

USAWC STRATEGY RESEARCH PROJECT

OIL VULNERABILITIES AND UNITED STATES STRATEGY

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ABSTRACT

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The United States, its industries, livelihood, and economy depend on oil. The United States is the world's largest consumer of oil, with daily usage of approximately 20 million barrels. Approximately 12.6 million barrels of oil per day is imported from foreign sources. Dependence on foreign oil leaves the American lifestyle, its freedoms, and its economy extremely vulnerable to risk, and exposed to factors outside the United States' immediate control. Foreign political or military action, acts of terrorism home or abroad, or the world's growing and competing demands for limited oil supplies are factors that could affect America's energy security. These factors place the United States in a precarious position. As a new world order continues to take shape, oil remains a strategic commodity, critical to national strategies and international politics. Is the US government promoting technology advances to find effective, efficient, and affordable solutions to fossil fuels? Research for this project intends to explore vulnerabilities associated with the United States' dependence on foreign oil and reveal if the United States has an effective strategy to reduce dependence on foreign oil.

OIL VULNERABILITIES AND UNITED STATES STRATEGY

Oil is a strategic commodity to the United States and its free flow represents a vital national interest, as oil is the lifeblood necessary for America's economic survival. The United States' homeland, industry, markets, military, and its extensive transportation networks demand and depend on the uninterrupted flow of oil. The United States is the world's largest consumer of oil, using 869 million gallons or 20.7 million barrels of petroleum products per day.

The United States imports approximately 12.6 million barrels of oil per day from foreign sources equating to 60 percent of its total daily requirements. Dependence on foreign oil leaves the American lifestyle, its freedoms, and its economy extremely vulnerable to risk, and exposed to factors outside the United States' immediate control. Foreign political or military action, acts of terrorism abroad, or the world's growing and competing demands for limited oil supplies are factors that could affect America's energy security. Additionally, acts of terrorism on American soil directed at its vast petroleum distribution infrastructure could have a devastating impact on transportation and industry, bringing the nation and economy to a virtual stand still.

The United States' reliance on foreign oil is a significant security threat facing the nation. In today's volatile, uncertain, complex, and ambiguous world, the United States requires an immediate, aggressive, and effective strategy to become significantly less dependent on foreign oil. Such a strategy will only be effective and successful with strong, committed, determined, and strategic leadership from Washington. For the past 30 years, United States presidents have talked about achieving energy independence; however, the United States oil demands have only continued to increase. Based upon the vast oil consuming infrastructure in America and related economics, the United States may never actually achieve energy independence; however, the stale strategy paradigm must be broken to make meaningful advances. Technology is available today, especially in the transportation sector, for the United States to make immediate and significant progress to reduce the nation's reliance on foreign oil.

Vulnerabilities

The United States' dependency on oil could be seen as the nation's center of gravity. Clausewitz's defined center of gravity as "the hub of all power and movement, on which everything depends."¹ Jihadists refer to oil as the provision line that feeds the crusader nation artery of life.² Enemies of the United States understand that oil fuels the United States' economy and is a key vulnerability.

One jihadist web site reads: "We call our brothers in the battlefields to direct some of their great efforts towards the oil wells and pipelines. The killing of 10 American soldiers is nothing

compared to the impact of the rise in oil prices on America and the disruption that it causes in the international economy.”³ Simple economic principles demonstrate that disruptions to oil supplies result in price increases. History shows that oil availability, along with the relative price of oil, has a direct relationship to the growth or decline of the United States economy.

In 2005, the United States’ imported oil from 87 different countries with the largest oil exporters to the United State being Canada, Mexico, Saudi Arabia, Venezuela, and Nigeria. Other significant imports come from Middle East countries, other than Saudi Arabia, that transport oil through the Straits of Hormuz. An extended interruption of exports from any one of these sources would have a significant impact on oil supply in the United States, increase crude oil prices on world markets, and have a ripple effect throughout the global economy. “Oil is a fungible global commodity; a change in supply or demand anywhere will affect prices everywhere.”⁴

On 27 July 2005, Mr. Robbie Diamond, President of Securing America’s Future Energy, testified before a congressional committee on risks associated with the United States’ oil dependence. In his testimony, Mr. Diamond demonstrated what could happen to global oil prices if a small percentage of oil became unavailable to world markets. He stated:

