

Chapter GEOPOLITICS 4

Abstract

The world energy map is changing. Projected energy demand will come increasingly from developing and emerging economies, as will supply. The global energy future is also distinguished by an increasing concentration of energy suppliers and demand centers, which are geographically farther apart; requiring increased investment, longer transport routes, and raising security and environmental concerns. The emergence of new market players, new alliances, and evolving rules further complicates the global energy picture.

This chapter recognizes that the global energy resource endowment is, indeed, enormous, but also examines “above-ground” risks such as access, resource nationalism, security concerns, political shifts, and environmental and security considerations. These can significantly affect the producibility, conversion, and deliverability of energy, and the timing of needed investments. The chapter also addresses implications of carbon constraints and seeks to recast calls for “energy independence” by endorsing opportunities for enhanced “energy

security” in a truly global and inter-dependent energy market.

The outline of the Geopolitics chapter is as follows:

- How the world is changing
 - Dramatic growth in global demand
 - New patterns of trade
 - The pressures of globalization
 - Changing evaluation of risks
 - Governance and resource nationalism
 - The growing power of national oil companies
 - Climate change
 - Sustainable development and related policy challenges
 - Security and terrorism
 - Other risks and scenarios
- Implications for the United States
- Conclusions.

International energy trade is increasingly influenced by geopolitical considerations at the expense of the free play of open markets and commercial actions by a competitive oil and gas industry. As demand grows, oil and natural gas become strategic commodities susceptible to being used for geopolitical leverage. Alternative energy sources have the potential to become viable substitutes, but making them available at a scale that reduces global dependence on fossil

fuels will take time. Meanwhile, global competition for oil and natural gas is intensifying as new players enter the market; suppliers are increasingly seeking to exploit their resources also for political ends; and consumers are exploring new ways to guarantee sources of supply.

The growing influence of geopolitical factors on global energy trade has profound implications for U.S.

interests, strategies, and policy making as well as for the ways that oil companies conduct their business. Many of the expected changes could pose heightened risks to U.S. energy security, in a world where relative U.S. influence is likely to decline as economic power shifts to other rising nations. In years to come, security threats to the world's main sources of oil and natural gas may persist and possibly worsen.

In geoeconomic terms, the biggest impact will come from increasing demand for oil and natural gas from developing countries, which may outpace the development of new sources of supply, thereby putting pressure on prices. In geopolitical terms, the consequences of such an imbalance will be magnified by the fact that demand is rising most strongly in China, India, and other large emerging economies.

Key questions abound: Will competition for scarce resources lead to political or even military clashes among major powers? Will bilateral arrangements among nations become common as governments attempt to “secure” energy supplies outside of traditional market mechanisms? How far will countries go in using their national oil companies to further foreign policy and internal political objectives? Will non-market forces divert needed investment in the energy sector?

These developments are taking place amid rising hostility to globalization in large parts of the world, including many industrialized countries that benefit from it. The political will to complete multilateral trade negotiations is ebbing, with major trading nations turning to bilateral or regional preferential agreements that fragment world trade, increase costs, and diminish market efficiency. It is even possible that the global trading system itself may fracture from geoeconomic and geopolitical stress.

On the security front, the spread of militancy is likely to continue in some of the major oil producing regions. Terrorism and weapons proliferation (including nuclear arms and other weapons of mass destruction) will probably continue to grow, as may the risk of war. The impact would be particularly acute if this happens in the Middle East, with its vast and critical oil and natural gas resources.

Government policy making is also likely to be increasingly influenced by non-governmental organizations and other groups promoting environmental interests, demanding new policies to combat climate change and other issues such as human and labor

rights violations, supported by shifts in public opinion. The result will be mounting pressure on international oil companies to conform to new regulations and/or voluntary controls, thus altering the economic and political order within which they operate.

HOW THE WORLD IS CHANGING

Dramatic Growth in Global Demand

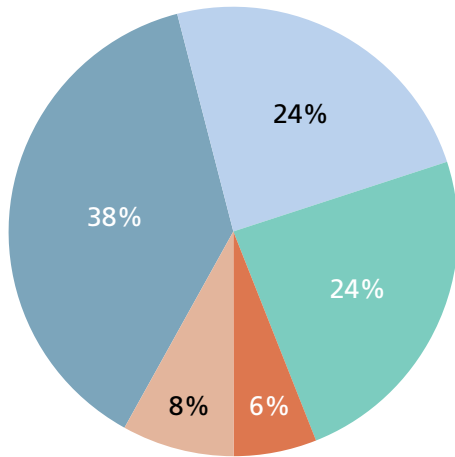
Current forecasts are for continued increases in global energy demand and changes in the pattern of energy flows, with a decided shift eastward on the “world energy map” due to higher demand in Asia. To appreciate the scale and pace of demand expansion, consider that it took world oil demand 18 years (1977-1995) to grow from 60 to 70 million barrels per day, but only eight years (1995-2003) to increase from 70 to 80 million barrels per day. If present projections prove accurate, demand could exceed 90 million barrels per day by 2010 and 115 million barrels per day by 2030.

Continued world population growth will lead to rapid increases in demand for food, housing, and other products and services that invariably require energy to produce and deliver. In addition, over a billion of the world's inhabitants currently have little or no access to the most basic forms of energy, an unsustainable predicament with potentially ominous consequences to the welfare of that population.

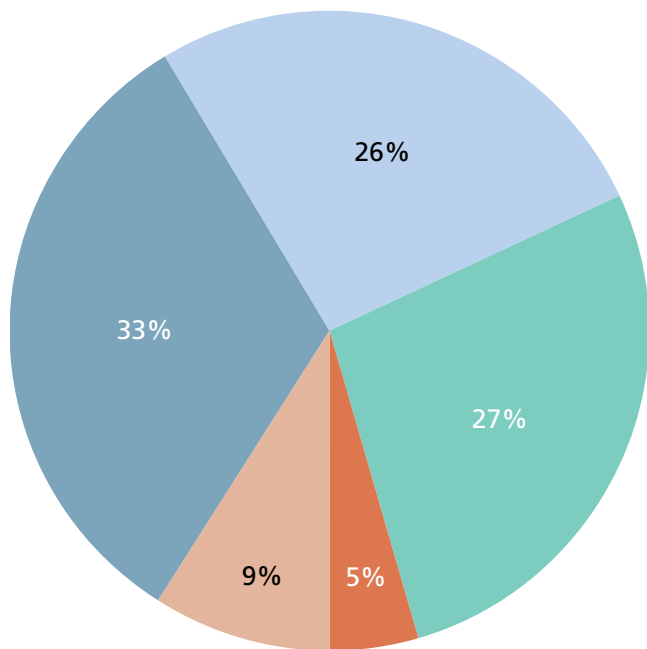
Most forecasts predict that during the next 25 years, the world will continue to rely essentially on the same forms of energy as it has for the past century—oil, natural gas, coal, and nuclear power—along with a broad range of renewable sources that includes solar, hydroelectric, biomass, and wind energy. Although global energy demand is forecast to double between 2001 and 2030, little change is expected in the relative shares of the major fuel sources (Figure 4-1) with over 80 percent of demand in 2030 projected to be met by fossil fuels.

Energy use in North America, which currently accounts for about 30 percent of worldwide consumption, essentially followed larger global trends. By contrast, greater reliance on nuclear energy in Europe slightly altered the total mix, with lower demand for coal and natural gas. In developing countries, often the least able to afford or employ the best available technology, fossil-fuel use approaches 90 percent.

2005 – 446 QUADRILLION BTU



2030 – 722 QUADRILLION BTU



Source: EIA, *International Energy Outlook 2006*.

FIGURE 4-1. Global Energy Demand — Fuel Shares

Given the long lead times necessary to develop and introduce new conventional fuel supplies and alternative energy forms, demand for fossil fuels (oil, natural gas, and coal) is expected to continue to dominate the global energy mix for at least the next two decades—absent radical changes in

economic or foreign policies, environmental crises, terrorist or war devastation, or a major technological breakthrough.

