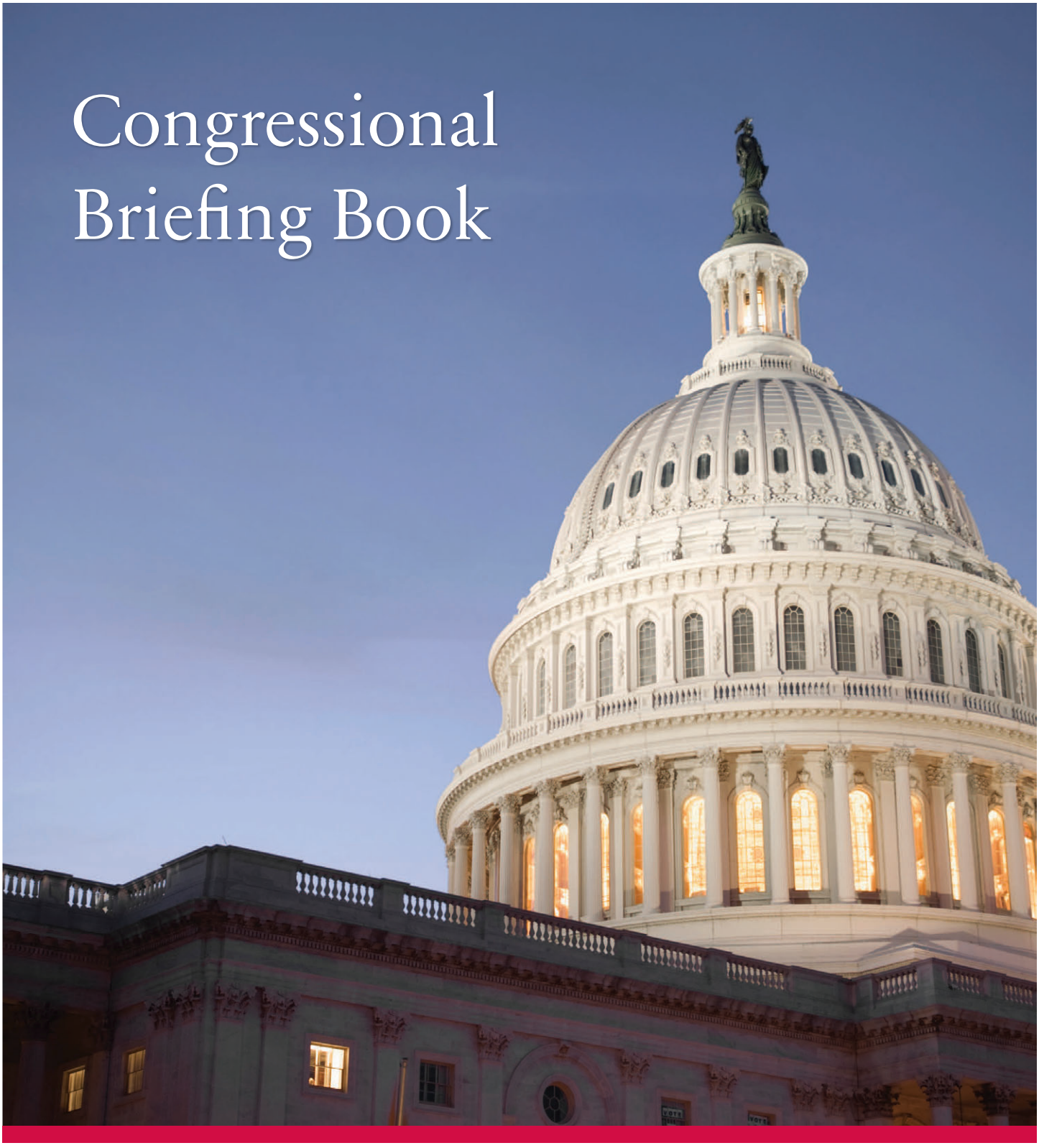
Congressional Briefing Book



Securing America's Future Energy

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Securing America's Future Energy (**SAFE**) is a nonpartisan, not-for-profit organization founded in 2004 for a single reason: to safeguard our nation's economic and national security by reducing America's dependence on oil.

