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The paper finds that while oil will remain plentiful, globalization and growing world demand will make oil consumers increasingly vulnerable to disruption. At the same time, the risk of disruption from interstate conflict, resource competition, internal instability, and other factors will grow. Oil dependency is inescapable in the short-run, and the U.S. can only manage and minimize the risk of disruption by defending the supply of oil and by hedging against future interruptions. Over the long-term, however, the United States should seek to reduce oil dependency by increasing efficiency and developing energy alternatives.

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OIL, SECURITY, AND THE POST-9/11 WORLD

by

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A paper submitted to the Faculty of the Naval War College for the Jerome E. Levy Economic Geography and World Order Prize.

The Contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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17 May 2002

Abstract

OIL, SECURITY, AND THE POST 9/11 WORLD

The September 11, 2001, terrorist attacks did not directly threaten world oil supplies, but they exposed the long-term danger of relying on an energy source found chiefly in one of the world's most explosive regions. Oil dependency has major consequences for the U.S. and other major consumers. This paper examines the driving forces and trends that will affect the global supply of oil to 2020. It then identifies possible economic and geopolitical implications of oil dependency and offers suggestions for a U.S. energy security strategy.

The paper finds that while oil will remain plentiful, globalization and growing world demand will make oil consumers increasingly vulnerable to disruption. At the same time, the risk of disruption from interstate conflict, resource competition, internal instability, and other factors will grow. Oil dependency is inescapable in the short-run, and the U.S. can only manage and minimize the risk of disruption by defending the supply of oil and by hedging against future interruptions. Over the long-term, however, the United States should seek to reduce oil dependency by increasing efficiency and developing energy alternatives.

OIL, SECURITY, AND THE POST 9/11 WORLD

The September 11, 2001, terrorist attacks on the United States serve as a brutal reminder that the global economy depends on an energy source found chiefly in one of the world's most explosive regions. The global oil supply was not a target of the attacks, and the flow of oil continued unabated following the atrocities in New York, Washington D.C., and Pennsylvania. However, those responsible for the attacks seek to replace the existing regimes in the Persian Gulf region with ones steeped in the anti-Western, anti-American hatred of their radical Islamist ideology. Were they to succeed, the terrorists would control two-thirds of the world's oil reserves and enjoy enormous leverage over all oil-importing countries.

The terrorists have so far failed to spark the mass uprising they hoped to foment in the Islamic world. However, the social, economic, and political conditions that spawned their movement have not disappeared. Indeed, these conditions are likely to worsen in the coming years, and the ensuing unrest and instability could easily disrupt the flow of oil. Moreover, the Persian Gulf states are not the only oil producers at risk. In fact, many of the world's major oil producers—from Azerbaijan to Angola, and from Venezuela to Indonesia—are beset with varying degrees of internal strains. Resource-related external conflict also threatens the unimpeded flow of oil.

Oil drives the global economy. Other energy sources are also important, but oil remains king—especially in transportation. Oil is cheap and abundant, but dependence on it imposes major costs and risks on the U.S. and other consumers. For example, the U.S. bears a major cost by providing a permanent military presence in the Persian Gulf to defend friendly petroleum-producing regimes and to preserve the smooth flow of oil from the region. Oil dependency also

creates the risk that serious supply interruptions will inflict major economic hardship upon the U.S. and other petroleum-dependent countries.

Global dependence on oil has major consequences for the U.S and other major consumers in a globalized economy. Will they continue to accept the inherent risks of oil dependency, or will they seek to reduce their mutual addiction to this commodity? This paper examines the driving forces and trends that will affect the world petroleum supply to 2020. It then identifies some possible economic and geopolitical implications of growing oil dependency. Finally, the paper offers suggestions for a U.S. energy security strategy over both the short and long-term. As the world's largest oil consumer, the U.S. has the greatest stake in global energy security, and as the world's dominant military and economic power, it has the influence to lead the international community to a more secure energy future.

Drivers & Trends to 2020

Globalization is Transforming the Oil Industry. The international oil industry has undergone some dramatic changes since control of oil prices in the U.S. market ended in 1980. Today, the oil trade is increasingly open, and information technology is making the industry more transparent. Oil is mainly priced and sold in the global marketplace, where it has become a "fungible, global commodity."[1] Once produced, it can be delivered virtually anywhere in the world. Oil trading patterns are now determined largely by transportation costs. Most producers seek to maximize revenue by reducing supply chains and selling their oil to the closest markets. Consequently, oil-flow patterns are shifting. By 2020, the U.S. will import over half its oil from the Atlantic Basin, which includes coastal Latin America and West Africa. Europe will import

increasing amounts of petroleum from Africa and the Caspian Basin as well as the Persian Gulf. Meanwhile, a growing percentage of Persian Gulf oil will flow to East Asia and the Pacific Rim.[2]

