

Fueled Again?

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On February 17, 2006, a rebel group called the Movement for the Emancipation of the Niger Delta (MEND) declared “total war” against oil companies operating in Nigeria’s main oil-producing region. Nigeria is Africa’s leading oil exporter and ranks fifth as an oil supplier to the United States. For oil companies, it is one of the most inhospitable domains on the planet in which to do business. In recent years the country, half of which is controlled by strict Islamic law, has become a cauldron of turmoil where sectarian violence, radicalism and corruption are rampant and on the rise.

That winter week, MEND launched a campaign of pipeline sabotage and kidnapping of oil workers that led to a 20 percent decline in Nigeria’s oil production. Five days later, Iraq, with the world’s second-largest reserve of conventional crude, nearly went offline when the Shi’a Askaria shrine in Samarra was bombed, threatening to drag the country into a bloody civil war. Since Saddam Hussein’s invasion of Kuwait in August 1990, Iraq has been producing far less oil than its potential capacity. Years of sanctions and neglect have brought production to less than three million barrels a day (MBD). The Iraq war has since brought the

country to a new oil production low. A sabotage campaign against the country’s oil installations has reduced Iraqi production to a disappointing average of two MBD. But the Samarra attack could have pushed the country over the edge, stopping crude exports altogether. This was the moment al-Qaeda was waiting for.

Since September 11, terrorist groups have identified oil terrorism as a way to break the economic backbone of the West. Until 2002, the oil market had sufficient elasticity to deal with occasional supply disruptions. Such disruptions could be offset by the spare production capacity owned by some OPEC producers, chiefly Saudi Arabia. This spare capacity has been the oil market’s main source of liquidity. But due to burgeoning demand in developing Asia, coupled with the voracious appetites of traditional consumers in the industrialized world, this liquidity mechanism has eroded from seven MBD in 2002, which constituted 10 percent of the market, to about two MBD today, less than 2.5 percent. As a result, the oil market today resembles a car without shock absorbers: The tiniest bump can send a passenger to the ceiling.

Without liquidity, the only mechanism left to bring the market to equilibrium is rapid and uncontrolled price increases. This reality plays into the hands of jihadists who seek to hurt the Western economy by going after what they call “the provision line and the feeding to the artery of the life of the crusader’s nation.” In

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an October 2004 videotape, Osama bin Laden explained: “We bled Russia for ten years until it went bankrupt and was forced to withdraw [from Afghanistan] in defeat. . . . We are continuing in the same policy to make America bleed profusely to the point of bankruptcy.” And that is why, throughout the world, jihadi terrorists have been attacking oil facilities almost on a daily basis, with significant impact on the oil market.

On a normal day these attacks impose a “fear premium” on the oil market of around \$10–15 per barrel. For the United States, an importer of 12 MBD, this fear premium alone costs roughly \$50 billion a year. But in February the combination of unrest in Nigeria and Iraq and fear over a looming crisis with Iran presented al-Qaeda with a unique opportunity to deliver a crippling blow to the global economy by cutting off a significant amount of oil from the market. That could be done most effectively by an attack on a strategic oil installation in Saudi Arabia. So on February 24 two trucks, driven by suicide bombers and each laden with one ton of explosives, blew up at the outer perimeter of Saudi Arabia’s Abqaiq plant—the world’s largest oil processing facility, through which more than half of Saudi oil passes each and every day.

Luckily, the terrorists failed to cause significant damage to the plant. But had they succeeded in turning the complex into an inferno, they would have denied the world of roughly half of Saudi Arabia’s oil and its remaining spare capacity. That would amount to more oil than all the OPEC members took off the market during the 1973–74 Arab oil embargo. Had such a calamity happened in conjunction with the shutdowns in Nigeria and Iraq, oil prices would have soared to \$150–200 per barrel. If it had happened in the midst of a hurricane season or an extra-cold winter, the outcome would have been even more catastrophic for the United States. Studies and simulations show that a loss of as little as three MBD can cause gasoline prices to double, causing a loss of more than one million jobs in the United States alone, and a significant spike in its current account deficit. If not for three factors—the terrorists’ incompetence, responsible behavior by Iraq’s Shi’a clerics who calmed things down, and the

Nigerian military—February could have ended with a far larger loss.