Given today’s precarious balance between oil supply and demand, taking even a small amount of oil off the market could cause prices to rise dramatically. . . . A 4 percent global shortfall in daily supply results in a 177 percent increase in the price of oil from 58 to 161 dollars per barrel. We are talking about a shortfall between 3 and 3.5 million barrels in a roughly 84-million-barrel global market. . . . Once oil supply disruptions occur, little can be done in the short term to protect the U.S. economy from its impacts.⁵

The former Director of the Central Intelligence Agency, R. James Woolsey, believes that American dependence on foreign oil is one of the most significant threats to national security. On 6 April 2005, he testified before a congressional committee that improving the United States’ oil security is the most significant near term energy challenge for the nation. Woolsey listed potential dangers relative to the United States’ dependence on oil and included the vulnerability of the nation’s petroleum infrastructure to terrorist attacks, and the possibility of embargoes or other disruptions to American oil supply by rogue regimes.⁶

Political, Economic, and Military Vulnerabilities

Venezuela is the fourth largest oil exporter to the United States, trading over 1.5 million barrels per day. As recently as 4 November 2006, Venezuelan President Hugo Chavez threatened to halt oil exports to the United States. Speaking to oil workers of the state-run oil company, Petróleos de Venezuela S.A. (PDVSA), Chavez made comments directed at the

United States. He said "if they try to destabilize PDVSA, if the empire and its lackeys in Venezuela attempt another coup, ignore the outcome of the elections or cause election or oil-related upheaval we won't send another drop of oil to the United States."⁷ On 3 December 2006, President Hugo Chavez won re-election by a wide margin, leaving him in office for six more years.

On 5 December 2006, President Ahmadinejad of Iran congratulated Chavez in a phone conversation. According to Iran's Presidential Office Media Department, Ahmadinejad stated in his congratulatory comments "Due to your victory our responsibility in the campaign against the hegemony of global arrogance is even heavier."⁸ Chavez is reported as replying that "this victory belongs to all those engaged in the anti-Imperialist campaign."⁹

Economic embargos against Iran have been in place by the United States since 1987, when President Reagan imposed sanctions as a result of Iran's support for international terrorism and its aggressive actions against non-belligerent shipping in the Persian Gulf. These sanctions were tightened in 1995, when President Clinton prohibited United States involvement with petroleum development in Iran, due to Iranian sponsorship of international terrorism and Iran's active pursuit of weapons of mass destruction.¹⁰ Due to these embargos, the United States does not import oil from Iran. However, "rising tensions over Tehran's nuclear program brought threats from Iran, the second-largest OPEC producer, to 'unleash an oil crisis.'"¹¹

In August 2006, Iran's top nuclear negotiator threatened to use the "oil weapon" and suggested the country might stop the 2.5 million barrels of oil it exports daily to world markets.¹² Iran could also create havoc on world oil markets and the global economy by using its military power to close the Straits of Hormuz. Currently, six Middle East countries meet about 40 percent of the world's daily crude oil demand, exporting through the Straits of Hormuz.¹³ In 1998, George J. Tenet, then the Director of Central Intelligence Agency, addressed the Senate Select Committee on Intelligence on threats to the Straits of Hormuz. In his testimony, Tenet stated: "Iran is improving its ability potentially to interdict the flow of oil through the Strait of Hormuz. It has acquired Kilo-class submarines from Russia and is upgrading its anti-ship missile capabilities."¹⁴ Iran also has the capability to mine the shipping lanes through the Straits.

Actions to restrict the flow of oil by either Iran or Venezuela are possible and the United States should be prepared for such situations; however, the actuality of such scenarios is unlikely in the near term. Both countries require oil revenues to pursue their national interests and Iran requires open shipping lanes in the Straits of Hormuz, as much as any other country that uses them.