We believe that America's dependence on oil is one of the single greatest threats to the nation's long-term security and prosperity. The path forward must enlist a combination of approaches. There is no single solution; to achieve our goal requires a lasting and sustained commitment.

In 2006, SAFE joined with General P.X. Kelley (Ret.), 28th Commandant of the U.S. Marine Corps, and Frederick W. Smith, Chairman, President, and CEO of FedEx Corporation, to form the Energy Security Leadership Council (ESLC), a group of business and military leaders committed to reducing U.S. oil dependence. SAFE and the ESLC published several ground-breaking policy documents during the next two years, including *Recommendations to the Nation on Reducing U.S. Oil Dependence* and *A National Strategy for Energy Security*. The strength of these policy arguments, combined with the ESLC's dedication to the goal of energy security, helped the Council play a major role in the drafting and passage of the Energy Independence and Security Act of 2007, which contained the first improved fuel-economy standards in a generation.

In 2009, SAFE brought together a group of business leaders representing the entire value chain of the electrified transportation sector to form the **Electrification Coalition** (EC), a nonpartisan, not-for-profit organization committed to promoting policies that accelerate the commercialization of plug-in electric vehicles (PEVs). That same year, the EC published its first major report, the *Electrification Roadmap*, a detailed plan designed to facilitate a transformation of the U.S. light-duty vehicle fleet from one dependent on petroleum to one largely powered by electricity.

SAFE and its partner organizations believe the costs of our oil dependence extend well beyond the price of gasoline. Every U.S. recession in the past 40 years has been associated with an oil price spike, while more than $1.4 trillion in U.S. wealth has been transferred abroad since 2007. Oil dependence also constrains U.S. foreign policy and limits our options with hostile governments in a number of oil-exporting states.

SAFE has laid out an ambitious plan to advance energy security in the United States. Our approach focuses on expanded domestic production of oil and natural gas, improvements in fuel efficiency, and a long-term shift in the transportation sector toward electrification of light-duty vehicles and natural gas for heavy-duty trucks. Breaking oil's stranglehold on our economy would represent a substantial strategic and economic victory for the country, and we believe this goal is within reach.

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PART I

Fundamentals of the Global Oil Market

DEMAND FOR OIL IN EMERGING MARKET ECONOMIES IS RISING RAPIDLY

Rapidly increasing demand for mobility in the developing world is reshaping the global oil market. Oil demand growth in emerging market economies averaged 3.6 percent annually since 2000, resulting in a net increase in global demand of 10.8 million barrels per day (mbd) by 2010.[1] Oil demand in the developed world actually shrunk over the same period.[2]

Together, China and India have accounted for 50 percent of the total global increase in oil demand since the start of the century; the majority of this increase was driven by transportation fuel demand.[3] Going forward, the International Energy Agency (IEA) expects emerging market transportation sectors to account for essentially 100 percent of global oil demand growth between 2010 and 2035.

OIL SUPPLIES CONTINUE TO BE AFFECTED BY GEOPOLITICAL VOLATILITY

Despite several bright spots in oil production growth—most notably in North America—2011 reminded policymakers and analysts that oil markets remain incredibly volatile. A wave of political unrest swept through the Middle East and North Africa—home to nearly 60 percent of global proved oil reserves—throughout much of the year. The instability culminated with the outbreak of civil war in Libya, an event that disrupted 1.6 mbd of global oil supplies and drove international benchmark crude oil prices to their highest yearly average on record.

Aside from such unpredictable events in the present, more fundamental factors generally cloud the outlook for global oil supplies in the future. No doubt, the global hydrocarbon resource base is more than adequate to keep markets supplied for decades to come. However, state-run national oil companies control as much as 90 percent of proved conventional oil reserves. Meanwhile, the portion of the resource base that is accessible to the private sector is growing increasingly costly and complex to develop and bring to market.