For the U.S. economy and the world economy at large, the danger of simultaneous multiple failures in the global oil industry could be more economically damaging than an outbreak of a pandemic or a dirty bomb set off in New York City. The supply disruptions of the 1970s cost the U.S. economy between \$2.3 trillion and \$2.5 trillion.¹ According to the National Defense Council Foundation, a disruption of similar proportions today could carry a price tag as high as \$8 trillion—a figure equal to more than 60 percent of U.S. annual GDP, or nearly \$27,000 for every man, woman and child living in America.² This is more money than the United States has spent in all of its wars combined since 1776. That ten of the top-14 oil-exporting countries are politically unstable; that the United States may be facing a long period of increased hurricane activity in the Gulf of Mexico; that, following the Abqaiq attack, al-Qaeda promised “we shall not cease our attacks until our territories are liberated”—all of this implies that it is only a matter of time before the United States finds itself in the midst of a severe oil shock.³ Here is an eminently predictable catastrophe if ever there was one.

The Energy Weapon Is Back

Transportation underlies the modern U.S. economy. Since 97 percent of U.S. transportation energy is petroleum-based, oil is the lifeblood of America’s economy. Without oil, goods and raw materials cannot reach their destinations, service providers cannot arrive at their clients, and children cannot go to school. America is poor in oil relative to its need. It consumes one of every four gallons in the world, but has barely three percent of the world’s prov-

¹Milton Copulos, “America’s Achilles Heel: The Hidden Cost of Imported Oil” (The National Defense Council Foundation, 2003).

²Testimony of Milton Copulos before the Senate Foreign Relations Committee, March 30, 2006.

³*Reuters*, February 26, 2006.



Scene of the crime, February 25, 2006

AFP/Getty Images

en reserves. The United States now imports 60 percent of its oil, more than twice as much as it imported prior to the 1973–74 Arab oil embargo. While America grows increasingly dependent on this resource, its supply to households and industries is ever more threatened, not only by non-state actors like MEND, al-Qaeda and the Iraqi insurgents, but also by the swaggering of oil-producing nations.

Conventional wisdom holds that the oil weapon used against the United States and its allies in the 1970s is obsolete. While it is true that the OPEC states that wielded the oil weapon subsequently suffered the most from it, the assumption that this weapon will not be used again is dangerous considering the fact that in the past five years alone, no fewer than six energy exporters unsheathed the oil saber when tension with the United States deepened. In October 2002, member countries of the Organization of the Islamic Conference considered an oil embargo as a way to stop the United States from attacking Iraq. Mahathir Mohamad, then Malaysia's prime minister, said: "Oil is the only thing Muslim nations have which is needed by the rest of the world. If they can cut back on supply, people will not be oppressive on them. . . . It can be used as a weapon to protect the interest of Muslims." Earlier, in April 2002, Saddam Hussein declared an oil embargo for thirty days in response to Israeli military operations in the West Bank. Libya

immediately announced that it would follow suit if other Muslim oil-producers imposed an oil embargo. Iran's supreme leader, Ayatollah Ali Khamenei, reminded his OPEC colleagues that if the West did not receive oil, "their factories would grind to a halt. This will shake the world!"⁴ A day later, similar sounds came from Saudi Arabia. More recently, Hugo Chavez has twice threatened to cut off oil shipments to the United States, and some senior Iranian officials have threatened to block the flow of oil from the Persian Gulf if the United Nations imposes sanctions over Tehran's nuclear-weapons program. In one case, Russia cut the supply of gas to Ukraine as punishment for its movement toward democracy.

This trend is alarming because it shows a growing inclination on the part of energy producers to use a negotiating method that for the past three decades has been taboo. More unsettling is the fact that in the future the industrialized world will be much more beholden to oil and gas exporters, particularly to OPEC. While non-OPEC countries pump at full speed, OPEC producers stick to a quota. As a result, the former are depleting their oil reserves proportionately faster than OPEC. Exxon Mobil Corporation has estimated that non-OPEC production—this includes Russia

⁴"Iran wields oil embargo threat", *BBC*, April 5, 2002.