The smaller proportion of Persian Gulf oil flowing to the U.S. suggests that the region will decline in overall importance to Americans. This perception is false. First, total imports from the Persian Gulf to the U.S. will nearly double by 2020 even if they decline as a percentage of oil imported.[3] Additionally, a globalized oil trade means that a major supply disruption anywhere in the world will force the U.S. and other consumers to compete for the remaining supply in the world marketplace, where they will pay full market price.[4] Finally, globalization means that individual economies are vulnerable to disruptions anywhere in the world economy—witness the 1997-8 Asian financial crisis and aftershocks felt from Russia to Brazil. Even if the U.S. was entirely energy self-sufficient, a major supply interruption affecting America's trading partners would harm the U.S. economy. The Bush Administration's *National Energy Policy* recognizes that "Because the price of our domestic and imported oil is determined by a world market, our energy security interests transcend the source of our physical energy supplies."[5]

Petroleum Supplies Will Remain Plentiful. The good news is that those oil supplies should remain plentiful—at least through 2020. The predictions of imminent oil scarcity that prevailed in the 1970s have given way to optimism that oil production can meet world demand for decades into the future. Technology has made locating, developing, and producing petroleum easier and less costly. Improvements in exploration and extraction technology have helped producers recover oil more economically from the deep oceans and remote regions of the world as well as from aging fields that were previously thought near depletion.

Deepwater areas in the Atlantic Basin are expected to become a major source of oil production, and significant untapped oil production potential remains.[6] The Caspian Sea region

is another source that has yet to be fully exploited. Although the area is land-locked and far from major consumers, improved exploration technology has located major new reserves, and modern pipelines are helping to bring more of it to market. Russia and the former Soviet states have reemerged as major oil producers after a decade of post-communist decline, and their combined exports could equal Saudi exports within four years.[7] These regions possess an abundance of proven reserves, but they will remain important primarily on the margin. The Persian Gulf will remain the center of gravity for global oil production. The region possesses nearly two-thirds of the world's known petroleum reserves, and its oil is plentiful, cheaply produced, and efficiently delivered to market using a well-developed infrastructure.

Although the supply outlook is bright for many regions, forecast production in major consuming countries is less encouraging. The U.S. will experience only a moderate increase in oil production as exhausted fields are supplanted by deepwater reserves in the Gulf of Mexico. Even if political and environmental hurdles are eventually cleared and oil from Alaska's Arctic Wildlife Refuge is produced, the overall U.S. supply picture would not improve dramatically. European nations will import a growing proportion of their oil from outside the region as North Sea output begins to decline later in the decade. China's petroleum production will decline even as demand from its rapidly growing economy continues to rise.[8]

Global Demand for Oil will Grow. Given the plentiful supply of oil, production should be sufficient to meet world demand for the next two decades and possibly well beyond. In 2020, oil will remain the world's major energy source—meeting 40 percent of the world's total energy needs. Total world oil consumption is expected to increase by about 2.2 percent annually from 75 million barrels per day in 1999 to 119 million barrels in 2020—an increase of 63 percent. Growth in demand will be most pronounced in developing countries, which by 2020 will

consume nearly as much oil as developed countries.[9] Oil will also remain dominant in the transportation sector, where few economically competitive alternatives to oil exist. By 2020, the transportation sector is expected to account for 55 percent of global demand for oil.[10] In developing countries, the expansion of transportation infrastructure and rapidly rising automobile ownership will particularly spur demand growth.[11]

Both the developed and developing countries will become increasingly dependent on oil to fuel their economies. The U.S. is the largest consumer of oil and accounts for one-quarter of world demand. The nation currently imports more than half of the petroleum it consumes. U.S. imports will increase from 10.4 million barrels of oil per day in 2000 to about 15.5 million barrels per day in 2020—a rise of nearly 50 percent.[12] Demand from European economies will also rise, and Japan will continue to depend almost exclusively on foreign petroleum sources. China and India will account for much of the projected growth in demand from the developing world. China became a net oil importer during the 1990s, and by 2020, it will be the world's second largest consumer after the U.S.[13] China will import over 70 percent of its petroleum needs from Middle East sources.[14] India will also see major demand growth, and both countries will become increasingly dependent upon the Persian Gulf.

The Economics & Geopolitics of Oil Dependency

The dependence of the global economy on oil will deepen, and this trend entails some major economic and geopolitical consequences for the U.S. and the rest of the world. The price of oil will probably become more volatile, and the vulnerability of world oil supplies to disruption from interstate conflict, resource competition, internal unrest, and terrorism will grow. Another repercussion of growing oil dependency is the expected need for the full petroleum

output of Iran, Iraq, and Libya—three so-called "rogue states"—to meet expected global demand. With the threat of disruption growing, buffers to interruption will assume greater importance in any energy security calculus.

