Center for American Progress

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Securing America's Energy Independence Through Energy Diversification

The Lessons of the Past and the Direction for the Future

Shiyong Park, Winny Chen, and Rudy deLeon April 2009

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Introduction

This time a year ago, the United States and the world were reminded of the devastating costs of a global energy crisis. Consumers, businesses, and industry leaders alike watched helplessly as crude oil prices skyrocketed to $147 per barrel, and the domestic consequences were reminiscent of the energy crisis of the late 1970s. Consumers suffered, costs of living soared, the auto industry contracted, proponents of domestic drilling gained momentum, and global oil companies raked in record profits.

But unlike in the aftermath of the first two energy crises, innovation and efficiency—not just conservation—have now taken the spotlight as the solution. In the past, as oil prices fluctuated, so did our commitment to energy independence. Not so today. With advancements in technology, conflicts in the Middle East, and the clear threat of climate change, America's energy interests are no longer based on swings in oil prices. Efforts to reduce oil consumption and to develop alternative energy continue to grow, and they must do so.

Without energy diversification, the United States will grow even more dependent on volatile regimes to feed America's insatiable appetite for oil, and it will finance this dependence by leveraging our nation's precious treasury. Twenty years of inaction have jeopardized our nation's security, and we simply cannot repeat our mistakes. We must develop sustainable sources of energy and tighten fuel-efficiency controls.

In the following pages, we make a case for the unavoidable need for energy diversification and efficiency, efforts critical to our national security, economic stability, and environmental preservation. We then provide the direction our nation must take to ensure that alternative energy capabilities and energy-efficiency efforts bear fruit quickly and firmly.

Our reliance on foreign oil

Currently, petroleum—the major product of crude oil—dominates as the leading source of all energy supply in the United States at 39.8 percent, accounting for 96 percent of transportation fuel and 44 percent of industrial fuel.[1] To meet this demand, the United States produced 1.8 billion barrels of crude oil in 2008,[2] and imported twice as much at over 3.6 billion barrels (see Figure 1).[3] Since 1994, the majority of crude oil supplied in the United States has been imported, and approximately half of it originated from the member nations of the Organization of Petroleum Exporting Countries.

What's more, over the past decade the United States spent a total of $2.3 trillion on crude oil, $1.5 trillion of which was for imports (see Figure 2). In 2008 alone, we purchased $357 billion worth of foreign crude oil, accounting for 2.3 percent of our nation's gross domestic product, the highest level recorded (see Figure 3, next page). Since 1985, the United States has become ever more reliant on foreign supplies, more than tripling the amount of imported oil while domestic production fell by nearly 50 percent.[4]

The top oil exporters to the United States of the last 10 years, in order, are Canada, Saudi Arabia, Mexico, Venezuela, and Nigeria (see Figure 4, next page).[5] Drawing from its vast oil sand reserves, Canada has been steadily increasing the flow, surpassing Saudi Arabia in 2004 to become the leading exporter to the United States. Although not as constant, Mexico has also increased its supply to the United States, overtaking Saudi Arabia's exports in three of the past five years.