and West Africa—will peak within a decade.⁵ At that point, there will be little easily recoverable oil left outside of the Middle East. As the International Energy Agency put it in November 2005, “We are ending up with 95 percent of the world relying for its economic well being on decisions made by five or six countries in the Middle East.”⁶

“Warping” Foreign Policy

Deeply embroiled in a struggle against radical Islam, nuclear proliferation and totalitarianism, the United States faces a stark reality: While its relations with the Muslim world are at an all-time low, more than 70 percent of the world’s proven oil reserves and over a third of production are concentrated in Muslim countries. The very same Shi’a and Sunni theocratic and dictatorial regimes that most strongly resist America’s efforts to bring democracy to the Middle East are the ones that, due to the market’s tightness, currently drive the world oil economy. While the U.S. economy bleeds, oil-producing countries like Saudi Arabia and Iran—sympathetic to, if not directly supportive of radical Islam—are on the receiving end of staggering windfalls. In 2005, the United States spent more than \$251 billion on foreign crude oil and refined petroleum products. This year, with oil hovering between \$60 and \$80 a barrel, the figure could surpass \$320 billion.

These figures make U.S. oil imports not only the cause of about a third of the U.S. trade deficit but also an indirect contributor to the spread of radical Islam and anti-democracy forces. An undetermined portion of the petrodollars sent to the Middle East finds its way—through official and unofficial government handouts, charities and well-connected businesses—to the jihadists committed to America’s destruction. As Under Secretary of the Treasury Stuart Levey told the Senate Committee on Banking, Housing and Urban Affairs in July 2005, “Wealthy Saudi financiers and charities have funded terrorist organizations and causes that support terrorism and the ideology that fuels the terrorists’ agenda. Even today, we believe that Saudi donors may still be a significant source of terror-

ist financing, including for the insurgency in Iraq.”

The flow of petrodollars from consuming economies to the coffers of producers that, in the words of President Bush, “don’t particularly like us”, not only casts a large shadow over America’s prospects of winning the War on Terror, but it also limits its diplomatic maneuverability on central issues like human rights and nuclear nonproliferation. Perhaps the most powerful statement of the impact on America’s ability to accomplish its foreign policy goals came from Secretary of State Condoleezza Rice, who told the Senate Foreign Relations Committee in April:

We do have to do something about the energy problem. I can tell you that nothing has really taken me aback more, as Secretary of State, than the way that the politics of energy is . . . ‘warping’ diplomacy around the world. It has given extraordinary power to some states that are using that power in not very good ways for the international system, states that would otherwise have very little power.

One of these states is Iran. With 10 percent of the world’s oil reserves and the world’s second largest natural gas reserve, Iranian President Mahmoud Ahmadinejad seems unfazed by the prospects of international sanctions against his country as a result of its efforts to develop nuclear weapons. At high oil prices, leaders of human rights-violating countries like Sudan, Uzbekistan, Azerbaijan, Turkmenistan and Chad can persecute their people with impunity. The control over a large part of the world’s oil and gas market allows Russia’s President Vladimir Putin to bully his European neighbors, to play “hard to get” on Iran and to undermine democracy in former Soviet republics like Ukraine and Georgia.

Oil also lubricates the so-called Bolivarian revolution led by Venezuela’s President Hugo Chavez. Chavez is using Venezuela’s oil wealth

⁵“Exxon president predicts non-OPEC peak in 10 years”, *Oil and Gas Journal*, December 13, 2004.

⁶“Energy Agency Sets Grim Oil Forecast”, *Wall Street Journal*, November 8, 2005.

to buy political influence in the Western Hemisphere and to consolidate an anti-U.S. bloc in the region. Last year, he signed agreements to finance cheap oil to 13 Caribbean countries, bought up more than \$1 billion of Argentina's debt and worked to distance Mexico from the United States. At the same time he is leading a nationalization campaign against multinational energy companies operating in South America, which will surely discourage energy majors from making the investments necessary to develop the region's economies.

U.S. diplomacy is further complicated by the indefatigable thirst for energy of emerging countries like China and India, which are becoming increasingly dependent on the very same countries the United States is trying to rein in. The growing appetite of developing Asian powers not only plays into the hands of the aforementioned rogue producing nations, but also feeds what could become a global competition for control of energy resources.