The trend is particularly dramatic in the developing world. Both the International Energy Agency (IEA) and the Energy Information Administration (EIA) of the U.S. Department of Energy predict that developing countries in Asia, including China and India, will continue their current economic expansion, driving the doubling of energy demand in the developing world by 2030 (Figure 4-2).

New Patterns of Trade

As demand rises in Asia, a new global energy picture is emerging that requires an increased focus on investment, transportation infrastructure, security, environmental, and geopolitical considerations, as well as a reevaluation of overall strategies by government and industry.

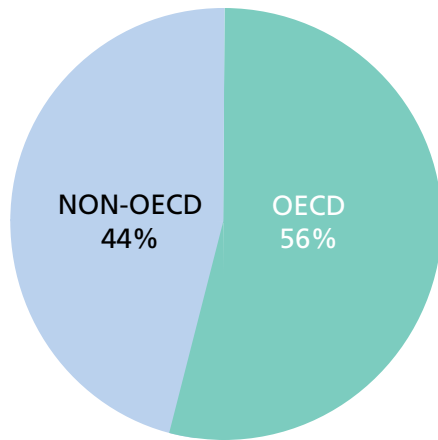
In the global oil and natural gas market, demand will continue to shift to emerging economies with growing populations. These nations will not only emerge as large energy consumers, but some will also control a large share of energy resources. At the same time, conventional oil and natural gas production in the developed world is declining.

The major regions of expanding production are the Middle East, West Africa, Russia, and the Caspian Sea, together with a few areas where unconventional production is rising (e.g., oil sands in Canada and extra-heavy crude in Venezuela). The three major consuming areas are North America, Europe, and Asia.

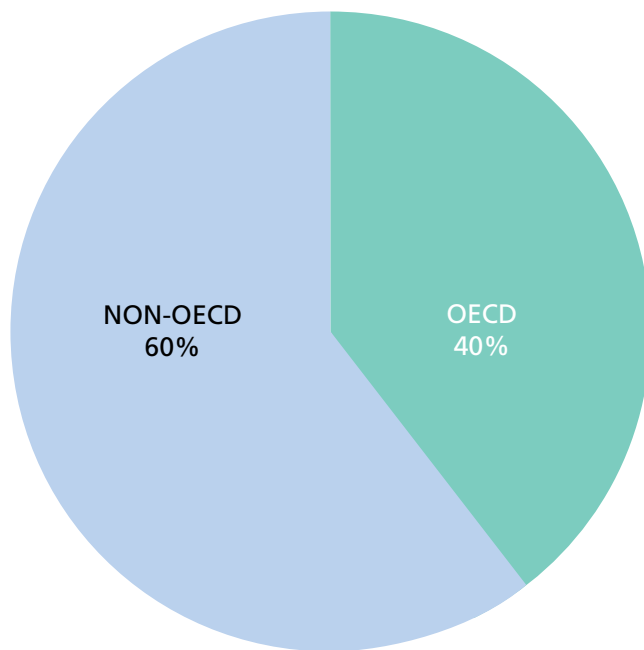
The growing need for transportation of energy between these areas raises important concerns over geographical “choke points,” both for oil shipments and, increasingly, for natural gas—whether delivered by pipeline or in the form of liquefied natural gas (LNG). The most potentially congested, difficult, or dangerous transit passages, such as the Straits of Hormuz and Malacca and the Bosphorus, pose both security and environmental challenges (Figure 4-3; see also Figure 2-76 in Chapter 2, “Energy Demand”).

As patterns of demand and transportation change, new regional and international, commercial and strategic alliances may emerge, marking the beginning of a “new game” in the geopolitics of

2004 – 445 QUADRILLION BTU PER YEAR



2030 – 678 QUADRILLION BTU PER YEAR



Source: IEA, *World Energy Outlook 2006*.

FIGURE 4-2. *World Energy Demand Growth from 2004 to 2030*

oil and natural gas, in which different countries and corporations will develop new strategies and techniques to secure access to resources. Although the implications for international energy companies and smaller “independent” companies seeking to explore and produce oil and natural gas overseas—especially U.S. companies—are not yet fully evident, such companies may find themselves at a competitive disadvantage in gaining access to resources and new business opportunities.

Evidence suggests that this new game may already be under way. In the future, non-OECD nations will include both the largest holders of conventional energy resources and their fastest-growing consumers. The national oil companies (NOCs) and energy ministries in these countries will play an increasingly important role in policy decisions about how to develop their resources and whether to rely on the global market or instead to negotiate bilateral supply arrangements with other countries. These bilateral deals may include provisions that extend well beyond conventional commercial terms and require foreign aid and other commitments from the governments of consuming countries.

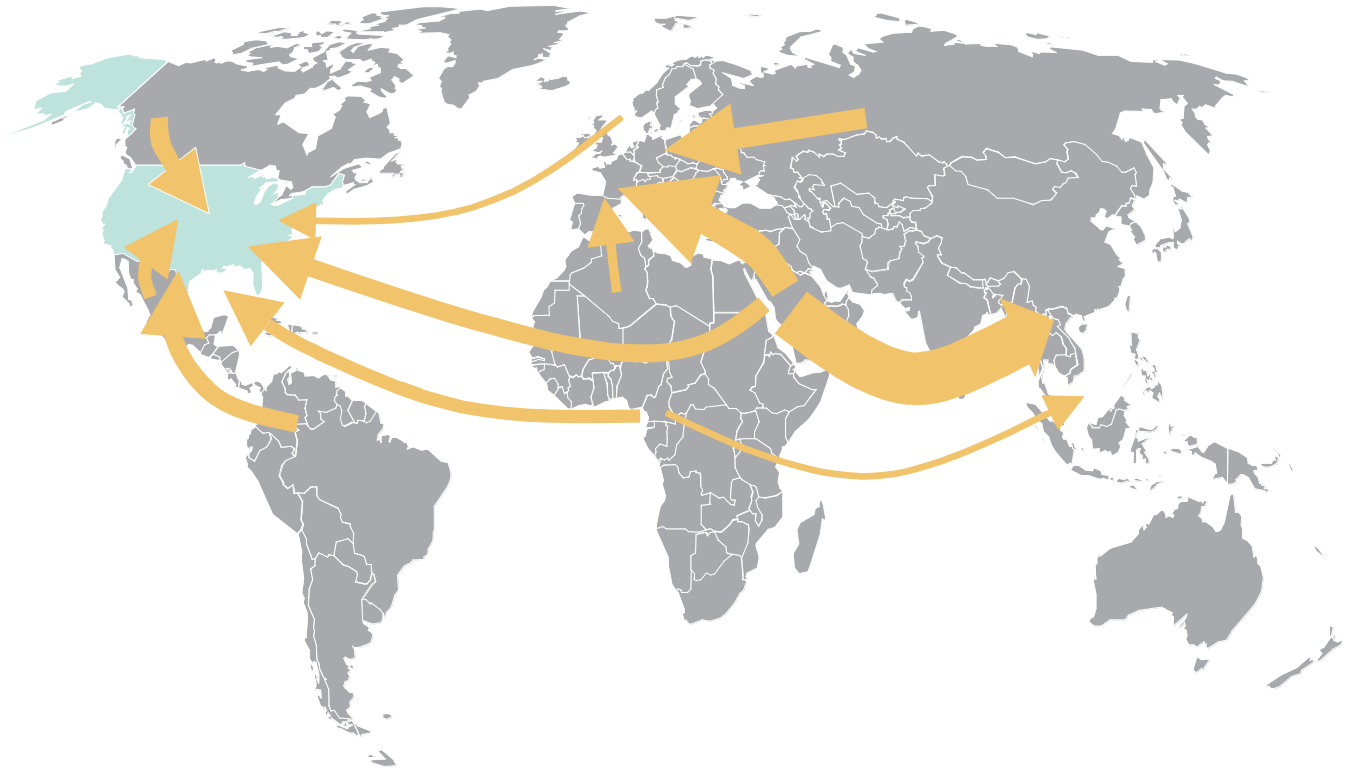
Energy’s growing strategic importance may thus encourage producers to leverage their advantageous positions when dealing with consumer nations, either to gain commercial benefits or to further their national geopolitical or foreign-policy objectives. With shifts in bargaining power, the open-market rules and norms that have characterized global energy trade and investment for the past several decades may well be under threat. Yet all energy producers and consumers would benefit from greater investment and freer trade that open-market practices promote in an increasingly integrated world.