FIGURE 1

U.S. crude consumption and supply

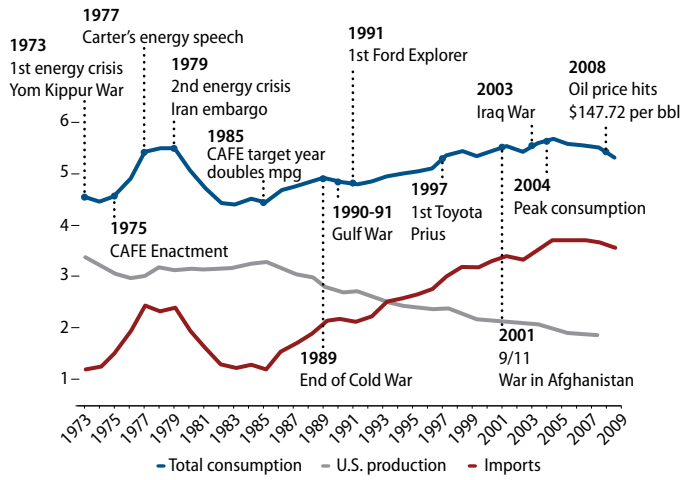
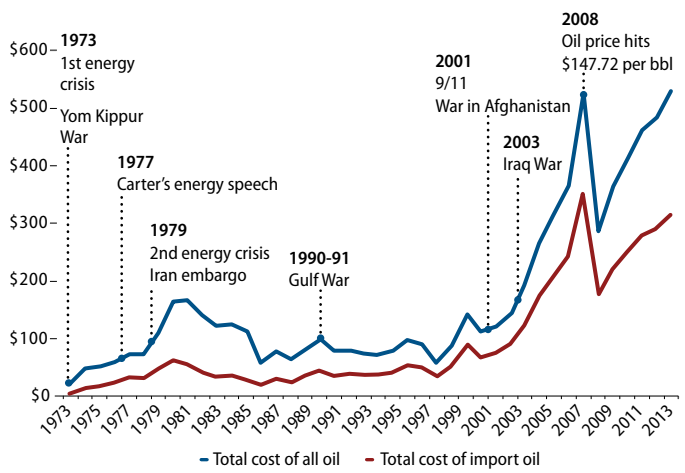


FIGURE 2

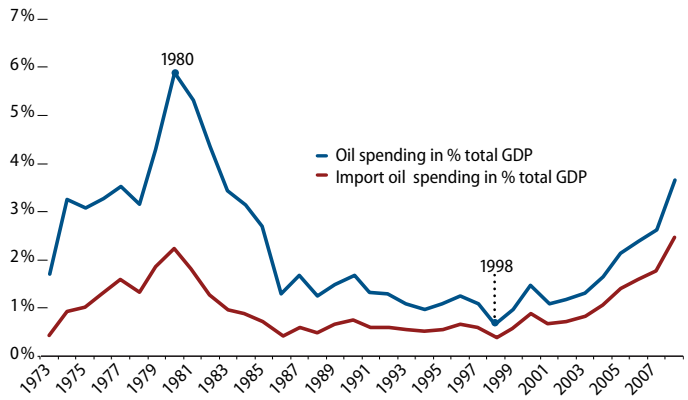
Annual spending on oil



Increasing oil exports from reliable neighbors is unquestionably a good development. In 2007, four stable allies of the United States—Canada, Mexico, Great Britain, and Brazil—supplied 35.5 percent of crude oil imports. But this will not continue for much longer. At the current level of production, the numbers appear to suggest that Canada has sufficient reserves to last over a hundred years, but this is misleading. The majority of Canada's oil is in oil sand reserves, an extremely dirty fuel that is expensive to refine. Strip mining, water pollution, and production of toxic hydrogen sulfide[6] hinder the extraction of oil sands, and its production has been identified as the leading emitter of greenhouse gases in Canada at 40 million tons of CO_2 per year.[7] The negative environmental consequences of production make oil sands unsustainable,[8] and Canada's oil production will likely diminish significantly in the near future.

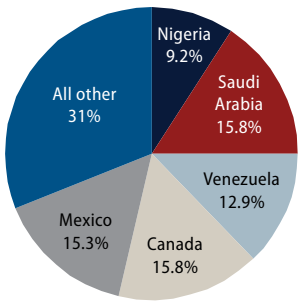
Annual spending on oil as percentage of GDP

FIGURE 3



U.S crude import shares

FIGURE 4



Great Britain, Brazil, and Mexico face even more imminent supply issues. By 2020, production in the North Sea oil fields—the primary source of Great Britain's oil—is expected to fall 66 percent from its peak production level of 1999;[9] Brazil's reserves will deplete within the next 10 years,[10] and Mexico will begin importing oil to meet domestic demands within five years, competing with the United States for foreign reserves. [11]

Without changes to our infrastructure, disappearing "friendly" foreign oil will cause the United States to grow more reliant on Venezuela, Russia, and the nations of the Middle East and Africa for fuel. This situation would be less than ideal as many of these nations are plagued with instability and hostility toward the United States and often use the energy reserves to pursue aggressive political agendas.