Foreign Policy Begins in Our Garage

The unique strategic importance of oil to the modern economy—beyond that of any other commodity today—stems from the fact that the global economy's very enabler, the transportation sector, is utterly dependent on it, with 220 million cars and trucks in the United States alone. Today's vehicles have an average lifespan of 16 years and, for the most part, can only run on petroleum. Therefore, even if every new vehicle produced runs on some alternative fuel, we will still need uninterrupted supplies of conventional fuels for the next 15 to twenty years.

The petroleum industry will doubtless do its part: With high oil prices expected for the foreseeable future we will likely see expanded domestic production using enhanced recovery technologies, the government relaxing some restrictions on domestic drilling, and, increasingly, non-conventional sources of petroleum such as tar sands, extra heavy oil and oil shale coming online. There are an estimated 180 billion barrels of oil that can potentially be generated from tar sands in Canada, and technology

is being developed to tap an additional 800 billion barrels of oil from shale in Colorado, Utah and Wyoming—more than triple the proven oil reserves of Saudi Arabia. America's vast coal reserves can also be tapped to produce synthetic petroleum. A process called Fischer-Tropsch, which was used extensively by Nazi Germany and by South Africa, allows the conversion of coal to clean diesel. The process is economically viable with oil selling at \$45 per barrel and above; the U.S. Department of Energy estimates that by 2030 a tenth of current U.S. oil production will come from coal. These solutions will require significant investment in the United States and abroad. The International Energy Agency estimates that it will take \$16 trillion in spending, much of it by national and privately owned oil companies, over the next 25 years on new energy infrastructure just to keep up with growing demand and to insulate the world from shocks.⁷

On the demand side of the equation, industrialized nations have demonstrated a remarkable ability to conserve and improve efficiency once prices spike. Between 1979 and 1985 U.S. oil consumption fell 15 percent and oil imports fell by 42 percent. Because 60 percent of the projected increase in oil use in the next twenty years will be in the transportation sector, the biggest efficiency gains can be accomplished there. Roughly 40 percent of the world's supply goes to power cars and trucks. Public policy initiatives such as gasoline taxes, fuel efficiency standards for cars and trucks and, in response to crisis, the introduction of mild austerity measures could dampen demand and push prices down. After fuel economy standards were introduced in the United States in 1978, the fuel efficiency of new cars and trucks rose quickly, though it has leveled off in recent years. The introduction of hybrid technology, which combines an internal combustion engine with an electric motor, allows auto manufacturers to increase efficiency without compromising safety or performance. Because of their high efficiency, hybrid electric vehicles can attain between 20 percent to over twice

⁷Daniel Yergin, "Ensuring Energy Security", *Foreign Affairs* (March/April 2006).

the mileage of conventional gasoline engines. In the more distant future the introduction of extra-strong lightweight vehicle materials could improve efficiency even further.⁸

But neither efforts to expand petroleum supply nor those to crimp petroleum demand will be enough to reduce America's strategic vulnerability anytime soon. When the British navy made the shift from coal to oil, then-Lord of the Admiralty Winston Churchill famously remarked, "safety and certainty in oil lie in variety and variety alone." To diminish the strategic importance of oil to the international system it is now critical to expand the Churchillian doctrine beyond geographical variety to variety of fuels.

The United States and other major oil-consuming countries are well endowed with a variety of energy resources, including coal—the United States has a quarter of the world's total reserves—agricultural, municipal and industrial waste, dedicated energy crops, nuclear power, and solar and wind power. All of these energy sources can play a role in the transportation system as part of what might be called a "fuel choice" strategy.

The key to "fuel choice" is the deployment of multi-fuel vehicle technologies that are readily available and compatible with the nation's current energy infrastructure. One key technology is the flex-fuel vehicle (FFV). This feature, which adds only \$150 to the cost of a new car, enables the use of any combination of gasoline and alcohols such as ethanol and methanol. About six million such cars are already on America's roads. In Brazil, where ethanol is widely used, the share of new car sales that have fuel flexibility has risen from four percent to 67 percent over the last three years.