The Pressures of Globalization

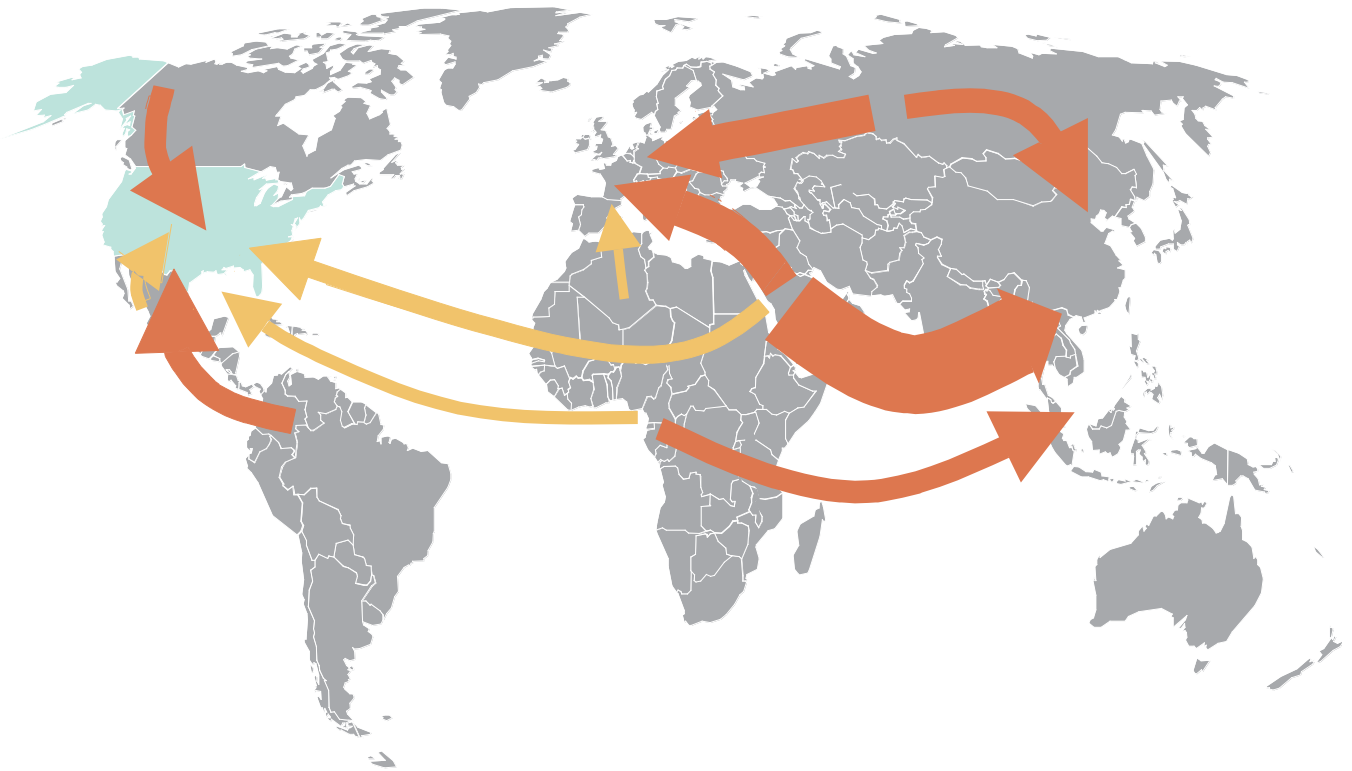
For more than 60 years, growing areas of the world have enjoyed the fruits of expanding free trade and economic integration. Globalization has been driven by the communications revolution, the increasing ease of international financial movements, rising living standards, the continued opening of markets for products and services, the worldwide reach of multinational corporations, and other modernizing forces. The resulting unprecedented economic growth has been boosted by a global oil market that has relied on ready access to resources and the efficient application of investment capital, technology, and management by an internationally competitive petroleum industry. Many of these long-standing conditions, however, now face new challenges to their sustainability in the years ahead.

As new entrants such as China and Russia play an increasingly important role in the international economic system, the fundamental, Western-inspired values that have underpinned the system—representative government, the rule of law,

2000



2030



EXPANDING FLOW TRENDS

FIGURE 4-3. *Global Oil Flow Trends*

transparency, accountability, and open markets—can no longer be taken for granted. The balance of global economic power is shifting to emerging countries, not only to major, fast-expanding nations such as India and Brazil, but also to the main group of developing countries that populate the halls of international organizations such as the World Trade Organization (WTO), the international financial institutions, and United Nations agencies.

Increasingly, these developing countries are joining forces to increase their political clout. Not all are as committed to the principles of free trade, transparency, and the rule of law as the governments that founded the current world institutional framework after World War II. International institutions, and particularly the WTO, may have to adjust to the requirements and wishes of these new economic powers, as they assert increasing influence over the global agenda and the rules of the international trading system. Many international economists hope that as developing countries grow richer, they will increasingly appreciate the need for open markets and the rule of law in order to protect their own exports and growing prosperity.

If, however, moves toward more open markets stall, and even reverse, the world economy will become less efficient, costs will rise, and individual governments may apply their own rules to investments, taxation, and the way they select energy trading partners. There may be more preferential trading among regions and an increasing number of bilateral or regional deals struck for political rather than purely economic reasons. U.S. influence for resolving these problems would diminish if agreed multilateral rules are disregarded. Such developments are all the more likely as a worldwide backlash against globalization has been growing in recent years, not least in the Western countries themselves. Rising economic nationalism and protectionism at home would make it harder for the United States to continue to exert global leadership in favor of open markets.

Various countries and interest groups are resisting the forces of globalization and many of the international norms and institutions designed to facilitate the spread of liberal market systems. At one extreme, rising anti-Western and particularly anti-American sentiments and actions—as exhibited by militant movements, terrorism, and economic populism—pose fundamental threats to globalization. Whether resistance is directed against the pace of globaliza-

tion, its perceived inequities or alleged failures, or its social/cultural impacts, countries and ideological movements often challenge the international system and the forces of economic liberalization.

It is unclear whether this resistance will ultimately slow, reverse, or otherwise alter the progress of globalization, or change the prevailing norms of the international system. Many opponents blame globalization for ills for which it is not responsible, although that does not necessarily diminish the political impact of their grievances. A prolonged and spreading backlash against globalization and international norms could threaten their long-term viability, thus introducing greater uncertainty and risk when energy investors and governments consider investment and management decisions.

Changing Evaluation of Risks

When evaluating global investment opportunities, international oil companies (IOCs) have traditionally relied upon an inventory of investment-risk criteria. In exploration and production ventures, these considerations typically comprise:

- Geological risk—are the hydrocarbons present?
- Technological risk—can resources be accessed with existing/available technology?
- Commercial risk—at what price, and under what terms? Are these adequate to ensure a favorable return on investment relative to shareholder and portfolio risk?
- Political risk—what threats do political conditions pose to the project and investments? What if the political situation changes? Can these risks be managed?
- Environmental risk—can the resources be developed in environmentally acceptable ways?
- Human-resource risk—are there enough suitably trained and qualified people available to develop the resources?

Some of these traditional assessments concern the location and nature of underground resources, others relate to “above-ground” risks, such as political and labor-market developments. As conditions for resource extraction change, however, it may well be that the “above-ground” risks pose greater challenges to meeting future global oil and natural gas demand than concerns over the resources themselves.

Such “above-ground” issues include conditions of access to resources, security, the kinds of investment required, transportation infrastructure, availability of skilled labor, the quality of governance and political stability in the country holding the resources, terrorism, corruption, and various environmental considerations. Over the past decade, investment risk has increasingly been reevaluated in the light of these factors, and it seems inevitable that this trend will intensify in coming years.