Domestic consumption of oil

Nor can the United States count on lowering its consumption of oil without taking serious steps to diversify its sources of energy. Consumption of oil peaked in two periods: the three years leading up to the 1977-1979 oil crisis and the two years following the Iraq war in 2003 and 2004.[12] The mid- to late-1970s saw the most dramatic spike as consumption increased from 4.5 billion barrels to 5.5 billion barrels between 1974 and 1979, only to plummet again to 4.4 billion barrels in 1983—the lowest consumption level in the past 30 years.

Statistically, no single determining factor exists to account for the consumption pattern of the past 35 years, but several factors account for periodic trends. In the period from1975 to 1979 the increase in oil consumption was likely caused by the rising vehicle sales[13] (see Figure 5) and consistently low oil prices. Between 1979 and 1983, the combination

of three years of decline in vehicle sales due to the panic caused by the first energy crisis, the initial success of the Corporate Average Fuel Economy regulation to increase fuel efficiency,[14] and the tripled oil prices caused the oil consumption to fall rapidly.

CAFE: The only successful legislation

In 1975, Congress enacted the Corporate Average Fuel Economy regulation, aimed to double the fuel-efficiency standards of passenger vehicles—not including SUVs or light trucks—to 27.5 miles per gallon by 1985.[15] With the law, the National Highway Traffic Safety Administration was granted authority to impose a standard beyond 27.5 mpg, subject to Senate veto. With the support of the White House and the Congress, the CAFE regulation survived the opposition of the auto and oil industries and achieved its target within 10 years. Once required, the auto industry effectively upgraded the fuel efficiency of production vehicles without substantial changes to the models or overall fleet composition. According to a study published by the National Academy of Sciences, due to the CAFE regulation, the United States today saves over 2.7 million barrels of gasoline per day—about a billion barrels per year.[16]

After the initial success of the CAFE regulation in 1985, however, intense lobbying from auto and oil industries led to two decades of unchanging fuel-efficiency standards despite technological innovations.[17] Coupled with the effective marketing of the fuel-guzzling SUVs and light trucks—in 2004, the sales of SUV/light trucks accounted for a record level of 52 percent of total auto sales[18]—demand for oil has been steadily increasing (see Figures 6 and 7).

The U.S. fuel economy has not improved since 1985. In fact, due to a surge of SUVs and light trucks in the national fleet, average fuel efficiency has dropped in recent years. Even for passenger vehicles, aggressive lobbying by the auto industry has resulted in lower standards and repeals in fuel economy legislations.[19]