Price Volatility. Oil price volatility is heavily influenced by market psychology and can result from either actual supply interruptions or the perceived likelihood of disruption. Price volatility can harm the economies of oil importers and exporters alike. Price spikes can adversely affect economic output, employment levels, and consumer prices in importing countries. Higher oil prices can also increase indebtedness and stifle development in many poorer countries. Oil exporters, on the other hand, suffer from low prices since most depend on oil exports as their major source of revenue. The economic impact of oil price volatility can contribute to political instability as well.

After a decade of relative price stability, crude oil prices collapsed below $10 per barrel in 1999. Then in 2000, prices soared above $30 per barrel. In the uncertain days following the September 11, 2001, terrorist attacks, crude oil prices slid below $16 per barrel as the world economy slumped. Since then, escalating violence between Israelis and Palestinians, Iraq's cutoff of its oil supply, and political unrest in Venezuela have pushed the price per barrel back above $27.[15] Meanwhile, the lack of spare capacity and smaller strategic petroleum reserves have reduced buffers to volatility. Over the long-term, volatility may become the norm for oil prices as it is for other commodities.[16]

Supply Vulnerability. Oil will become increasingly vulnerable to disruption from a variety of causes. One source of interruption is deteriorating infrastructure. Many producers have not properly invested in maintaining aging production facilities or pipelines, and decaying refining facilities in both oil producing and importing countries can cause disruptive supply

bottlenecks. Human error and malfunctions can also cause costly disruptions—particularly as industry reliance on complex distribution networks and information technology grows. Potential supply interruptions from these relatively benign causes are likely to be temporary and localized, and while they might be inconvenient, they pose no security threat. Of much greater concern are those disruptions caused by regional conflict, internal instability, and terrorism.

Regional Conflict. One of the greatest threats to the steady flow of oil is interstate conflict in oil-producing regions. Nowhere is that threat more pervasive than in the Persian Gulf. The Iran-Iraq War highlighted the risk of conflict between key oil producers in the 1980s, and the 1990 Iraqi invasion of Kuwait underscored the risk that a regional hegemon might seize another country's reserves and extend its influence over other Gulf producers. Although a U.S.-led coalition expelled Iraq from Kuwait, its regime still poses a long-term threat to its neighbors. Even conflict involving non-oil producers could spill over into the Gulf. This risk is especially serious in the conflict being waged between the Israelis and the Palestinians. Continued escalation could draw other states into the conflict either willingly or unwillingly.

The threat posed by regional conflict to the world's petroleum lifeline includes direct attacks against key infrastructure. Iraq destroyed much of Kuwait's production infrastructure in the Gulf War and threatened that of Saudi Arabia and other Gulf states. Shipping terminals and pipelines are also highly concentrated and vulnerable to attack. Iranian attacks against Kuwaiti tankers during the Iran-Iraq War underscore the vulnerability of seaborne transport. Another critical vulnerability is the fact that much of the world's crude oil supply passes through key straits that are highly susceptible to closure. The Straits of Hormuz alone see 14 million barrels pass every day, and the amount of oil that will need to transit the straits may triple by 2020 to meet growing world demand.[17] These narrow straits are vulnerable to sea mines, anti-ship

missiles, submarines, and air attacks. Other key oil chokepoints, including the Suez Canal and the Straits of Malacca, are also at risk.

The danger posed by interstate conflict to the world oil supply will become more grave once it involves the potential use of weapons of mass destruction (WMD). Even a simple threat of a nuclear, chemical, or biological attack against an oil producing state could prove highly disruptive to the oil trade. Currently, key producers Iran and Iraq are among those countries most actively seeking to develop nuclear weapons. Iraq is especially dangerous since it already possesses chemical weapons and has demonstrated the means and willingness to employ them. Libya is another producer known to have sought WMD capabilities. WMD could provide these countries leverage in a crisis or conflict were they to threaten or launch strikes against an adversary's oil facilities. They could also seek to deter U.S. or other outside intervention in a conflict by threatening strikes against a third nation's energy facilities.[18]

Resource Competition. Oil dependency will result in increased interstate competition between oil consumers seeking new reserves or ensured access to existing sources. Michael Klare has described this phenomena a part of a "new geography of conflict…in which resource flows rather than political and ideological divisions constitute the major fault lines."[19] One manifestation of this new geography is the military competition between China and six southeast Asian nations over the South China Sea and its oil reserves. The need for oil could also promote great power competition over Persian Gulf and Caspian Basin sources between China, India, and perhaps Japan. Each of these states has a growing interest in oil producing regions, and each could seek greater security ties with key suppliers. Security competition in the Persian Gulf could bring confrontation with the United States, which remains the region's military guardian. Resource competition can also occur between net suppliers as well. The five states bordering the