1 BP, plc., *Statistical Review of World Energy 2011*, at 9
2 Id.
3 Id.

THE RESULT IS HIGH AND VOLATILE OIL PRICES

Rapidly rising demand for oil in emerging economies is putting pressure on the global oil market to expand production capacity and develop new resources. At the same time, geopolitical volatility, rising marginal production costs, and an uncertain economic climate have slowed needed growth in capacity and led to tighter margins. Effective spare production capacity within members of the Organization of the Petroleum Exporting Countries (OPEC) averaged just 3.6 mbd in 2011, its lowest level since 2008.[4]

Exposure to oil price volatility is economically damaging and the most significant consequence of America's dependence on oil. Despite improvements in efficiency, the average American household spent a record $4,000 on gasoline in 2011—8.2 percent of the median household's income.[5] While the economy narrowly avoided a double-dip recession, the increased spending on fuel weakened consumer spending and acted as a drag on growth. Addressing this vulnerability should be the primary goal of U.S. energy policy.

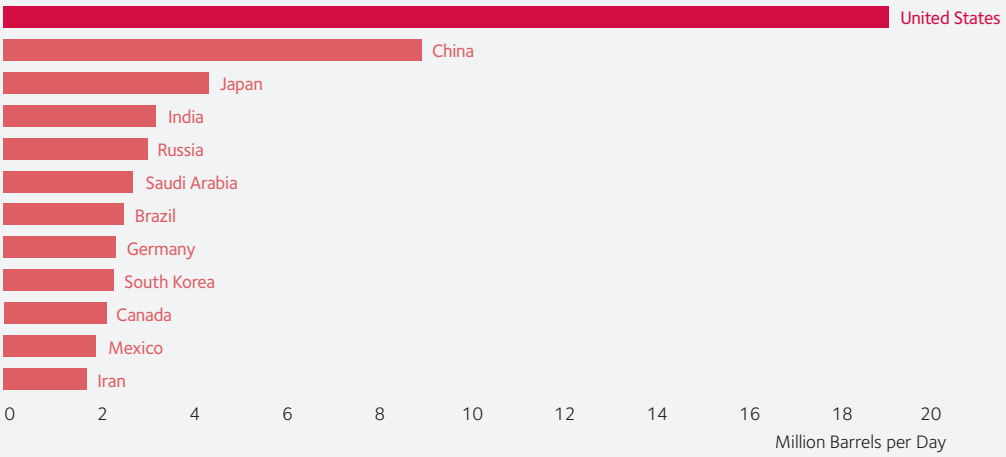
4 SAFE analysis based on data from: International Energy Agency (IEA), *Monthly Oil Market Report*

5 SAFE analysis based on data from: U.S. Department of Energy (DOE), Energy Information Administration (EIA); U.S. Bureau of Labor Statistics (BLS); and U.S. Bureau of Economic Analysis (BEA)

Global Oil Consumption

Petroleum is critical to a number of industries globally, including the chemical and pharmaceutical industries. However, the majority of oil demand is energy-related, primarily for transportation fuels. Oil consumption in the electric power sector is still significant in many developing countries.

Top World Oil Consumers (2010)



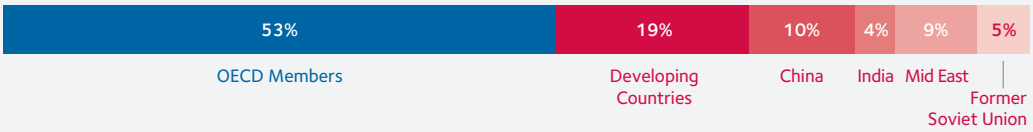
Source: BP, plc., *Statistical Review of World Energy 2011*

» The United States is the world's largest consumer of petroleum fuels. At approximately 18.9 mbd, American consumption accounted for 21 percent of the global total in 2011.[6]

» Though oil demand in several countries and regions has risen sharply in recent years, the world's second largest consumer, China, still uses roughly half as much oil as the United States.