Governance and Resource Nationalism

Since at least the first half of the 20th century, host governments have attempted to take direct control of their countries’ oil resources. Now, high global oil prices have encouraged a new wave of resource nationalism. Most recently, a new generation of sovereign governments has begun to reassert greater control over natural resources, in an effort to extract maximum commercial advantages—often by violating existing contracts. Sometimes, these governments also select partners on the basis of national geopolitical or broader economic

priorities, rather than on open market competition. Increasingly, NOCs are operating outside their own countries or traditional areas and are competing internationally with the support of their governments.

A predominant share of the world’s known oil and natural gas reserves is not available for direct investment by international oil companies. These reserves are primarily in member countries of the Organization of Petroleum Exporting Countries (OPEC) located around the Persian Gulf, where resources are most plentiful and can often be developed at low cost (Figures 4-4 and 4-5). Countries outside the Middle East that once welcomed foreign investment, such as Venezuela and Russia, have turned increasingly hostile. Thus, investment capital, as well as the best industry technology and manpower, cannot be applied in the most economically effective manner to increase supplies of oil and natural gas for the world market, even at a time of historically high energy prices.

In a world of growing energy demand, producing countries are more inclined to dictate political or other conditions that often distort market efficiency. As Russia explores new ways to increase control over

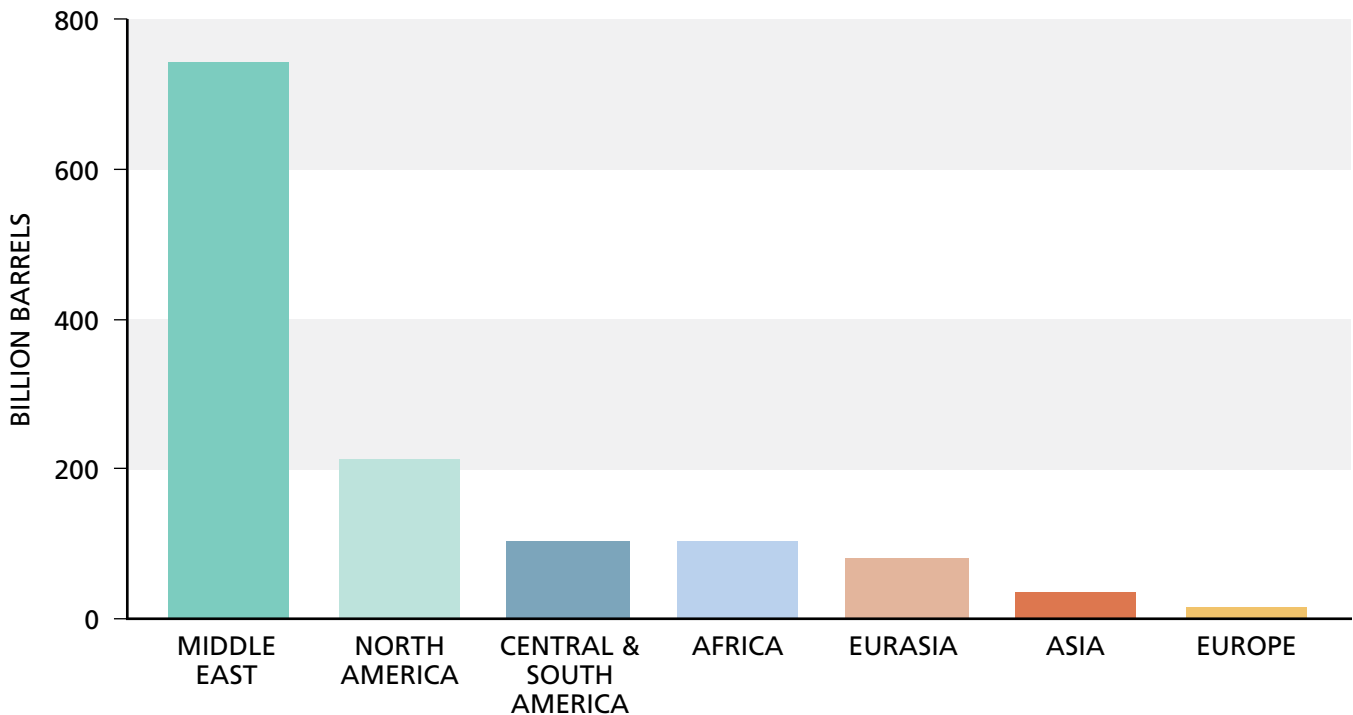


FIGURE 4-4. World Crude Oil Reserves — Regional Shares

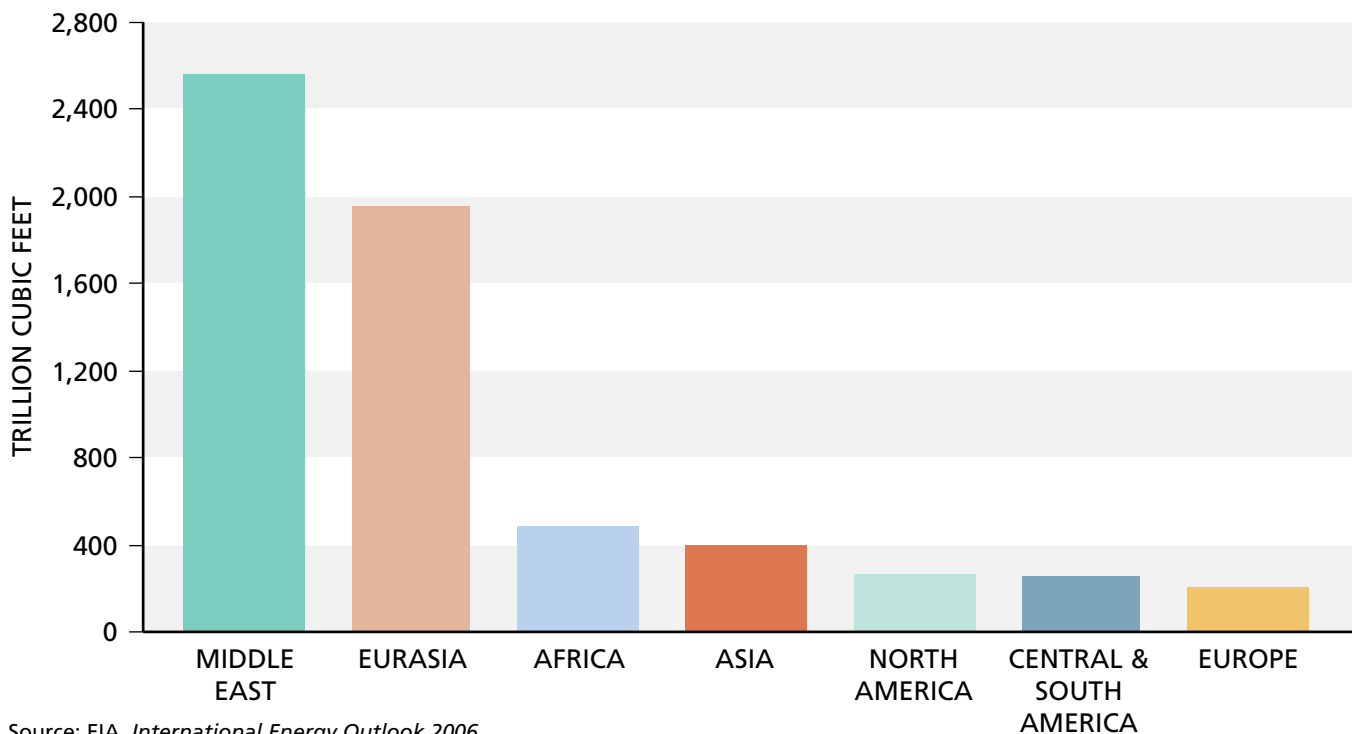


FIGURE 4-5. World Natural Gas Reserves — Regional Shares

investors and consuming markets, similar developments are occurring in Latin America, most especially in Venezuela. In Russia, resource nationalism is used to justify reversing privatizations and redistributing oil income, and often considered a desirable way to safeguard the nation's greatest natural assets from rapid "exploitation" by profit-maximizing international companies that would endanger national plans to stretch out use of the resources over as many years as possible. Russia and other countries also view energy as a means to increase their global influence.