Caspian Sea cannot agree on a plan to divide its oil wealth, and the dispute has led to at least one military confrontation in which Iranian gunboats chased oil exploration vessels away from Azeri-claimed waters.[20]

Internal Instability. The primary security threat to many oil producing states is internal unrest, which proved its disruptive potential with the oil crisis following the 1979 Iranian revolution. Internal unrest can evolve into armed struggle in which oil infrastructure can offer an attractive target. Today, most major oil suppliers suffer some degree of political instability. Arab oil producers states are governed by authoritarian, often unpopular regimes, and they face a host of internal pressures, including social tensions, high population growth, underdevelopment, and poverty. Many of these factors will only worsen between now and 2020. The growing discontent in the Middle East has helped swell the ranks of religious extremists and fuel the hatred that led to the September 11 attacks. These stresses are mirrored in contemporary Iran, where an increasingly unpopular clerical regime clings to power.

Beyond the Middle East, many other oil producers are plagued by internal unrest and political instability. The former Soviet states of the Caspian region and Central Asia are each governed by stagnant, Soviet-style autocracies rife with corruption. These countries confront social, economic, and demographic pressures similar to those faced by Arab states, but in these fledgling countries with no history of autonomy, many strains are even more pronounced. Russia itself is a major oil producer that has faced a precipitous economic decline and has made only tenuous progress toward long-term stabilization. Russia's pipeline through Chechnya was a frequent target of Chechen rebels, who have disrupted the flow of Russian oil during their struggles with Moscow. Although Russia has rerouted the pipeline around Chechnya, it remains vulnerable to attack from rebel fighters operating outside Chechnya.

Among other major producers, Venezuela recently faced production stoppages and a failed *coup d'etat* provoked in part by its president's attempt to extend his control over the state oil company. Nigeria faces bloody ethnic and religious tensions as it attempts to bolster its fragile democracy. Indonesia is making a difficult transition to representative government while attempting to recover from the near-collapse of its economy and while confronting a number of separatist movements. Angola is a rising oil producer, but a debilitating civil war has hampered development of its oil riches. Not even Mexico, one of America's most important suppliers, is immune. Although it has developed rapidly in the past decade, Mexico faces internal difficulties from the drug trade and from insurgents in Chiapas.

Terrorism. One major outgrowth of internal instability is terrorism, and petroleum infrastructure is highly susceptible to sabotage and disruption by terrorist groups. Long pipelines through unstable territories may prove to be tempting targets for terrorists as well as insurgents. Refineries, distribution centers, storage facilities, transportation terminals, and other nodes in the oil supply network could likewise prove to be tempting targets. The information technology that has helped oil become so fungible opens the door to cyber terrorism, ranging in scale from an attack by a sole hacker to concerted assaults by a global terrorist network.

The threat of terrorism against petroleum infrastructure is particularly acute in the Persian Gulf and the Middle East. So far, al Qaeda terrorists have not directed attacks against the oil production and distribution facilities of the region—possibly in the belief that such attacks would most harm people they hope to attract to their cause. However, al Qaeda seeks to foment political upheaval leading to the replacement of existing Arab regimes, and it could adopt a new strategy to achieve its ends. A concerted terrorist campaign against the region's oil infrastructure would strike at the core of governmental power while disrupting "infidel" economies.

The Caspian Basin is also vulnerable to terrorist attacks against oil infrastructure. Presently Caspian oil must transit the troubled Caucasus region, which includes Chechnya, Georgia, and other unsettled territory. Al Qaeda terrorists are known to have aided Chechen rebels, and some are believed to be active in a remote part of Georgia, through which transits the main trans-Caucuses pipeline. Not even the United States is immune from this type of threat. The Trans-Alaska Pipeline System has been bombed twice, and it remains both vulnerable to disruption and difficult to repair.[21] This pipeline and other oil infrastructure could easily be targeted in a terrorist attack—a threat that must be taken very seriously after September 11.

Oil as a Weapon. While oil can be the target of an attack, it can also be used as a political and economic "weapon" when producers intentionally halt their supplies in order to influence the policy of an oil consumer or group of consumers. Some observers have argued that the threat of an oil embargo such as that imposed in 1973 by Arab members of the Oil Producing and Exporting Countries (OPEC) is no longer credible. The integration of petroleum producers in the overall world economy has given them a greater stake in the economic health of consumers. Furthermore, the power of the OPEC, which is dominated by Saudi Arabia and other Arab producers, has waned with the rise of non-OPEC suppliers in Mexico, the North Sea, the Atlantic Basin, and the former Soviet Union. The OPEC share of output has declined from 74 percent of world output in 1977 to less than 52 percent two decades later.[22]

Nevertheless, Iran and Iraq have called for a new oil embargo in response to Israeli actions in the West Bank, and Iraq has actually halted its oil exports. Iraq's actions have so far failed to garner support from other producers, but other Arab producers could choose to sacrifice their economic interests to appease angry populations if the crisis spirals out of control. The risks inherent in another embargo are heightened by the fact that most non-OPEC producers lack

spare capacity today—making it more difficult to offset reduced Arab production.[23] An embargo might not be as disruptive as in 1973, but it could still have damaging effects on the global economy. In the coming years, an embargo could be even more damaging because of the need for higher levels of output from all suppliers to meet growing global demand.