6 IEA, *Monthly Oil Market Report*, February 2012, at 55

Oil Consumption by Region (2010)

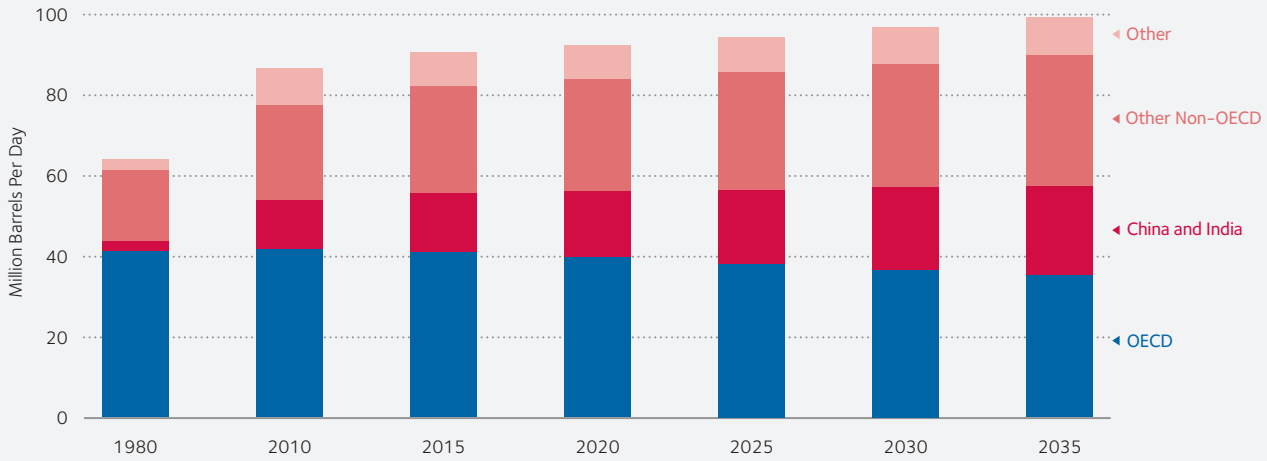


Source: BP, plc., *Statistical Review of World Energy 2011*

» The world's 34 most developed countries—members of the Organization for Economic Cooperation and Development (OECD)—accounted for 53 percent of total oil demand in 2010.[7] Rising demand in emerging economies is expected to shift the balance toward developing economies by 2015.[8]

» Globally, the transportation sector accounts for 53 percent of oil demand.[9]

Projected Growth in Regional Oil Demand



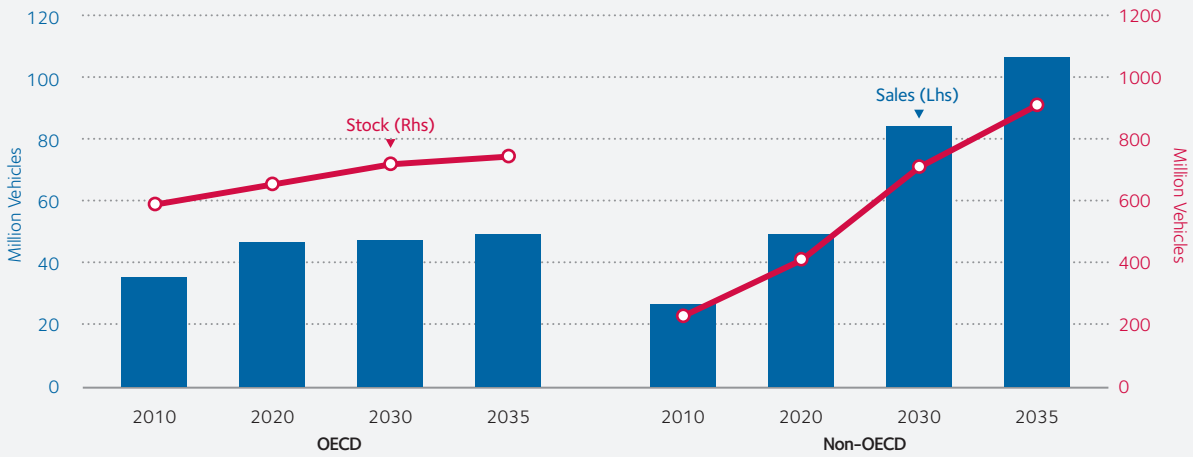
Note: Chart does not include biofuels.
Source: International Energy Agency (IEA), *World Energy Outlook 2011*