However, resource nationalism undermines investor confidence in the long run and can lead to many undesirable results: deferred investment slows the pace of resource development; oil rents are diverted to unconnected social, political, or military activities; infrastructure and resource development are neglected; and the expertise available from international industry is rejected in favor of state control or cooperation with other NOCs.

High prices for producing countries—together with popular pressure for jobs and other government programs—further encourage resource nationalism and erode the sanctity of contracts. Consequently,

investments in production capacity either slow or flow instead to areas of higher geological, technical, financial, and political risks. In some of these areas the phenomenon known as NIMBYism (from "Not In My Back Yard") or environmental concerns may further restrict access. Restrictions on timely investment in an industry with long lead-times prolong the normal cycles of the petroleum business. The result is to extend periods of supply shortfalls, as in the 1970s, and surpluses, as from 1984 to 1999, and to increase uncertainties, inflexibility, and consequent volatility in global energy markets.

The Growing Power of National Oil Companies

Over the last 30 years, national oil companies have become a major factor in the global oil market. Most owed their creation to a feeling in many resource-rich countries that their energy endowments would only be used for the national good if a national company were directly involved in the process. This was accomplished in various ways, ranging from seizing foreign-owned resources and facilities, to nationalizing with compensation, to creating new companies to

participate in developing the resources. Many of the early NOCs (e.g., Aramco and Statoil) have grown into world-scale, efficient energy-market players operating globally in ways largely indistinguishable from IOCs. Because of non-commercial operating mandates or other local factors, other NOCs have remained inefficient or even marginal suppliers, and most operate only within their own borders.

With the increasing concentration of reserves in countries where NOCs have a dominant role by law, the future development strategies adopted by NOCs will play a key role in determining whether future oil supply meets expanding global demand. This will be even more important as reserves are depleted in other parts of the world or cannot be developed because of environmental, economic, or political constraints. NOCs from countries with growing oil imports, such as China and India, are increasingly participating in the global market, both to try to safeguard their own energy security and to foster other trade relationships.

With few exceptions, producing-country NOCs have proved to be reliable suppliers on the world market. Absent a fracturing of the global oil market, which would make political use of “the oil weapon” more feasible, NOCs may continue to develop in this way—if only to ensure access to the markets they want. The concern is, if bilateral energy deals become more common, governments may be tempted to achieve political or foreign policy objectives by utilizing their energy “leverage.” A more immediate and important concern is whether sub-optimal development of resources controlled by NOCs could pose a major and long-term supply risk. Inefficiency could result from:

- Subsidized or below-market domestic product prices
- Diversion of revenues and deferral of investment for social purposes, or for other government uses
- Uncompetitive labor practices or government employment requirements
- Low levels of technology.

These disadvantages may be partly offset by low production costs, easy access to reserves, preferential regulatory treatment, and, in many cases, small dividends to shareholders. More generally, NOCs may have a competitive advantage when dealing with certain problems, largely because they are not accountable to shareholders in the same way as IOCs

and because they often enjoy tangible advantages accorded by their national governments. On the other hand, if energy prices decline significantly, producing countries may once again need to attract foreign investment in order to maintain or increase production levels.

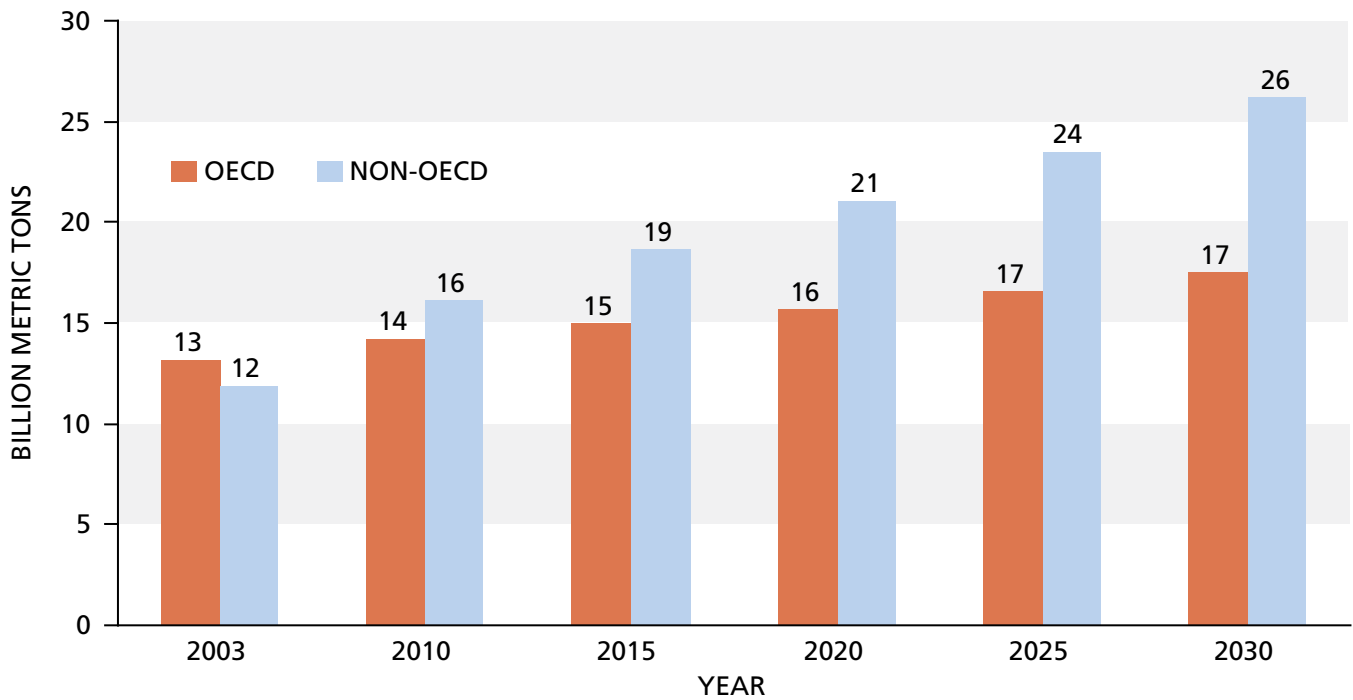
Climate Change

Greenhouse gas emissions have hitherto come primarily from industrialized countries. In the future, emissions from emerging economies and the developing world are expected to increase dramatically, accounting for over 60 percent of new growth in global greenhouse gas emissions (Figure 4-6). Greenhouse gas emissions from the developing world will exceed those of the industrialized world before 2010.

Climate change and the policy responses it triggers will have significant effects on global oil and natural gas supply and demand. There is widespread agreement among climate scientists that the world is growing warmer, regardless of whether most of the temperature increase is due to human activities. As a result, national, state/provincial, and local governments, as well as companies are beginning to work toward a carbon-constrained future and are trying to anticipate its consequences. Growing consensus on the need for technological, policy, and commercial responses to rising temperatures, sooner rather than later, would ultimately have an effect on energy/fuel choices by both producers and consumers. Significant impacts fall into two general categories: the effects of climate change itself, and the effects of policy responses to it—notably the move to a carbon-constrained economy.

Climate Change

- Climate change will physically affect the supply of oil, natural gas, coal, and other fuels both positively and negatively; for example, as a result of longer ice-free periods in higher latitudes and lost ice roads.
- Climate change will increase or lower the demand for oil and natural gas as changing weather patterns modify seasonal demand for heating and cooling, and as changes in crop growth and water resources alter population patterns.
- If the earth becomes significantly warmer, pressures arising from population migrations, altered food supplies, and new growing seasons could create not only environmental but also security problems. The



Data Source: EIA, *International Energy Outlook 2006*.

FIGURE 4-6. *World Carbon Dioxide Emissions by Region, 2003-2030*

hardest hit countries are likely to be in the developing world, the biggest potential source of new waves of migrants and refugees.

Policy Responses and Carbon Constraints

- Policy responses to climate change, such as carbon taxes, cap-and-trade systems, and tougher efficiency and fuel standards, will affect both the supply and demand for oil and natural gas.
- Differing national responses could damage the international trading regime by distorting competition and provoking retaliation by other countries.
- It is widely agreed that significant reductions in human emissions of carbon dioxide and other greenhouse gases would require substantial innovation and the widespread deployment of new energy technologies, requiring large and sustained private and public sector investments in research, development, demonstration, and deployment.
- Many economists agree that the most cost-effective ways to reduce greenhouse gases involve broad market-based incentives to the private sector to undertake technological advances without governments mandating the technology chosen.