The Problem of Rogue Producers. The inclusion of Iran and Iraq in President George W. Bush's "Axis of Evil" underscores another major strategic consequence of oil dependency. If estimates of world demand in 2020 are accurate, then Iran, Iraq, and Libya—a third "rogue state"—will have to produce at nearly full capacity to satisfy that demand.[24] Multilateral sanctions against Iraq and unilateral U.S. sanctions against Iran and Libya will become less effective and more difficult to sustain. Growing demand for their oil could thus require either the accommodation, rehabilitation, or replacement of regimes in these states.

Buffers to Disruption. The multidimensional threats to the world oil supply are real now, and they will likely grow by 2020. The importance of buffers against supply interruption will increase accordingly. The most important buffers are the existence of strategic petroleum reserves and the moderating role played by Saudi Arabia as a swing producer. Russia may also become a stabilizing force as uncertainty about Saudi Arabia's future intensifies.

Strategic Reserves. In response to the 1973-4 oil crisis, the International Energy Agency (IEA) was formed by the U.S. and other developed countries. IEA member states are bound by treaty to maintain a strategic petroleum reserve equal to 90 days of net imports and to coordinate the allocation of these supplies with other IEA countries in the event of a severe disruption.[25] While these strategic reserves could ease the effects of a short-term crisis, they would be gradually depleted in a longer-term crisis or series of crises. The effectiveness of this tool is further reduced by the fact that many countries have let their strategic reserves drop below the

treaty limit. Furthermore, developing countries do not belong to the IEA, and many lack strategic reserves altogether. As their demand increases, this tool will weaken even further.

The Role of Saudi Arabia. In the past, Saudi Arabia—custodian to one-quarter of all global petroleum reserves—has also helped to moderate the effects of such disruptions. The oil kingdom has traditionally performed a stabilizing role by using its tremendous reserves and spare production capacity to increase supply in times of crisis. This has helped to keep oil supply constant and prices moderate. Saudi strategy has been to keep crude oil prices high enough to make a steady profit, but low enough to remove any incentive for consumers to switch to alternative energy sources. The rise of al Qaeda, which has deep roots in the kingdom, calls the future of Saudi Arabia into question. In coming years, the kingdom could itself be the source of disruption. Ruled by a highly autocratic regime, and plagued by growing social, economic, and political problems, Saudi Arabia could conceivably face the sort of upheaval that shook Iran—and the world economy—in 1979. An Islamist revolution in Saudi Arabia could make this earlier shock seem mild by comparison. A Taliban-like regime in Riyadh could not be relied upon to act in a rational, profit-maximizing fashion, and an devastating cessation of exports would become disturbingly plausible under radical Islamist rule.[26]

The Rise of Russia. The stabilizing role played by Saudi Arabia could be taken over to some degree, but not entirely, by Russia. Prior to its demise, the Soviet Union was the world's largest oil producer. Production in the region entered a precipitous decline after the Soviet collapse, but Russia has quietly reemerged as a major petroleum producer in the past two years. Although Russian oil is more difficult and expensive to produce than Saudi crude, and the Russian reserve base is smaller than that of Saudi Arabia, Russia retains substantial reserves. Technology has provided better access to oil in Siberia and the Arctic regions. Furthermore,

Russian energy firms have become more efficient, and reforms have reduced corruption in recent years. Russian firms also have significant financial interests in other Caspian Sea countries, and these interests have even led Moscow to support American-backed pipeline schemes that circumvent Russian territory. Since September 11, Russia has aligned itself more closely with the West, and it has helped moderate world oil prices. In the future, Russia could become an important swing producer in an oil crisis—especially one involving Saudi Arabia.[27]

Implications for U.S. Strategy

As long as the American economy remains fueled by oil, "energy independence" will remain a pipedream. Consequently, energy security will remain a centerpiece of U.S. national strategy. The U.S. government must worry about the flow of oil to other nations as well as to American shores. The *National Energy Plan* observes that:

> "U.S. energy and economic security are directly linked not only to our domestic and international energy supplies, but to those of our trading partners as well. A significant disruption in world oil supplies could adversely affect our economy and our ability to promote key foreign and economic policy objectives."[28]

U.S. strategy in the short-term should focus on managing and minimizing the risks of disruption. Over the long-term, U.S. strategy should seek to reduce oil dependency altogether.