But where will the fuel come from? Throughout the world alternative fuels today total a mere 2 percent of the transportation fuel market. But rising oil prices have brought a spike in demand and production of gasoline replacements. Ethanol production has more than doubled since 2000; production of biodiesel has expanded nearly threefold. In many countries, motor fuel is already blended with ethanol. In Brazil, for example, ethanol accounts today for 20 percent of the country's transportation fuel market.⁹ According to the

Worldwatch Institute, the world could theoretically harvest enough biomass to satisfy the total anticipated global demand for transportation fuels by 2050.¹⁰

In the United States today ethanol is made primarily from corn. Hopes of drastically ramping up domestic production are predicated on the commercialization of advanced technologies to convert cellulosic material like switch grass, wood chips and rice straw to ethanol using genetically modified biocatalysts. In his 2006 State of the Union Address, President Bush set a goal for such technologies to mature in under six years. Until this happens, the United States should use sugar cane as well as corn for ethanol production. Sugar yields five times more energy than corn and costs half the price to turn into ethanol. Therefore, unlike corn, it does not require a government subsidy (although, in today's climate of high prices, with production costs of corn ethanol well under \$1.50 a gallon and selling costs of about \$2.30 a gallon, it is questionable whether corn ethanol requires its current subsidies).

Unfortunately, the United States does not have an ideal climate for growing sugar cane—sugar needs a long, frost-free growing season—and is not able to ramp up sugar production to the level needed to even come close to satisfying its energy needs. This is why Latin American and Caribbean countries like Brazil, Guatemala, Honduras, the Dominican Republic, Costa Rica, El Salvador and Jamaica—all low-cost sugar cane producers—could become keys to U.S. energy security. Brazil, the Saudi Arabia of sugar, already exports half a billion gallons of ethanol a year and could provide the United States with cheap ethanol. "We don't want to sell liters of ethanol", Brazil's Agriculture Minister Roberto Rodrigues said in 2004. "We want to sell rivers."¹¹

Expanding U.S. fuel choice to include biofu-

⁸Amory Lovins, *Winning the Oil Endgame* (Rocky Mountain Institute, 2004).

⁹"Bumper Crop", *Wall Street Journal*, January 9, 2006.

¹⁰*State of the World 2006*, Worldwatch Institute, 2006, p. 74.

¹¹"Brazil's Biofuels Strategy Pays off as Oil Prices Soar", *Washington Post*, June 18, 2005.



Paulo Whitaker/Reuters/Corbis

Sugar cane harvesting in Brazil

els imported from our neighbors in the Western Hemisphere has significant geopolitical benefits at a time when U.S. standing in the region is challenged. Sugar is now grown in one hundred countries, many of which are poor. Encouraging these countries to increase their output and become fuel suppliers could have far-reaching implications for their economic development. By creating economic interdependence with sugar-producing countries in Africa and the Western Hemisphere, the United States can strengthen its position in the developing world and provide significant help in reducing poverty. In many countries where coca is grown and used for the production of narcotics, sugar could replace coca and thus help address the scourge of the illicit drug trade.¹² Yet despite the economic and geopolitical benefits of sugar ethanol in the United States, corn and sugar growers as well as major ethanol refiners oppose imports of sugar ethanol. The growers' champions in Congress have imposed a stiff tariff of 54 cents per gallon on imported ethanol to protect local industry. The result is that, while we do not tax fuel imported from Saudi Arabia or Venezuela, we do tax fuel coming from Brazil. This is absurd.

A game-changing alcohol that could be used in flexible fuel vehicles is methanol, also known as wood alcohol. While ethanol can only be made from agricultural products like corn, sugar cane and, assuming technological success, from cellulosic biomass, methanol can be made from all of them, plus an array of other carbon-rich energy sources with which

the United States is well endowed. Today, about 90 percent of the worldwide methanol supply is produced from methane, the main component of natural gas. Technologies to produce methanol from coal are at hand, and a commercial-scale plant in the United States now produces it for about fifty cents per gallon (methanol has about half the energy of gasoline, so this equates to about one dollar per gasoline-equivalent gallon). In China, eight provinces have recently made a strategic decision to use methanol as a fuel and eighty coal-to-methanol plants are in the making. When it comes to biomass, methanol enjoys a significant advantage over ethanol: A ton of biomass will produce 50 percent more energy if converted to methanol than to ethanol. Chemistry Nobel Laureate George Olah has also proposed recycling carbon dioxide emissions from industrial exhausts by combining them with nuclear or renewable hydrogen to produce methanol.¹³

No less promising is the use of electricity as a transportation fuel. In most of the industrial world petroleum is no longer used to generate power. Since the 1970s, oil-powered generators have been replaced by nuclear reactors, coal-fired power plants, natural gas turbines, solar panels and wind turbines. Only about 2 per-

¹²Johanna Mendelson-Forman and Norman A. Bailey, "Hooked-on-oil energy substitute?", *Washington Times*, May 22, 2006.