- Technological and policy efforts to meet energy-security and environmental goals are sometimes aligned, but often are not. For example, renewable biofuels may help meet both energy and environmental objectives despite raising food prices and creating disruptions in land and water use; whereas converting domestic coal and oil shale to liquid fuel may benefit energy security, but present significant environmental challenges.

Sustainable Development and Related Policy Challenges

Traditional concepts of economic development are being challenged by the growing movement in favor of “sustainable development.” This term means different things to different people, resulting in widespread confusion over its definition. Often “sustainable development” is used simply as a call for greater attention to be paid to the environmental and social impacts of human activities. According to the United Nations’ Department of Economic and Social Affairs Division for Sustainable Development, “sustainable development” is the type of investment that “meets the needs of the present without compromising

the ability of future generations to meet their own needs.”

Such an aim may conflict with market-based development strategies, particularly if it implies that restrictions would be placed on the behavior of economic actors, such as constraints on the use of non-renewable resources. In the energy sector, progressive adoption of “sustainable development” principles could result in increasing political pressure to move from non-renewable to renewable sources of supply—even in situations where it may make less economic sense than choosing a conventional fuel alternative. Some proponents for sustainable development reject fossil fuels completely, while others recognize they are needed until adequate alternative energy sources become widely available. Sustainable development strategies are also sometimes linked to proposed solutions to problems of energy poverty and the distribution of wealth.

Steep increases in oil prices have led to significant transfers of wealth from energy consumers to a small and increasingly concentrated group of energy producing nations. Large amounts of capital have shifted from OECD countries to non-OECD states, which may not have adequate institutional safeguards to protect against rampant corruption and misuse of these massive revenue inflows. Many resource-rich countries have no institutional capacity to distribute energy revenue equitably, or to use it to stimulate economic growth and diversity by developing and modernizing other sectors of their economies. In addition, the temptation to rely excessively on energy revenue while neglecting the rest of the economy (a condition sometimes referred to as “resource curse”) can be a barrier to economic reform and a recipe for long-term economic failure.

Higher energy prices also widen the disparity in living standards between rich and poor nations. Wealthier countries have largely managed to cope with the price rise, while some developing economies have been forced to curb energy demand and to revert to use of non-commercial biomass, such as firewood. Other developing countries, however, have benefited from the current cycle of commodity price increases.

Increasingly, governments consider that these disparities in living standards reflect an unsustainable development path and may alter the way they approach natural resource development and revenue distribution. Concerns over the consequences of

higher energy prices on developing and emerging or transitional countries could redirect energy investment from traditional fuels to alternative-energy technologies and services. Many countries, however, are unable to attract the latest clean-energy technologies because energy is not priced at market rates in the domestic economy.

The International Energy Agency’s *World Energy Outlook 2006* estimates that over a quarter of the world’s population (some 1.6 billion people) has no access to electricity. Global electrification is distributed very unevenly. The highest proportions of people without electric power live in large parts of Sub-Saharan Africa and in South Asia. Supplying electricity to these communities may drive up carbon dioxide production, further increasing concerns about climate change. Even when people live close to sources of energy production, as in the Niger Delta, they are often precluded from enjoying the potential benefits because of inadequate distribution systems, lack of needed investment, and ineffective government policies on pricing, revenue sharing, and resource regulation.

Security and Terrorism

During the past 20 years, increases in global energy demand and the elimination of uneconomic refining capacity have effectively depleted the once ample surplus in production and refining capacity. Stricter petroleum product specifications also absorbed a large share of investment capital and limited refining flexibility. This has created a tighter market in which instability, labor unrest, sabotage, or other threats to supply can drive oil prices sharply higher. In particular, global reliance on oil supply from the Persian Gulf puts a premium on security in a confined area with growing intra- and inter-state tensions emanating from the war in Iraq, Arab-Iranian rivalry, rapid social change, and religiously inspired radical groups that seek government overthrow.

Conflict in the Middle East is neither a recent phenomenon nor one that lends itself to quick solutions. While many argue that the Arab-Israeli conflict is not at the core of regional tensions, the persistence of the conflict and the polarization of opinions surrounding it keep the entire Middle East in a high state of tension. Current circumstances suggest that hostilities will persist—or perhaps even escalate—in the near term.

While overt war between countries of the Persian Gulf is unlikely, threats to and harassment of production facilities, refineries, terminals, and shipping remain a possibility. Extreme “resistance” groups seek to overturn the current order by means ranging from political activism to subversion and terrorism. Militants aim to remove many of the existing governments in the region and to drive Western powers and oil interests from the Middle East. While the likelihood of extremist groups actually taking over governments in the region is remote, there is a much greater possibility that non-governmental or para-governmental organizations could either disrupt supplies through the Strait of Hormuz or conduct a successful attack on a land-based facility.

If a radical group were to come to power in any Middle Eastern producing country, it might cease shipping oil to the United States or selling it to U.S. oil companies. Such restrictions would result in at least short-term supply disruptions that could put a small premium on oil destined for U.S. markets as other suppliers diverted their product in the global market.

Another threat could be heightened regional tensions as a result of nuclear proliferation in the Middle East. Iran’s acquisition of a nuclear weapons capability, for example, could induce Saudi Arabia, Turkey, Egypt, and others to develop their own military nuclear capacity. In such a scenario, already high tensions in the region would be stoked by the threat of preemptive strikes or nuclear warfare. Should Middle East oilfields be seriously threatened, there would be sweeping consequences for world energy supplies and prices.

Other Risks and Scenarios

China and India are both concerned that the strains of unprecedented economic growth could trigger domestic political instability. Both countries must meet the energy demands of their rapidly growing economies and the development expectations of extremely populous societies. Failure to deliver on these expectations could lead to social unrest, but fulfilling these demands will also create huge economic, social, political, and environmental problems. Domestic coal is the most abundant and economic resource in both countries. It is often, however, used inefficiently and is subject to infrastructure bottlenecks such as those in rail transportation. Expanded

use of coal would increase greenhouse gas emissions even more rapidly.

Although most current concern centers on high oil prices, a sudden price collapse could also cause instability in parts of the Middle East and other major producing countries, such as Russia, Mexico, Nigeria, Venezuela, and Angola. In the years ahead, Middle Eastern oil producers face relatively similar challenges: undiversified extractive economies, a youthful population seeking gainful employment, and political systems that are beginning to show signs of strain in large part because of insufficiently representative governments. While all these problems are becoming more acute, current high oil prices have taken much of the political urgency out of addressing them in the near term.

Apart from the petroleum sector, economies and trade are underdeveloped in most of the major oil producing countries, although in some localized areas construction is booming and capital markets are becoming more vibrant. About 40 percent of Saudi Arabia’s gross domestic product (GDP) is still directly connected to the petroleum sector, as is 60 percent of Qatar’s GDP and 30 percent of Algeria’s. Government revenues are even more closely tied to the energy sector: petroleum exports account for 70 to 80 percent of Saudi Arabia’s state revenues, about 80 percent of Kuwait’s, and 40 to 50 percent of Iran’s. High oil prices thus not only create a significant income for regional producers, but the windfall revenue disproportionately aids producing governments that rely almost exclusively on oil production rather than normal taxation for their income.

How these countries manage their substantial oil and natural gas profits, how long high prices will be sustained, and how far and how quickly they may fall, are all critical questions that will determine political risks in the Middle East over the next two decades. Where elections have been held in the region, extremists have scored some striking successes. Democratic elections are not by themselves a guarantee of political stability, which requires much more fundamental changes in governance, and social and legal systems, often over many years.

In addition, radical political movements are extending their influence across borders in an unprecedented manner, thanks in part to easy access to the international media that satellite television and the internet provide. Local populations are also

being radicalized by fanatical religious leaders and by indoctrination in terrorist training camps. Finally, it is difficult to achieve stability in this critical oil-producing region without real progress in an Israeli-Palestinian peace process.