FIGURE 5

Auto sales and oil consumption

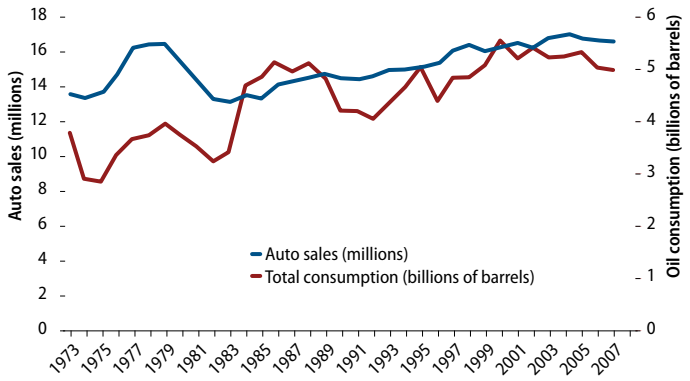


FIGURE 6

Truck (SUV) sales and MPG

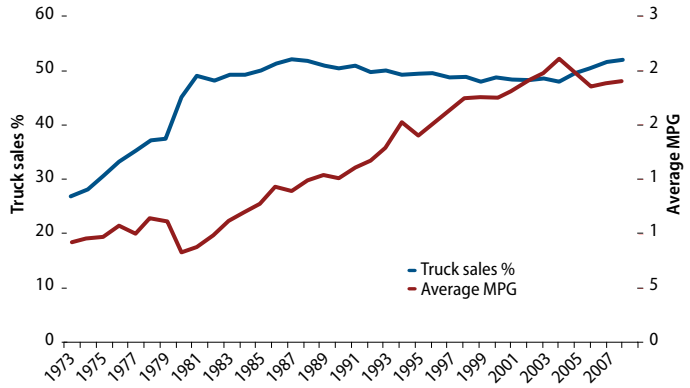
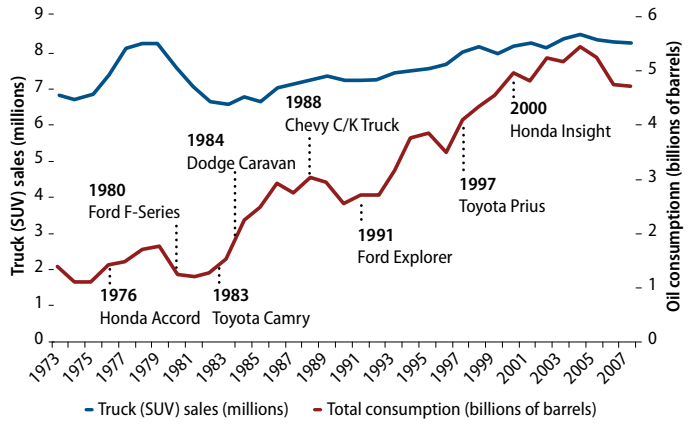


FIGURE 7

Truck (SUV) sales and oil consumption



In 1990, Sen. Richard Bryan (R-NV) and Sen. Slade Gorton (D-OR) sponsored a bipartisan bill to increase fuel standards by 40 percent over a decade,[20] a much less ambitious goal compared to the 1975 legislation. The Senate, however, filibustered the bill. Had it passed, the new standards would be saving the United States over a million barrels of crude oil daily today.

Intriguingly, following the most recent oil price spike in the first half of 2008 alongside the global financial crisis, overall consumption of oil has declined to 1992 levels and will likely decline further due to the drop in auto sales—especially the sales of SUVs, trucks, and large cars. Last year's gasoline prices of over $4 a gallon have renewed consumer awareness, and suddenly there is much wider interest among carmakers in hybrid technology and higher fuel efficiency.

This new awareness of the volatility of oil prices could well play to our nation's advantage. According to the National Academy of Sciences, a 12-to-27 percent fuel efficiency increase in cars and a larger 25-to-42 percent increase in SUVs and light trucks can be achieved without sacrificing performance or safety and without structural redesigns.[21]

By 2020, the U.S. national standard will be increased to 35 miles per gallon from the current 27.5 mpg levels. At the current level of consumption, this change would reduce annual motor gasoline consumption by 21.4 percent, which would translate to a savings of $20 billion to $40 billion in crude oil imports per year. California, the largest auto market in the United States, is implementing an even higher goal of 42.5 mpg by 2020. If California's goal was introduced for all 50 states, the savings would increase to $35 billion to $70 billion per year.[22]

The costs of oil dependency

Simply stated, the United States can no longer afford—financially nor politically—to continue on this course of consumption. In 2008, 66 percent of oil consumed in the United States was imported,[23] accounting for 16 percent of all import spending.[24] This contributes to the increasing annual trade deficit for the United States, and there could come a time when this credit bill interferes with our political interests—a situation we must avoid.

There are two major concerns over sustained dependence on oil imports. First, we will increasingly come to rely on politically unstable and culturally incompatible regimes for the lifeline of our economy. The fact that Venezuela—a country without ambassadorial ties to the United States—is one of the top five oil exporters to the United States should be a cause for concern.

Second, to bankroll these insensible expenditures, the United States continues to borrow, adding to the foreign-held U.S. Treasury securities of over $3 trillion. By relying on domestically unsustainable energy, we forfeit our economic sovereignty and undermine the American ability to defend ourselves and assert political influence.

Taking the next step: Alternative energy sources

The United States today is in an ideal position to move in a new direction, and it is critical for us to pursue the ideal course of action. Although the Obama administration is pursuing alternative energy, some are still proposing further oil exploration. We must carefully examine the future implications of our next step.

A telling case in point: As the polar ice caps melt and the Arctic Ocean becomes more amenable to oil exploration, the potential to extract the estimated 90 billion barrels of arctic crude oil reserves[25] has attracted attention from several countries. Russia has particularly taken an aggressive stance, increasing naval activity and even planting a flag at the bottom of the Arctic Ocean.[26]

Tension is inevitable without international laws governing the Arctic resources. And even if we were able to secure this band-aid solution of additional oil reserves, we are ignoring a paradox: Arctic oil has only become available through environmental degradation, a phenomenon caused largely by the world's consumption of oil. We cannot fall on this slippery slope that will bring devastating consequences.