Venezuela relies on oil revenues for 75-80 percent of total export earnings and 40-50 percent of government revenues.¹⁵ The government uses these revenues to fight poverty, promote literacy, and improve health care, to name a few of its domestic programs. The United States purchases over 50 percent of Venezuela's exported oil and is one of Venezuela's best and most important customers. The United States' market is convenient due to relative proximity, low transportation costs, and the United States oil industry having ample refineries structured to process Venezuela's sulphur-rich crude.¹⁶

Iran's threats to close the Straights of Hormuz may only be fear appeal. Iran is unlikely to take military action to stop shipping in the Strait of Hormuz, as this action, while implied against the United States, would also directly affect Iran's Islamic neighbors, fellow Organization of Petroleum Exporting Countries (OPEC) members, and any nation relying on trade through the Straights, to include Iran itself. Additionally, while Iran may be one of the world's leading oil exporters, it does not have sufficient refining capacity to meet its daily fuel requirements, thus it imports approximately 60 percent of its refined products. Finally, oil accounts for 80 percent of Iran's total exports and its government gets 90 percent of its revenues from oil.¹⁷ Iran severing its route to export oil would also cut its oil revenues, and thus limit the country's ability to fund its nuclear development, or other programs it may have to build regional hegemony.

A more strategic move by Iran would be to use its oil to gain nuclear weapon and delivery technologies. "In a tight oil market, an important oil producer could try to use its exports as a lever to attain access to sophisticated military hardware or technology from a major oil-consuming nation."¹⁸

"North Korea depends on China for up to 90 percent of its oil supplies. . . . Any sustained reduction could cripple its isolated and struggling economy."¹⁹ In the month of September 2006, China set a precedent when it cut-off oil exports to North Korea for a month. Speculation in the media was that China punished North Korea for test firing missiles earlier that summer. Since North Korea also buys oil from Iran, North Korea could enter marriage of convenience with Iran, to exchange nuclear technology for oil.

Terrorism and Infrastructure Vulnerabilities

Perhaps the greatest threat to disrupting oil flow to or within the United States is the threat of terrorism. The attack on the World Trade Center on 11 September 2001, demonstrated a key tactic of Osama bin Laden, to attack and disrupt the economic element of United States' national power. Terrorists "have identified the world energy system as the Achilles' heel of the West and have made attacking it a central part of their plan."²⁰

In 2006, Al-Qaeda claimed responsibility for attacks on oil facilities in Yemen and Saudi Arabia. Two attacks in Yemen on 15 September 2006 “came days after al-Qaeda’s number two, Ayman al-Zawahri, issued a videotaped threat of attacks on the Persian Gulf and facilities he blamed for stealing Muslim oil.”²¹ While unsuccessful in penetrating the inner perimeter of Saudi Arabia’s Abqaiq oil facility on 24 February 2006, the attack demonstrated vulnerabilities in the world’s largest oil processing facility. The impact of this attack pushed worldwide crude oil prices up by 2 dollars a barrel.²²

There are over 370 documented attacks on Iraq’s 4,350 mile-long oil pipeline system, infrastructure, and 11,000-mile-long power grid since 12 June 2003.²³ Most of the attacks were accomplished by simplistic means to included arson, indirect fire, improvised explosive devices, bombs, or rocket propelled grenades. These inexpensive and effective attacks led to costly results. Attacks against the Iraqi petroleum infrastructure have severely hindered Iraq’s oil production, subsequent exports, and have cost the Iraqi government billions of dollars in lost revenues. Since Iraq also depends on oil for power generation, attacks interrupt the country’s ability to supply constant power to its people. The tangible results of attacks on Iraq’s petroleum infrastructure have had a negative psychological impact on the Iraqi people, and consequently undermine the United States’ and Iraqi efforts to stabilize and rebuild the country and its economy.

Attacks on petroleum infrastructure, such as those mastered in Iraq, could easily be executed on American soil. The United States’ vast petroleum distribution networks of terminals, refineries, and pipelines are extremely vulnerable. Petroleum pipelines alone cover over 150,000 miles in the United States.²⁴

Colonial Pipeline and Plantation Pipeline are two major pipeline systems that provide gasoline and kerosene-based products from Gulf Coast refineries to twelve southeast and eastern states. Daily deliveries from these pipelines account for over 2.7 million barrels of fuel, or 13 percent of total United States’ refined products consumption. Combined, Colonial and Plantation Pipeline Companies control over 8,600 miles of refined product pipelines, and transport fuel to over 300 fuel terminals, that further supply gas stations or airports.