Short-Term Strategy. The main energy-related objective in U.S. strategy is to ensure the continuous and unimpeded flow of the world's oil supply. The U.S. accomplishes this by defending friendly petroleum producers and protecting oil supply lines. By defending its own supplies, America secures the energy lifeline for all consumers and thus provides a global public good. In the past, U.S. forces protected Kuwaiti tankers against Iranian threats during the Iran-Iraq War, and they expelled Iraqi forces from Kuwait in the Persian Gulf War. A permanent American military presence now safeguards the critical Persian Gulf reserves and defends the

pro-American regimes that supply most of the region's oil. In the future, U.S. military power may be required for a final reckoning with Saddam Hussein. Little hope of Iraqi rehabilitation exists with Saddam in power, and the world economy will require robust Iraqi oil output by 2020—giving added incentive for an early regime change. Military action is also needed before Iraq gains the nuclear capabilities that will place the entire Persian Gulf at risk.

Meanwhile, the U.S. Navy protects the shipping lanes through which Persian Gulf and other foreign oil passes to American shores and to allies and competitors alike. As more and more Persian Gulf oil flows eastward, Americans may become reluctant to defend what might appear to be an Asian-Pacific interest. However, a U.S. withdrawal from the Persian Gulf or from world sea lanes would leave a power vacuum that would likely invite competition—perhaps violent conflict—between other powers in the rush to fill the void. China, India, and Japan could compete to gain influence and increase security ties within the Gulf, and they could embark upon a naval race to secure their own energy lifelines. Although the U.S. could encourage other countries to share some of the energy security burden, the U.S. military will remain "Guardian of the Gulf,"[29] and the U.S. Navy will continue to guard the sea-borne oil trade. The risks of regional conflict and resource competition outweigh any relief the U.S. might gain from a reduced military burden.

Since the September 11 attacks and the war in Afghanistan, U.S. military power has also filled the vacuum left by waning Russian power in Central Asia and the Caspian Basin. Currently, the U.S. continues to prosecute the war on the al Qaeda terrorist network in Central Asia, but American energy interests could help make this military commitment long-term. Without a U.S. military presence, the continued weakness of the Soviet successor states could encourage competition for Caspian resources by China and other countries worried about their

oil supply. The high U.S. profile in the Persian Gulf and Central Asia is not without risks, however. Its military presence could fuel a growing anti-American backlash and contribute to the instability of oil producers in both regions. Ultimately, protecting oil supplies from internal unrest is not a task for which the U.S. military is well-suited. The Iranian revolution demonstrated that American military power can do little to prevent internal supply disruptions.

A broader U.S. strategy should foster the long-term social, political, and economic reforms needed to make petroleum producers more stable and secure. Without such reforms, Islamist revolutions could threaten key oil producing states—most importantly Saudi Arabia. By itself, U.S. influence is limited in this regard since oil dependency gives producers significant leverage and has limited U.S government willingness to press reforms in the past. The best approach would be a multilateral one. The U.S. should promote reform internal reform and development through international institutions, including the World Bank and International Monetary Fund as well as United Nations development agencies. Similarly, the U.S. should also adopt a multilateral approach to encourage the rehabilitation of Libya and the gradual and peaceful transition of power in Iran.

To reduce the risks of disruption, the U.S. should work with other governments and the private sector to reduce the vulnerability of oil infrastructure to terrorism and sabotage. As a hedge against future supply interruptions, the U.S. and other Western countries should expand the IEA or encourage non-IEA members to develop their own strategic reserves. Current IEA members should be encouraged to rebuild their stocks at least to treaty levels. For its part, the U.S. should expand its own strategic reserves beyond the 157-day peak reached in 1986.[30] As another hedge, the U.S. should continue promoting greater diversity in the world's oil supply by seeking to exploit reserves in deepwater areas and remote regions and by promoting efforts to

make currently uneconomical resources—such as "heavy oil" reserves and synthetic crude from oil sands—more viable. Because other consumers share a common interest in diversity, a multilateral endeavor would be most effective.

Russia and the Caspian Basin will remain central to diversification efforts. The U.S. and its European allies should continue to encourage Russia's strategic realignment since Russia offers the best hope for a swing producer in case Saudi Arabia becomes unwilling or unable to perform that role. Oil consumers should help Russia and the other the Caspian producers get their oil to market as quickly as possible by supporting the most efficient export routes.[31] This means abandoning U.S. government efforts to support only those pipelines that skirt Russian and Iranian territory. Instead, the U.S. should back the development of multiple routes to add redundancy in case a single supply line is interrupted. U.S. leaders should also promote the development of pipelines running from Russia and the Caspian to China in order to reduce its overwhelming dependence on Persian Gulf oil and to reduce the risks of a future resource conflict.[32] Finally, the U.S. should offer its good offices to help mediate the quarrel over Caspian oil rights as well as the territorial disputes in the South China Sea. The more energy secure other major consumers feel, the greater American security will be.