Similarly, trying to drill our way out of our dependence on foreign oil along the Atlantic, Pacific, and Gulf coasts would yield only 21 billion barrels of oil.[27] This is a miniscule amount considering our current consumption rate of over 5 billion barrels per year and domestic production of 1.8 billion barrels.[28] Oil is simply not a domestically sustainable energy source, our energy needs cannot be met through offshore drilling.

Fortunately, the Obama administration is dedicating resources to the development of alternative energy. The urgent need for alternate sources comes from the environmental damage and the rapidly diminishing Mexican reserves. In as little as five years, Mexico is predicted to become an importer of oil, leaving a 15-percent gap in foreign oil supply to the United States.[29]

The need for an alternative fuel has prompted several options. Proponents of natural gas suggest the conversion of vehicles—limited or full fleet—to use liquid natural gas or compressed natural gas. Although the United States holds ample reserves of natural gas, it too is ultimately a limited resource, and the solution is not sustainable indefinitely.

Currently, the United States holds 238 trillion cubic feet of proven dry natural gas reserves.[30] However, we also consume an astonishing 23 trillion cubic feet annually, most of which is produced domestically.[31] Although it is difficult to estimate the timeline for natural gas supply because of the uncertainties in calculating the total size of reserves, the annual U.S. consumption is projected to increase to 31.1 trillion cubic feet by 2025.[32] This continually growing demand may eventually deplete our reserves, and once again lead to reliance on overseas resources.

Furthermore, while natural gas is the cleanest of fossil fuels, it contributes considerably to CO_2 emissions. According to the U.S. Department of Energy, natural gas produced 1.2 billion metric tons of CO_2 in 2006, while coal and petroleum emitted 2.1 billion metric tons and 2.6 billion tons respectively.[33]

The only viable option for sustained energy supply is the development of renewable fuels, and the Obama administration has taken the first step with infrastructure upgrades and renewable energy incentives. Wind, solar, and geothermal power, combined with plug-in vehicle technology and infrastructure upgrades are a permanent solution toward energy independence.

In tandem, the planned high-capacity "smart" electrical grid must be constructed to connect alternative energy sources of the Great Plains and the Southwest with businesses and consumers across the country. In the meantime, federal support for the development of smart meters in businesses and homes and plug-in vehicles must continue apace to replace fossil-fuel vehicles.[34]

Another potential renewable solution is the development of "green crude" processed from algae.[35] Different from the traditional biofuels, green crude can be converted directly to match the molecular structure of petroleum, requiring no changes to the refineries, distribution system, or vehicles. Although the fuel has been successful on small scales, only start-up companies are working on the technology, and full-scale production may be years away.

Without government support, developing these and other sources of alternative energy amid the current economic downturn will be difficult—if not impossible—for most companies. The solution for sustainable energy should be a two-pronged approach for the Obama administration: implement higher fuel efficiency standards and stricter emissions controls while providing the public infrastructure, funds, and legislative support for research and development of renewable energy sources. This will allow the United States to wean itself off foreign oil and make a smooth transition to sustainable, renewable energy.

Conclusion

For two decades, we repeatedly made mistakes of inaction. Rather than pursuing long-term sustainable goals, policymakers were swayed by the prospect of immediate benefits, and the public was too focused on the falling prices at the pump after successive energy crises to see the bigger picture of ever escalating oil imports. Today, we stand at a similar crossroads, but this time it is no longer a matter of financial inconvenience but of national security, global economy, and sustainable human existence.

The installation of smart grids and the development of domestically produced renewable energy are imperative for current and future national security and economic stability. Continuing to rely on fossil fuels will only defer the inevitable switch to renewables, and the delay will only raise the costs for future generations. To make up for the past two decades, we must quickly diversify our sources of energy to overcome our overreliance on dirty fossil fuels. We must realize the full potential of effective legislation, address consumer behaviors, and invest in scientific development. These steps toward renewable energy will not be the first, but we have the opportunity to make them the last.

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