One such terminal fed by Plantation Pipeline is in Newington, Virginia, just south of the nation’s capitol. The Newington fuel distribution terminal holds fuel for several major oil companies that supply gas stations in and around the Washington, D.C. area. This terminal serves as an example of a potential target. Newington terminal is highly visible from Interstate 95 and an easy target for indirect fire from surrounding neighborhoods, vehicle-borne attacks, or

rocket propelled grenades from the interstate. A devastating blow to this terminal would hit and cripple the heart of our nation.

Similarly, if either Colonial or Plantation Pipeline, or both, were hit with major, coordinated, and simultaneous attacks, the result would be devastating for ground and air transportation on the east coast. These pipelines are generally unprotected, run through public-accessible land and are well marked. Title 49 of the *Code of Federal Regulations* (CFR) 195.410, requires pipeline operators to place and maintain line markers over buried pipeline. "Markers must be located at each public road crossing, at each railroad crossing, and in sufficient number along the remainder of each buried line so that its location is accurately known."²⁵ While these markers serve as cautions for public safety, they also make pipelines easy targets for potential saboteurs or terrorists.

One of the United States' most significant pipelines requires no marking for most its route, as over 500 miles of the 800 miles trans-Alaska pipeline traverses above ground. Much of the pipeline is accessible from public land and paralleling Alaskan highways. An attack on this pipeline would stop the flow of approximately 25 percent of the United States' domestic oil production.

Other potential targets in the United States include most refineries. Refineries, to include their huge storage tanks for crude oil and refined products, are highly visible, easily accessible from public highways and offer large targets for indirect or direct fire. Of the nation's 149 oil refineries, over twenty produce "at least one percent of national capacity, the largest having over three and a half percent."²⁶ "The Houston area is ground zero of the refining industry."²⁷ Approximately 15 percent of the national refining capacity is located in the Houston area. When Hurricane Rita posed a threat to Houston in 2005, gasoline and crude oil prices surged. Imagine what would happen if a suicide squad strategically placed a tactical nuclear device in Houston?

Strategic Competition for Limited Oil Supplies

In the next 25 years, great potential exists for growing world oil demand to outstrip supply. The Energy Information Administration's (EIA) International Energy Outlook 2006 (IEO2006), estimates that world oil demand will increase from 80 million barrels per day in 2003 to 118 million barrels per day in 2030.²⁸ This represents a 47 percent increase. In order to meet this growing demand, world production must also increase by 38 million barrels per day. The report suggests that OPEC producers will provide 14.6 million barrels per day of the increase and that

higher oil prices will cause non-OPEC nations to substantially increase production by over 23.7 million barrels per day.²⁹

The EIA model-based report makes assumptions in its predictions. The preface of the 2006 report states that “the projections in *IEO2006* are not statements of what will happen, but what might happen given the specific assumptions and methodologies used. . . . Many events that shape energy markets are random and cannot be anticipated, and the content and timing of policy developments, as well as assumptions concerning future technology characteristics, demographics, and resource availability, are inherently uncertain.”³⁰

There is a great deal of uncertainty in our volatile, complex, and ambiguous world. One such uncertainty, debated by oil scholars, is when global oil production will peak. Pessimists argue that global oil production peaked in 2005,³¹ and optimists believe that with advances in oil production technology, global oil production may not peak for another 20 to 30 years.³² Regardless, oil has or will peak and statistics show that global oil consumption will continue to grow over the next 25 years. Once oil peaks, production curves decline permanently in a relatively sharp downward arc.

With oil consumption growing and the certainty of oil production peaking, geopolitics is a significant factor for the world’s top oil consumers, as well as oil producing countries. The United States and China are the world’s two largest consumers of oil, both of which rely on foreign oil to meet demands. “Energy is a common thread weaving through the fabric of critical American interests and global challenges.”³³ The same can be said for China.