» World oil consumption (including biofuels) is forecast to rise by 15.7 mbd between 2010 and 2035—an increase of 18 percent—according to the International Energy Agency.[10] One hundred percent of this growth is expected to occur in China, India, and other emerging economies, essentially all of it in the transportation sector.[11]

» Oil demand in most OECD countries is expected to remain relatively flat as high fuel prices and new fuel-economy and tailpipe-emissions standards act to offset demand growth.

7 BP Statistical Review, at 9
8 IEA, *World Energy Outlook 2011* (WEO 2011), Table 3.2, at 107
9 Id., at 544
10 Id., Table 3.2, at 107
11 Id., Figure 3.3, at 108

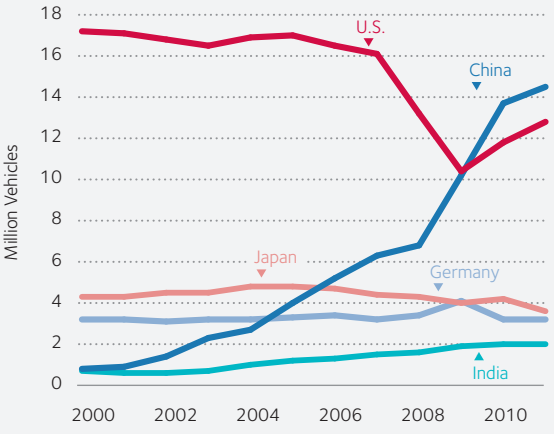
Light-Duty Vehicle Sales & Stock



Source: IEA, *World Energy Outlook 2011*

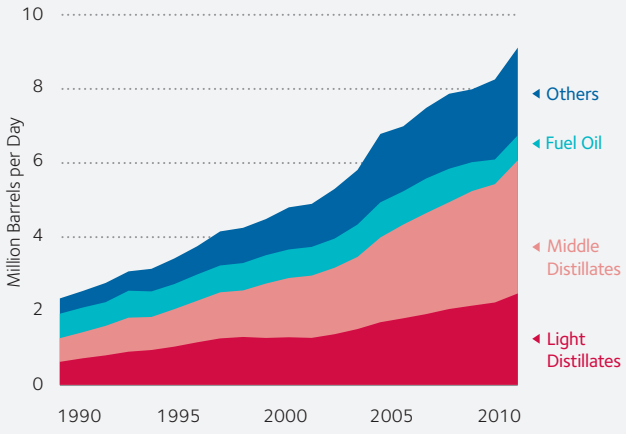
» Driven by growth in emerging markets, global passenger vehicle sales are projected to reach nearly 100 million units by 2020. The number of cars on the road in emerging markets will surpass developed economies around 2030.[12]

Passenger Vehicle Sales (2000–2011)



Sources: IEA, *World Energy Outlook 2011*; Ward's Automotive; China Association of Automobile Manufacturers; Japan Automobile Manufacturers Association; Verband der Automobilindustrie; Society of Indian Automobile Manufacturers

Chinese Oil Demand (1990–2010)