Outside the Middle East, many African countries and other under-performing economies are struggling to convert their energy wealth into economic development and diversification, whether through innovative energy-development programs in cooperation with the World Bank or by increasing social requirements on energy companies. Africa currently provides the United States with about 15 percent of its imported energy and may ultimately account for over 25 percent of U.S. oil and natural gas imports. However, continued and expanded U.S. access to African energy is by no means certain as other suitors are already lining up to secure future supplies. African trade with India and especially with China is growing rapidly. China's trade with Africa doubled between 2000 and 2004 and China is now Africa's third largest trading partner after the United States and France.

Chinese and Indian companies are competing aggressively with IOCs and providing more capital to develop African resources. This is a healthy development as long as investment projects are based on economic competition and are not attached to non-economic conditions. Corruption continues to pose a challenge to stable oil and natural gas production, especially in Africa, by misallocating precious resources and by discouraging long-term investment.

In Russia, the shifting roles played by private and state companies since the Soviet Union's collapse have stemmed investment flows and economic revival of the oil and natural gas industry. These problems have been exacerbated by policy swings between support for market competition and greater government control. Current policies show a strong preference by Moscow for reestablishing state control over energy resources and to use oil and natural gas supply as geopolitical tools to increase its influence in Europe and Asia. However, the vast investment needs of Russia's energy sector could still persuade the government to become a more market-oriented global player at some point in the future, particularly as world energy prices moderate.

In the Caspian Sea region, the competing interests of Russia, China, and the European Union continue to place heavy pressure on resource development and

transit decisions. Ideally, a multiple pipeline strategy would include, simultaneously, expanding capacity along the Russian route, expanding shipments to China, and dramatically increasing shipments across the Caspian Sea to Western markets—either by a shuttle-fleet of more efficient oil tankers or, more ambitiously and controversially, by seabed pipelines for oil and natural gas. In that way, oil and natural gas could be delivered to the highest-value market without political or commercial restrictions.

It remains uncertain, however, whether such a multiple-pipeline strategy can overcome significant political and financial roadblocks. The cost-benefit calculations by host and transit states, and by foreign investors, will undoubtedly play a significant role in deciding the fate of these various routes. Nevertheless, delays in resolving these transit issues have already postponed delivery of significant oil and natural gas from the Caspian Sea region to world markets. Further delays would forestall the full development of this significant oil and natural gas potential.

IMPLICATIONS FOR THE UNITED STATES

Energy Security

For more than half a century, the United States has been the leader in global economic integration and a strong advocate for the free flow of goods, services, and capital to benefit both the American and the global economies. Throughout this period, the United States has been a net importer of oil. Domestic oil production peaked in 1970. In 2030, oil and natural gas will continue to dominate primary energy demand. The notion that the United States, as the world's largest energy consumer, can truly be rid of reliance on imported oil and natural gas is politically appealing, but fanciful. "Energy independence," if it were to be pursued vigorously without taking into account economic consequences, could work at cross purposes to America's other international objectives and obligations in this increasingly interdependent world.

For globally traded commodities like oil, and increasingly for natural gas, significant supply disruptions in one part of the world affect all markets regardless of whether they seem to be directly involved. This interdependence was dramatically demonstrated by the global repercussions from

Hurricanes Katrina and Rita in 2005: storm damage to oil rigs and refineries in the Gulf of Mexico affected markets worldwide, and U.S. demand could only be met with the help of petroleum supplies from around the world. Other events that have disrupted supplies include, for example, militant activity in Iraq and Nigeria, and surges in market demand from developing countries such as China, India, and Brazil.

By the same token, in an integrated global energy market, the opening up of new resources in any particular region adds to overall global supplies and thus benefits all consumers, wherever they may be. Therefore, managing “energy *interdependence*” is a worldwide geopolitical challenge, one in which the United States must play a constructive leadership role.

A more useful definition of energy security is required to help inform and shape the public policy debate. Such a definition would include:

- A competitive market
- Stable and diverse supply with minimal disruptions
- Low price volatility
- Adequate spare capacity and logistical infrastructure
- Diverse energy mixes
- Protection of the global environment, including climate considerations
- Flexibility to accommodate shifting demand patterns
- Transparency and reliability of commercial relationships.

Neglecting these objectives in a blind pursuit of energy self-sufficiency would risk unintended and harmful consequences for both energy suppliers and consumers alike.

As the price of energy rises, its political importance to both producing and consuming countries increases. Producers and consumers regard energy security from different perspectives. For major energy importers, supply security is a key concern because reliance on another country or third party for energy involves risk. Governments of consumer countries want to provide their citizens with energy services while protecting them from disruptions and major cost fluctuations.

Energy exporters, in turn, depend on stable demand and reliable access to consumers. Countries rich in

natural resources arguably have greater control over their domestic energy security. But the ways that producer countries interpret the approaches their consumers take to secure greater energy assurance for themselves (demand-side management, promoting renewable fuels, etc.) can affect investment decisions by producer countries. These decisions, in turn, affect importing countries’ energy security interests.

Energy security involves various perspectives and requires many potential solutions. These multiple possibilities make managing global energy flows extremely complex. Individual governments and companies have few tools to influence overall energy security. And yet, the interconnected nature of the global oil and natural gas markets means that decisions made by producer or consumer countries will affect the energy security of others.

Engagement and Cooperation

International cooperation is an important component of U.S. energy policy and a significant means by which Washington seeks to promote greater understanding of diverging perspectives and to foster agreement on common principles, shared priorities, and paths forward. International engagement and cooperation will become more important as geopolitical tensions continue to place stress on international energy markets and relationships between energy players.

Broad-based cooperation will ensure that global energy markets continue to function efficiently and to meet the energy needs of a growing global economy. U.S. programs should aim to:

- Expand energy production
- Improve energy efficiency
- Reduce damage to the environment caused by energy production and use
- Diversify the types, sources, and suppliers of energy
- Encourage efficient and flexible markets nationally as well as globally and avoid restrictions that impede their ability to adjust to any disruption
- Remove barriers to energy investment and trade
- Promote greater transparency in energy trade
- Invest in modernizing energy infrastructure
- Develop and deploy new technologies
- Protect global energy infrastructure.

PARTNERSHIP	GOAL	MEMBERS
Carbon Sequestration Leadership Forum	Development of improved cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term safe storage. The purpose of the CSLF is to make these technologies broadly available internationally; and to identify and address wider issues relating to carbon capture and storage.	Australia, Brazil, Canada, China, Colombia, Denmark, EC, France, Germany, Greece, India, Italy, Japan, Korea, Mexico, Netherlands, Norway, Russia, Saudi Arabia, South Africa, UK, United States
International Partnership for the Hydrogen Economy	Accelerate the transition to a hydrogen economy. The IPHE provides a mechanism for partners to organize, coordinate and implement effective, efficient, and focused international research, development, demonstration, and commercial utilization activities related to hydrogen and fuel cell technologies. The IPHE provides a forum for advancing policies, and common technical codes and standards that can accelerate the cost-effective transition to a hydrogen economy; and it educates and informs stakeholders and the general public on the benefits of, and challenges to, establishing the hydrogen economy.	Australia, Brazil, Canada, China, EC, France, Germany, Iceland, India, Italy, Japan, Korea, New Zealand, Norway, Russia, UK, United States
Generation IV	The Generation IV International Forum, or GIF, was chartered in May 2001 to lead the collaborative efforts of the world's leading nuclear technology nations to develop next-generation nuclear energy systems to meet the world's future energy needs.	Argentina, Brazil, Canada, EC (represented by EURATOM), France, Japan, Korea, South Africa, Switzerland, UK, United States
Methane to Markets	Reduce global methane emissions in order to enhance economic growth, strengthen energy security, improve air quality, improve industrial safety, and reduce emissions of greenhouse gases. The Methane to Markets Partnership is an international initiative that advances cost-effective, near-term methane recovery and use as a clean energy source.	Argentina, Australia, Brazil, Canada, China, Colombia, Ecuador, Germany, India, Italy, Japan, Mexico, Nigeria, Poland, Republic of Korea, Russia, Ukraine, UK, United States
ITER	ITER is a joint international research and development project that aims to demonstrate the scientific and technical feasibility of fusion power.	EC (represented by EURATOM), Japan, China, India, Korea, Russia, United States
Global Nuclear Energy Partnership	Develop worldwide consensus on enabling expanded use of economical, carbon-free nuclear energy to meet growing electricity demand. This will use a nuclear fuel cycle that enhances energy security, while promoting non-proliferation. It would achieve its goal by having nations with secure, advanced nuclear capabilities provide fuel services—fresh fuel and recovery of used fuel—to other nations who agree to employ nuclear energy for power generation purposes only. The closed fuel cycle model envisioned by this partnership requires development and deployment of technologies that enable recycling and consumption of long-lived radioactive waste.	Still being formed
Global Gas Flaring Reduction	The GGFR public-private partnership, a World Bank-led initiative, facilitates and supports national efforts to use currently flared gas by promoting effective regulatory frameworks and tackling the constraints on gas utilization, such as insufficient infrastructure and poor access to local and international energy markets, particularly in developing countries.	(Donors) Canada, EU, UK Foreign Commonwealth Office, Norway, United States (Countries) Algeria (Sonatrach), Angola (Sonangol), Cameroon, Chad, Ecuador, Equatorial Guinea, Indonesia, Kazakhstan, Khanty-Mansiysk (Russian Federation), Nigeria, Norway, United States