China, Where the Future Drives Today

The United States currently accounts for approximately 25 percent of the world’s daily oil consumption. In 2003, China passed Japan as the world’s second-largest consumer of oil and currently represents approximately 9 percent of world consumption. “As late as 1993, China was self-sufficient in oil. Since then, its GDP has almost tripled and its demand for oil has more than doubled.”³⁴ China currently consumes approximately 6.9 million barrels of oil per day, of which 2.8 million barrels, or 40 percent is imported. In 2030, China’s oil consumption is expected to at least double with over 75 percent of its oil expected to come from foreign sources.³⁵

China’s growing economy, demands for foreign oil, and its position as an emerging hegemonic power, influences and is integrated with its strategic policies and international relationships. In March 2004, during a lecture at Beijing University, China’s deputy foreign minister said that China’s foreign policies are “at the service of China’s economic

development.”³⁶ In the past ten years, Chinese national oil companies have acquired interests in oil projects and spent billions of dollars in fourteen countries to include Venezuela, Iran, and Sudan.³⁷

In his book *The World is Flat*, Thomas L. Friedman writes that "China's foreign policy today consists of two things: preventing Taiwan from becoming independent and searching for oil. China is now obsessed with acquiring secure oil supplies from countries that would not retaliate against China if it invaded Taiwan, and this is driving China to get cozy with some of the worst regimes in the world."³⁸

China supports rogue regimes with money in exchange for oil, as well as with economic investment in infrastructure. China is reported to be a supplier of weapons to Sudan,³⁹ and links are made between China and Iran's development of advanced conventional weapons, missiles, and other military technologies.⁴⁰ Politically, China has used its United Nations Security Council position to stall, dilute, or abstain from voting on United Nations resolutions regarding the situation in Sudan's Darfur region, and regarding Iran's nuclear program. R. James Woolsey, former director of the CIA, is quoted as saying: "Oil makes it harder to avoid genocide in Darfur because the Sudanese have a deal with China, and it makes it harder to deal with Iran, because China and Iran have an oil deal."⁴¹

China has also struck oil deals with Venezuela and Canada, two of the United States' top four oil suppliers. Not only do these deals allow China greater access to oil, but they also represent China's growing economic influence in the western hemisphere. These deals allow Venezuela and Canada to reduce their dependence on the United States as a trading partner, and could have residual political effects in the future.

Even closer to home, in June 2005, one of China's state owned oil companies made an unsolicited takeover bid, backed by China's Communist government, for UNOCAL, also known as the Union Oil Company of California. After the bid, the House of Representatives overwhelmingly approved a resolution urging the Bush administration to block the proposed transaction.⁴² China accused Congress of politicizing economic and trade issues,⁴³ and in August 2005 dropped its offer citing political opposition.

Pessimists believe that China's global reach for oil means less oil available to the United States in the future. Optimists believe that China's investments in global exploration and production, posture world oil markets to meet the future of greater oil demands. Optimists also believe that China's dependence on foreign oil may eventually lead China to influence stability in the Middle East and improve United States and China relations. "From the viewpoint of consumers in North America, Europe, and Japan, Chinese and Indian investment in the

development of new energy supplies around the world is not a threat but something to be desired, because it means there will be more energy available for everyone in the years ahead as India's and China's demand grows."⁴⁴

Despite disagreements with China on Darfur, Iran, North Korea, Taiwan, trade imbalance, and currency manipulation, the UNOCAL ordeal demonstrated legitimate and immediate concerns concerning America's vital national interests, leading America's leaders to quickly react. The troubling aspect of this situation was that something significant had to happen to challenge the security of United States' oil supplies before Congressional leaders took action. Should Washington also be concerned with the other economic and political actions taken by China in their quest to control the ever dwindling global supplies of oil? Regardless, should Washington take a more strategic approach to revise and strongly implement better United States' strategy to reduce our dependence on foreign oil? Will our nation's leaders take action to secure the United States' future energy needs before there is an urgent crisis and it is too late?

United States Strategies

Twilight in the Desert, written by Matthew R. Simmons, is a book that questions estimates on global oil production and speculates that the world's largest oil reserves in Saudi Arabia are near production peak. Simmons presents a situation that current United States leaders need to ponder to determine if they have done everything they can do for our nation to formulate an effective energy security strategy.