Source: BP, plc., *Statistical Review of World Energy 2011*

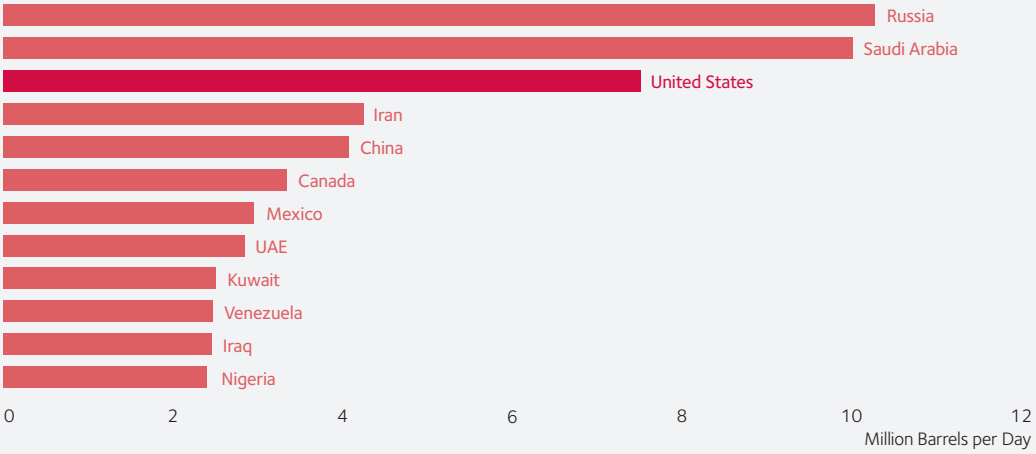
» New passenger car sales in China topped 13.7 million units in 2010, passing the United States for the first time in history.[13] In 2011, new passenger car sales were 14.5 million units.[14]

12 Id., at 115-116
13 SAFE analysis based on data from: Ward's Automotive and China Association of Automobile Manufacturers
14 China Association of Automobile Manufacturers, *Automotive Statistics*

Global Oil Production

Global liquid fuel production topped 88 million barrels per day in 2011, its highest level in history. The twelve members of OPEC accounted for 40 percent of global liquids supplies. Global biofuels production topped 1.8 mbd, its highest level in history, accounting for 2 percent of supplies.

Top World Oil Producers (2010)



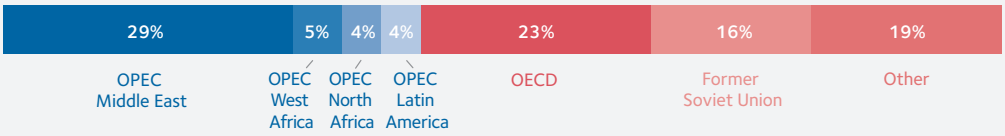
Source: BP, plc., *Statistical Review of World Energy 2011*

» The United States was the world's third largest oil producer in 2010, trailing only the Russian Federation and Saudi Arabia.[15]

» Only three of the world's top 10 oil producers are established liberal democracies: the United States, Mexico, and Canada.

15 BP *Statistical Review*, at 8

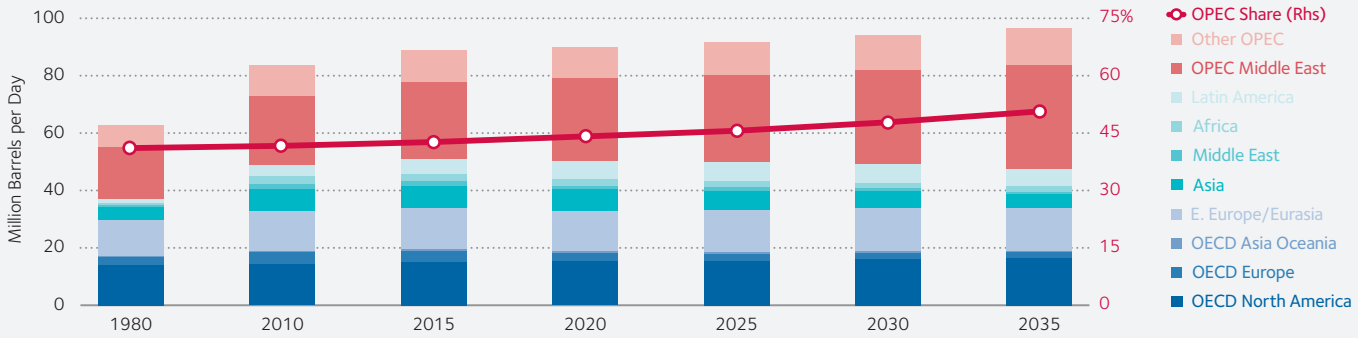
Oil Production by Region (2010)