¹³George Olah, Alain Goeppert and Surya Prakash, *Beyond Oil and Gas: The Methanol Economy* (Wiley, 2006).

cent of U.S. electricity is now generated from oil. Using electricity as a transportation fuel enables the full spectrum of electricity sources to displace petroleum. Plug-in hybrid electric vehicles (PHEVs) are multi-fuel vehicles that can utilize grid electricity in addition to liquid fuel. PHEVs can be plugged into the electric grid and provide the stored energy for much of a typical day's drive. Like the first-generation hybrids currently on the road, plug-ins have a liquid fuel tank and internal combustion engine, so they have the same driving range as a standard car. A person who drives less than the car's electric range in a day could do so exclusively by recharging the battery and seldom have to dip into the fuel tank. Since half the cars on the road in the United States are driven twenty miles a day or less, a plug-in with a twenty-mile range battery would reduce gasoline consumption significantly. When the charge is used up, the PHEV automatically switches over to running on the engine powered by the liquid in its fuel tank. PHEVs can reach fuel-economy levels of one hundred miles per gallon of gasoline. If a PHEV is also a flexible fuel vehicle powered by 85 percent alcohol and 15 percent gasoline, fuel economy could reach over *500 miles per gallon* of gasoline. Ideally, plug-in hybrids would be charged at night in home or apartment garages, when electric utilities have significant reserve capacity. The Electric Power Research Institute estimates that up to *30 percent* of the U.S. vehicle market could shift to plug-in hybrids without needing to install additional baseload electricity-generating capacity.

Thinking Out of the Barrel

By shifting to non-petroleum next-generation transportation fuels like alcohol, non-petroleum diesel and electricity, Americans can reduce the content of gasoline in their tanks and hence reduce their vulnerability to supply disruptions. Today, the United States imports 12 MBD and it is projected to import almost twenty MBD by 2025. If all cars on the road by 2025 are either diesels burning some non-petroleum fuel or flexible and plug-in hybrid vehicles, U.S. oil consumption would drop by as much as 12

MBD. Oil would face competition at the pump with other energy sources, which should serve to dampen its strategic value, enabling America to regain control over its foreign policy and reduce its vulnerability to an energy catastrophe.

A nationwide deployment of flex fuel cars, plug-in hybrids and alternative fuels could take place within two decades. But such a transformation will not occur by itself. In a perfect world, government would not need to intervene in the energy market, but in a time of war, the United States is taking an unacceptable risk by leaving the problem to be solved by the invisible hand. This is especially true since the energy market is anything but free. It is manipulated by a cartel, heavily rigged in favor of the status quo, and, as the case of Brazilian ethanol shows, riddled with protectionism. In the absence of appropriate public policy, hundreds of millions of petroleum-burning cars ill-suited to address the changing geopolitics and geology of oil will roll onto our roads in coming decades, with profound implications for the future. On pure national security grounds, government must facilitate energy security by requiring that vehicles sold in the United States be able to run on other fuels in addition to oil-based fuel. A fuel-choice standard would level the playing field and promote free competition among diverse energy suppliers.

The shift from an oil-based economy to a fuel-choice economy is a big idea. But the American people have never shied away from big ideas. Space exploration, disease eradication and the proliferation of freedom were all big ideas that have benefited billions of people around the world. They all required dedicated and enthusiastic leadership, public support, close international cooperation and, more than anything, perseverance. An aggressive, inventive energy policy can gradually diminish the role of oil in world politics and reduce predictable friction between consumers and producers and among consumers themselves. Such a vision is both practical and economical—far cheaper than maintaining our current energy system. The only question is whether our leaders will lead, or whether, instead, they will be dragged to act by the most painful oil shock in American history. 🌍