What will happen to our global society if (or when?) legitimate, empowered oil demand begins to exceed available supplies on a regular basis by 2 or 5 percent? Unless we carefully formulate and swiftly adopt a plan to use oil in increasingly less intensive ways, the event could trigger a massive energy war as neighbors fight each other for increasingly scarce supplies. The world could find itself on a precarious global tipping point between peaceful prosperity and an era of sinister conflict. If world oil demand exceeds supply by even a modest 5 to 10 million barrels a day, these dire predictions could materialize.⁴⁵

In the past 30 years the United States developed initiatives and seriously looked for effective energy solutions when oil got expensive. Shortly after the 1973 embargo, the Nixon administration talked about energy independence. On 25 November 1973, President Nixon addressed the Nation on the National Energy Policy and said, "In the last third of this century, our independence will depend on maintaining and achieving self-sufficiency in energy."⁴⁶ Subsequent administrations also developed strategies and called for an end to the United States' precarious reliance on foreign oil; however, in each administration, energy initiatives

became low priorities, lacked proper attention, and became insignificant due to lower oil prices, subsequent economic factors, or other geopolitical reasons. The United States' demand for foreign oil has steadily increased from over 6 million barrels per day in 1973 to over 12 million barrels per day today.⁴⁷ "Unfortunately, energy policymaking in the United States in recent years has been neither decisive nor strategic."⁴⁸ "Every decade or so, Washington enacts a 'comprehensive' energy policy, but with few exceptions these measures do little but affect energy practices on the margin, and U.S. strategic interests are kicked down the road."⁴⁹ Based on current vulnerabilities and the outlook over the next 25 years, leaders of the United States must break this paradigm!

The Energy Policy Act of 2005, signed into law by President George W. Bush on 8 August 2005, is the first comprehensive, bipartisan energy bill passed by Congress in 13 years.⁵⁰ In addition to the Energy Policy Act of 2005, United States' strategies to reduce its dependency on foreign oil and improve energy security can be found in: *The National Energy Policy*, dated May 2001; *The Department of Energy Strategic Plan*, dated 30 September 2003; and the *Advanced Energy Initiative*, dated February 2006.

Common to each document are reasonable strategies that propose advancing emerging fuel technologies, to reduce the United States reliance on oil. One of the three basic principles stated in *The National Energy Policy*, is to "advance new, environmentally friendly technologies to increase energy supplies and encourage cleaner, more efficient energy use."⁵¹ A portion of the Department of Energy's mission is "to advance the national, economic and energy security of the United States; and to promote scientific and technological innovation in support of that mission."⁵² One of the Department of Energy's supporting goals is to develop "technologies that foster a diverse supply of reliable, affordable, and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency."⁵³ Finally, President Bush's *Advanced Energy Initiative*, repeats the theme of reducing America's dependence on oil by taking advantage of alternative and renewable energy technologies. Specifically, he states that "we will increase our research in better batteries for hybrid and electric cars and in pollution-free cars that run on hydrogen. We will also fund additional research in cutting-edge methods of producing ethanol, not just from corn, but from wood chips, stalks, or switch grass."⁵⁴

Critics of overall United States' policies argue that energy issues lack sufficient and sustained attention, are not thoroughly integrated into foreign or domestic policies, that the government is not well organized to address threats of oil dependence on national security, and

that federal research and development efforts, as well as funding, are fragmented, unfocused and “try to be all things to all people.”⁵⁵ The Energy Policy Act of 2005 is said to be typical of pork barrel politics, with many “goodies for special interests.”⁵⁶ The Energy Policy Act of 2005 is also criticized for not reducing the United States’ dependence on foreign oil.

Proposal for the Way Ahead

Washington should heed the critics and learn from failures over the past 30 years. Much can be accomplished using the nation’s current energy plans, initiatives, and policies as a basis from which to build. The current initiatives and legislation provide sound strategies on pursuing various oil-free technologies; however, the focus should narrow with attention placed on the technologies that can make an immediate and meaningful impact. Congress must build on the bipartisan successes established in passing The Energy Policy Act of 2005 to develop aggressive and urgent legislation that sets lasting economic conditions to drive the nation’s demand for oil alternatives. Implementing effective change will come at a substantial cost. The American majority must understand the country’s oil dependence vulnerabilities, so they are willing to pay the price to support effective energy solutions.

