development Programme, Arab Fund for Economic and Social Development, *Arab Human Development Report 2003: Building a Knowledge Society*, UNDP, New York, 2003

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