Long-Term Strategy. Over the short-term, global oil dependency is a certainty, and U.S. strategy can only reduce or minimize its risks. A risk reduction strategy will not work for the long-term, however. Oil is ultimately finite and non-renewable. At some point beyond 2020, a growing global economy will begin to deplete petroleum reserves no matter how advanced extraction technology becomes or how many more oil fields are discovered. Long before reserves are finally depleted, production will peak and gradually decline. Once this point is reached, the price of crude oil will progressively rise as the resource becomes more scarce.

Scarcity will also increase vulnerability to disruption. Producers will lack excess capacity to ease the effects of a crisis as productive capacity reaches its limit. The risk of disruption will be magnified even further since non-Gulf reserves will be depleted long before that region's own reserves begin their decline. Persian Gulf petroleum will then assume an even more central role in energy security calculations. True energy security will remain a chimera as long as the global economy depends so heavily on oil. The U.S. needs to prepare for the world beyond 2020 now by fostering a multilateral effort to reduce demand for petroleum through more efficient use of oil products and through development of alternative energy sources.

The last major energy efficiency effort in the United States had dramatic results. In the 1970s, more stringent federal efficiency standards—plus the incentive provided by dramatically higher oil prices—helped cut U.S. oil imports by 42 percent from 1977 to 1985 while the U.S. Gross Domestic Product rose 27 percent at the same time. Adopting energy-efficient, hybrid automobiles such as the Honda Insight and Toyota Prius "could save globally as much oil as OPEC now sells."[33] Increasing fuel economy standards to 40 miles per gallon by 2010 would eliminate the entire projected growth in U.S. oil imports over the same period. Furthermore, if Americans kept their engines tuned and tires properly inflated, U.S. oil consumption could be cut by a million barrels per day.[34] An efficiency drive today could have huge benefits for the U.S. economy, and if repeated by other consuming nations, the benefits would be multiplied.

Another way to promote greater efficiency is to charge consumers a more representative price for the fuel they consume. U.S. fuel prices reflect neither the cost of maintaining a large Persian Gulf military presence nor of keeping sea lanes open for oil transport. Furthermore, consumers are not charged the full cost for the health and environmental damage inflicted by carbon emissions. If these social costs were added to the price of oil products in the form of a

federal tax, prices would be significantly higher—making this a highly unpopular, politically risky move. However, higher taxes on oil consumption could be offset by reductions in other federal taxes so there would be no net change in government revenue.[35] Higher prices would have some major advantages. They would lead to diversification of supply by providing greater incentive for production in remote areas and by making unconventional sources more economically viable. Higher prices would also encourage greater efficiency and promote the development of energy alternatives.[36] In addition, increased efficiency and new, non-carbon based energy sources would provide added environmental benefits as concern about carbon emissions and climate change mounts.

Over time, substitution of another energy source for oil offers the best hope for real and lasting energy security—especially if the source is renewable. New technologies offer the possibility that an alternative energy source could one day supplant oil. Among the more promising possibilities are hydrogen-based fuel cells, carbon sequestration, and biomass ethanol. The U.S. should lead a broad, collaborative effort involving other governments, international organizations, private industry, and non-governmental organizations to develop the alternatives best suited for the world economy as a whole. Oil dependency transcends national borders and economies, so its remedy must be transnational as well.

Nevertheless, reducing oil dependency would have a number of negative effects that must be considered. It could be tremendously costly given the complex global network of workers, companies, and infrastructure that has been developed around the production and consumption of oil. Ideally, the petroleum-based system could be adapted to support an energy substitute with only a minimum of dislocation. Another risk inherent in reducing demand is the fact that most of the states that rely on oil production today lack the other developed economic sectors they would

require after demand for oil declines. Decreasing petroleum revenues would exacerbate the social, economic, and political problems besetting countries in the Middle East and Caspian region until other economic sectors could be developed. Ironically, reduced oil exports could aggravate the very conditions that gave rise to Islamist terrorism in the first place. Even so, energy substitution would be a very gradual process, and oil producers would have many years to prepare for the transition. In the end, the risks of continued oil dependency outweigh the dangers of reducing and eventually eliminating it.

Conclusion

The terrorist attacks on America were not an obvious threat to world oil supplies, but they expose an insidious, long-term danger. Oil dependency is inescapable in the short-run, and the U.S. can only manage and minimize the risk of disruption by defending the global oil supply and by hedging against future interruptions. Over the long-term, however, the United States has both the national interest and the resources to lead the world to a future free of oil dependency. The road to true energy security will be long and difficult, but it is a path Americans must eventually take. The tragedy of September 11 should provide the national will for making that journey sooner rather than later.

Notes

[1] Morris Adelman, quoted in "Will the Oil Run Out?" *The Economist*, 10 February 2001, 13.