Since 2001, the Bush administration has spent nearly 10 billion dollars to develop alternative energy sources.⁵⁷ In relative terms of finding effective and timely solutions to the United States oil dependency, 10 billion dollars over a six year period is insignificant. At 60 dollars a barrel, United States’ consumers spend over 1.2 billion dollars per day on oil. Expensive events of the past should serve as lessons in relation to the current vulnerabilities of our country. From 1973 to 1975 the Arab oil embargo caused average stock prices to drop by nearly half, and the value of United States’ equities dropped by 600 billion dollars, about 40 percent of gross domestic product.⁵⁸

The United States President and Congress should serve as the nation’s catalyst to get citizens and industry absorbed in the country’s immediate need for alternative fuels. “Leadership from Washington is critical because the United States is so big, so economically powerful, and so vulnerable to oil shocks and terrorism.”⁵⁹ Three leadership initiatives could potentially take the country quickly in a new direction towards reducing foreign oil dependency.

First, strategic and constant communication from Washington leaders to the American public is required for the American people to understand the national security threats associated with America’s dependence on foreign oil, as well as the ends, ways, and means necessary to find and implement effective alternatives. Washington leaders must unite the American people,

whose will is necessary to support initiatives, accept change, and support Congressional leaders. Sun Tzu said: "He whose ranks are united in purpose will be victorious."⁶⁰

Second, Congressional leaders must set legislative conditions for focused research and development programs to improve current alternative fuel technologies compatible with existing infrastructure. Relatively quick progress and results can be made transforming the transportation sector. There are over 227 million automobiles and light trucks registered in the United States.⁶¹ Two-thirds of the oil consumed in the United States goes to the gas tanks of these vehicles.⁶² Automobiles and light trucks are rotated fairly quickly, with the median age of automobiles in the United States being 9 years and light trucks just over 6 ½ years. In 2005, over 17 million new cars and light trucks were sold in the United States.⁶³ "A recent Wall Street Journal Online/Harris Interactive Personal Finance Poll reveals that one-third (33%) of U.S. adults who plan to purchase or lease a new vehicle say they are most likely to seriously consider an alternative-fueled vehicle for their next purchase."⁶⁴ These statistics demonstrate that replacing the nation's automobiles with alternative fuels vehicles is achievable in a relatively short period of time. In the next 25 years, with the right legislative backing and economic incentives, the nation could have alternative fuels vehicles dominating the roads.

Approximately 9 million vehicles in the United States are powered by alternative fuels. The majority of these vehicles are supported by existing infrastructure and include: hybrid gasoline-electric, flexible-fuels, ethanol, and biodiesel vehicles. Hydrogen powered and pure battery-only vehicles are also on the roads, with hydrogen vehicles requiring special refueling facilities.

Hybrid vehicles are currently available from many manufacturers. Advanced hybrid vehicles will soon offer plug-in capability to recharge batteries through household outlets, which will allow the automobile to initially run under electric-only power in the first 40 to 50 miles. "Your 50-mile per gallon Prius now becomes a 100 to 150 mile per gallon Prius. Based on current electricity prices, you would get the functional equivalent of 50-cent-a-gallon gasoline."⁶⁵ Future hybrid vehicles using a combination of advanced batteries and flexible fuels engines, versus the current hybrid gasoline engines, will have even more of a fuel-savings impact.

Flexible fuel vehicles are commercially available in the United States today and are capable of running on a combination of gasoline and up to 85 percent ethanol (E85). The significant differences with these vehicles, versus gas-only guzzlers, are special fuel system components and fittings. Ethanol and gasoline mixes can be pumped from current gas station infrastructure with few modifications. The United States' corn-belt states are currently the primary users of flexible fuel vehicles, with E85 (85 percent ethanol) gas stations reasonably

available. Daimler Chrysler, General Motors, Mazda, Mercedes-Benz, Ford, Mercury, and Nissan offer flexible fuel vehicles in the United States.