TABLE 4-1. Sampling of Multilateral Energy Technology Initiatives

PARTNERSHIP	GOAL	MEMBERS
APEC – Energy Working Group	The APEC Energy Working Group (EWG) is a voluntary, regional-based forum operating under the APEC umbrella. EWG helps further APEC goals to facilitate energy trade and investment, and ensure that energy contributes to the economic, social, and environmental enhancement of the APEC community.	Australia, Brunei, Canada, Chile, China, Hong Kong, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Russia, Singapore, Chinese Taipei, Thailand, United States, Vietnam.
Asia-Pacific Energy Partnership	Public-private partnership to develop and accelerate the deployment of cleaner and more efficient technologies and practices.	Australia, China, India, Japan, South Korea, United States
Security and Prosperity Partnership/ North America Energy Working Group	Under the SPP, the energy goals are to strengthen North America’s energy markets by working together, according to our respective legal frameworks, to increase reliable energy supplies for the region’s needs and development; by facilitating investment in energy infrastructure, technology improvements, production, and reliable delivery of energy; by enhancing cooperation to identify and utilize best practices, and to streamline and update regulations; by promoting energy efficiency, conservation, and technologies like clean coal.	Canada, Mexico, United States

TABLE 4-2. *Sampling of Regional Multilateral Energy-Related Activities*

International engagement takes many forms, as illustrated in Tables 4-1 and 4-2. The U.S. government engages both producer and consumer countries, as well as the private sector, to maintain open lines of communication and to seek cooperation in overcoming common energy challenges. In general, the U.S. government engages other countries through specially designated bilateral and multilateral energy dialogues, through a series of next-generation energy technology initiatives, and by integrating energy policy considerations into other related bilateral and multilateral fora.

By maintaining frequent and regular contact with major producing and consuming countries through established energy dialogues, the United States has sought to foster greater stability in global energy markets through better communication and coordination. The U.S. military has also played a large role in securing major energy transit choke points throughout the world by maintaining forward deployed positions.

Participation in institutions like the International Energy Agency creates many benefits. It helps to improve data collection and transparency, to coordinate the use of strategic stockpiles during supply disruptions, and to foster joint consideration of energy policy issues that are of particular interest to member countries. Finally, public-private, multilateral partnerships on next-generation energy technologies help to encourage research, development, and deployment of transformative energy technologies.

CONCLUSIONS

U.S. Leadership

American leadership is key to advancing free markets, international stability, and open access to energy and raw material supplies. In order to maintain and reinforce this leadership, the United States must more strongly resist both isolationism and domestic protectionism. The United States must also take the

initiative to lock its economic and political principles as deeply as possible into the multilateral system.

America's prosperity rests on reliable access to stable supplies of energy from a global market. It cannot successfully pursue this goal separately from the rest of the world with a unilateral U.S. policy path. Therefore, the United States must adopt a global approach to energy security for its future national prosperity.

This means, in the immediate future, overcoming U.S. disagreements with the EU and some developing countries in global trade negotiations. In the longer term, it means strengthening institutions such as the WTO that enforce the market-based rules of the international system. It also means restoring strong political links with Europe and combating anti-Americanism around the world in more imaginative ways. And, it means doing the utmost to establish stability in the Middle East and to avoid unnecessary confrontation with China.

The U.S. government should press for large emerging consumer countries in the developing world, such as China and India, to be integrated progressively into the international energy security system—into institutions such as the International Energy Agency and the Group of Eight—in order to draw them into a decision-making process based on market principles and to enable closer monitoring of their compliance with international agreements. Irrespective of other policy differences, the United States, China, and India share vital common interests as energy importers, and cooperation among them could significantly strengthen the hand of the major consuming nations. It would also help to avert the adoption of divide-and-rule tactics by energy exporters aimed at bidding up prices and securing political objectives.

The United States should also boldly offer credible proposals for reforming international institutions, such as the United Nations and the International Monetary Fund. Multilateral institutions should be strengthened in order to enforce international rules that support not only U.S. interests but those of the rest of the world.

Energy Security

It is incumbent upon both producer and consumer countries to find common ground, or at least to agree

to basic principles, for governing the energy sector to ensure a relative degree of stability for all. Tension over energy security has turned energy into a key political preoccupation for governments around the world. The challenge in responding to such short term pressures is that energy policy decisions endure for decades with profound and lasting consequences, yet they are often made to resolve immediate issues with only short-term fixes. Sustainable long-term energy policies can only be developed from a robust and healthy debate over ideas. If a policy is to be effective for an extended period, an informed general public must accept and support not just its tactical aims, but also its strategic goals.

New Policy Tools

Along with a new strategic approach, the emerging energy world requires new policy tools to influence developments. For example, the need to open energy investment markets has largely been left out of WTO and other international trade negotiations, such as for NAFTA. U.S. economic, energy, and security interests, along with those of the rest of the world, will be best served if the United States and its allies work to achieve and maintain an open, multilateral, global system to the greatest extent possible.

National Oil Companies

To achieve the expanded production required to meet growing global demand in a timely manner, NOCs should be encouraged to work cooperatively with internationally competitive oil company partners in order to encourage the use of the best technology and to adopt global standards of transparency, accountability, and contract sanctity. The U.S. government should lead a worldwide campaign against resource nationalism and protectionism in resource development.

U.S. Policy Priorities

Measures the United States can take to help achieve the above objectives include:

- An energy policy that recognizes the need for—and actively encourages—long-term investment in production both domestically and abroad.
- Promotion of market energy prices in all countries—many NOCs owe their strong positions to

preferentially low product prices in their home countries. This will become increasingly unsustainable in a carbon-constrained environment.

- Continued openness in the United States to investment by foreign energy companies—especially through the Committee on Foreign Investment in the U.S. process. This is a critical bargaining chip in the U.S. government's efforts to win greater market access for American companies in producing countries.
- A firm stance opposing the carving out of energy investment and energy services from free-trade agreements.

Climate Change

Political consensus and coordinated national and international policies will be needed to facilitate long-term investments and technological advances as part of any attempt to mitigate climate change. Because the world shares a common atmosphere and because energy and other markets are interconnected, responses to climate change should be global.

Corporate Environmental Strategies

Consumers are increasingly aware of the environmental and social impacts of the products they buy. This means that energy companies must pay attention to their images as socially responsible organizations, and offer consumers the opportunity to purchase cleaner, more efficient energy or energy technologies. Companies are increasingly finding ways to turn this attention to sustainability and corporate citizenship to their competitive advantage.

A Global Response

The United States has much to gain by strengthening the international structures that promote maintaining and expanding open global markets and that prevent fragmentation of the world economy. However reluctant we and other countries may be to admit it, energy is a crucial policy area in which the interests of the United States and those of the rest of the world coincide. If the world does not respond creatively to the challenges outlined above, we risk confronting an increasing uncertain future, defined by factors beyond our control or influence.