[2] U.S. Department of Energy, Energy Information Administration, *International Energy Outlook 2002*, DOE/EIA-0484(2002), (March 2002), 37-38, <http://www.eia.doe.gov/oiaf/ieo/index.html> [5 April 2002].

[3] Ibid.

[4] Anthony H. Cordesman, "Are Energy Wars Still Possible?" Center for Strategic and International Studies, (11 February 1999), 5, <http://www.csis.org/mideast/reports/energywars.pdf> [28 March 2002].

[5] Report of the National Energy Policy Development Group, *National Energy Policy*, (May 2001), 8-3.

[6] *IEO 2002*, 35.

[7] Edward L. Morse and James Richard, "The Battle for Energy Dominance," *Foreign Affairs* 81, no. 2 (March/April 2002), 25.

[8] *IEO 2002*, 34-37.

[9] Ibid., 3. The projected 2.2 percent annual increase in world demand is based upon the *IEO 2002* reference case. The high economic growth case in the report projected an annual increase of 3.1 percent while the low economic growth case projected an annual increase of 1.5 percent in world demand.

[10] *National Energy Policy*, 27.

[11] *IEO 2002*, 3.

[12] U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 2002*, DOE/EIA-0383(2002), (21 December 2001), Supplemental Tables, 123, < http://www.eia.doe.gov/oiaf/aeo/supplement/sup_ogc.pdf> [27 April 2002].

[13] *IEO 2002*, 29.

[14] *National Energy Policy*, 8-14.

[15] See U.S. Department of Energy, Energy Information Administration, *Weekly Petroleum Status Report*, (17 April 2002), Table 12 < http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/weekly_petroleum_status_report/current/pdf/table12.pdf> [27 April 2002]; *Monthly Energy Review*, (29 March 2002), Table 9.1, <http://www.eia.doe.gov/emeu/mer/pdf/pages/sec9_3.pdf> [27 April 2002]; and for current price, *Energy Situation Analysis Report*, (30 April 2002), <http://www.eia.doe.gov/emeu/security/esar/esar.html> [30 April 2002].

[16] "Will the Oil Run Out?" 16.

[17] Cordesman, 13.

[18] Ibid., 18.

[19] Michael T. Klare, "The New Geography of Conflict," *Foreign Affairs* 80, no. 3 (May/June 2001), 52. Also see Klare's recent book, *Resource Wars: The New Landscape of Global Conflict*, (New York, Henry Holt and Company: 2001).

[20] "Caspian Heads Meet Today to Settle Row," *Gulf News Online Edition*, (23 April 2002), <http://www.gulf-news.com/Articles/news.asp?ArticleID=48615> [24 April 2002].

[21] Amory B. Lovins and L. Hunter Lovins, "Fool's Gold in Alaska," *Foreign Affairs* 80, no. 4 (July/August 2001), 73.

[22] Fadhil J. Chalabi, "OPEC: An Obituary," *Foreign Policy*, (Winter 1997-98), 132.

[23] Mamdouh Salameh, "A Third Oil Crisis?" *Survival* 43, no. 3, (Autumn 2001), 130.

[24] Guy F. Caruso, "The Geopolitics of Energy into the 21st Century," Testimony before the U.S. Senate Energy and Natural Resources Committee, (21 March 2001), 4, <http://www.csis.org/hill/ts010321caruso.htm> [28 March 2002]. Caruso is Director, Strategic Energy Initiative for the Center for Strategic and International Studies.

[25] International Energy Agency, "Fact Sheet on IEA Oil Stocks and Response Potential," (no date), 1-3, <http://www.iea.org/about/files/factshee1.pdf> [5 April 2002].

[26] "Addicted to Oil," *The Economist*, 15 December 2001, 9.

[27] See Morse & Richard, 16-31. The authors detail the resurgence of Russian oil production and its implications for global energy security.

[28] *National Energy Policy*, 8-3.

[29] Ann Myers Jaffe and Robert A. Manning, "The Shocks of a World of Cheap Oil," *Foreign Affairs* 79, no. 1 (January/February 2000), 27.

[30] *National Energy Policy*, 8-17.

[31] Morse & Richard, 27.

[32] Center for Strategic and International Studies, A Report of the CSIS Strategic Energy Initiative, *The Geopolitics of Energy into the 21st Century*, Executive Summary, (November 2000), xx, < http://www.csis.org/sei/geopoliticsexecsum.pdf> [28 March 2002].

[33] Lovins & Lovins, 75, 84-85.

[34] National Environmental Trust, *National Security: What Government and Industry Data Really Show*, (2001), 4, <http://www.environet.policy.net/security/america_oil.pdf> [28 March 2002].

[35] See "Addicted to Oil," 9, for a similar taxation proposal.

[36] Salameh, 142.