Ethanol is currently produced in the United States using corn; however, cellulosic ethanol technology, using fast-growing plants, is still in developmental stages for mass production. In addition to reducing oil demands, the emerging ethanol industry will provide farmers with new markets for crops, and the emerging ethanol-processing industry will create new jobs in America's heartland.

Biodiesel fuels are produced with fatty substances, such as soybean oil, canola oil, animal fats, or recycled cooking fats. Biodiesel is available in pure form or as a blend with traditional diesel fuel. Most diesel vehicles can run off a blend of 5 percent biodiesel and conventional diesel with no engine modification. Vehicles with engine modifications can run from 20 to 100 percent biodiesel fuel. Besides biodiesel reducing oil demands, it also burns more efficiently than traditional diesel and produces less pollution.

Hydrogen is another fuel source that requires continued and focused support from Congress for research and development. Hydrogen-powered vehicles are available today; however, hydrogen requires special infrastructure for refueling and the technology requires further improvement to make it cost effective. Hydrogen offers great potential over the next forty years, to revolutionize America's energy demands. As a renewable energy source, hydrogen can be replenished at the same rate it is used. Hydrogen-fueled vehicles are also environmental friendly, as the only emission is water vapor. President Bush recognizes the potential of hydrogen in his *Advanced Energy Initiative* and announced that the hydrogen fuel initiative "could reduce our oil demand by over 11 million barrels per day by 2040 – approximately the same amount of crude oil America imports today."⁶⁶

Finally, Congress must be aggressive and promote economic incentives, tax credits, and impose gasoline taxes to set economic conditions to promote alternative fuel vehicles and drive demand for these vehicles. While increasing gasoline taxes will not be popular with American voters and thus the nation's political leaders, it is a "tough love" measure that should be taken by our government. Raising the price of gasoline with a substantial user tax will drive economic factors to make alternative fuels more competitive with gasoline. Additionally, higher gas prices in conjunction with improved tax credits for owning alternative fuel vehicles, should drive demand for alternative fuel vehicles. An increase in demand will lead to automobile manufacturers increasing production and options available to customers. Theoretically, more alternative fuel vehicles on the highway will also drive the nation's oil industry to provide greater access and more options, such as E85, at the pump.

Conclusion

James Woolsey “drives a Toyota Prius with a bumper sticker that reads ‘Bin laden hates this car.’ The sticker is a testament to Woolsey’s irreverent approach to American foreign policy and what he has called ‘defeating the oil weapon.’”⁶⁷ With the will of the American people and immediate, committed, aggressive, consistent, and strategic leadership in Washington, the United States’ energy security could improve relatively quickly, through focused governance and effective legislation. America can build upon current strategies that serve as a foundation for necessary change. Technologies available today could work as effective placeholders to fuel America’s transportation sector, while these and other fuel technologies are concurrently developed and improved.

The last 30 years of political action in Washington however have proven that effecting change to reduce America’s oil dependence will not come easy. As the world’s largest consumer of oil, any significant change in United States’ energy policies will have global affects. Reducing the United States’ demand for oil, even by a small percentage, will affect the delicate global equilibrium of oil supply and demand, and prices will fall. As the United States considers policies to boost alternative fuel usage, oil producing nations, as well as the powerful and influential oil companies, will apply political pressures in Washington to protect their economic and profit-making interests. Additionally, OPEC could take actions to increase production to keep oil prices relatively low and stable. When the average citizen and politician pay lower prices at the pump, expensive alternative fuel programs become politically unpopular. Congressional leaders will remain reluctant to support controversial strategies, such as increasing gasoline taxes to promote alternative fuels, when higher taxes are typically disliked by constituents, and a “yes” vote by legislators could lead to political suicide.

Based upon America’s overall short-sightedness, its vast oil consuming infrastructure, and related economics, the United States may never achieve energy independence; however, the right leadership in Washington must weigh the risks, and place national security interests first. Before the growing global oil demands pass the world’s ability to supply those demands, the United States’ stale oil strategies must change; otherwise, needs for oil alternatives will be too urgent and solutions too late. For the foreseeable future, the United States will remain in a precarious position concerning its reliance on foreign oil and its energy security extremely vulnerable. The United States and its leaders must break the oil paradigm! America cannot afford to wait.

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