Note: Chart excludes biofuels and refinery processing gains.
Source: BP, plc., *Statistical Review of World Energy 2011*

» Excluding biofuels and refinery processing gains, the 12 members of OPEC accounted for 42 percent of global oil production in 2010 and 2011.[16] OPEC acts as a cartel, setting production quotas for its member states. Although cartel discipline has varied over time, OPEC generally aims to set production at levels that will achieve a specified price target. Today, that price target is $100 per barrel.[17]

World Oil Production (Historical and Forecast)



Note: Does not include refinery processing gains or global biofuels production.
Source: IEA, *World Energy Outlook 2011*

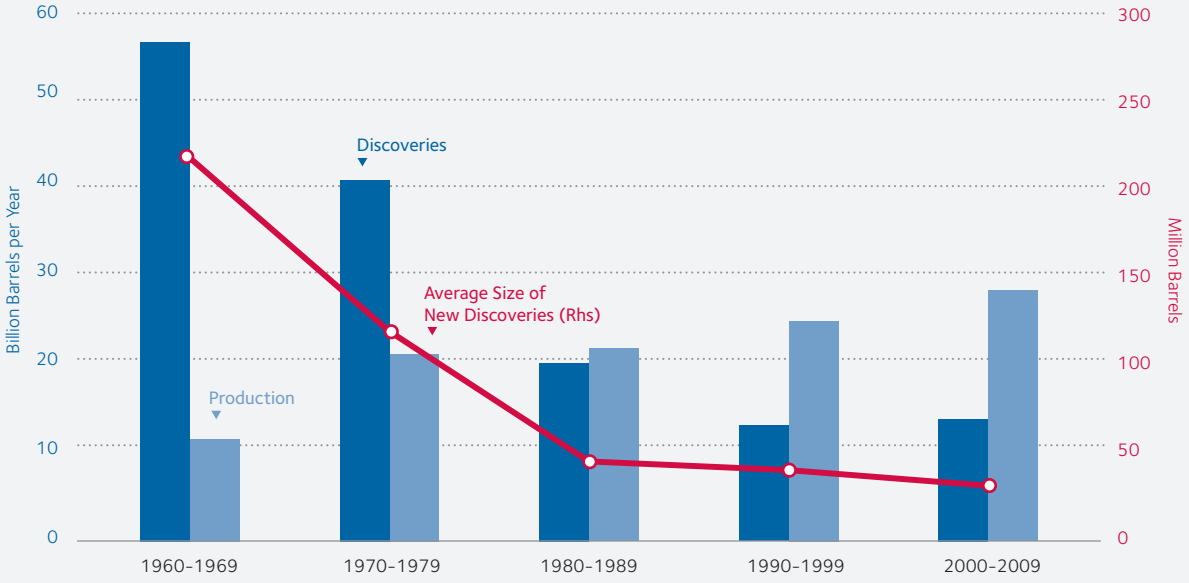
» Going forward, OPEC nations will be counted on to provide much of the growth in conventional oil supplies. A key uncertainty is whether these nations will invest in new production capacity at a sufficient rate: recent estimates suggest OPEC crude production capacity will average 35.5 mbd in 2012, slightly less than its level of 38.6 mbd in 1975.[18]

» In the aggregate, conventional oil production outside of OPEC is expected to decline between 2010 and 2035. Strong production growth in the United States, Brazil, and the Former Soviet Union will be offset by declines in Norway, the United kingdom, and Asia.

» Particularly outside of OPEC, unconventional resources play an increasingly vital role in most mainstream forecasts. The International Energy Agency recently forecast Canadian oil sands production to triple from 1.5 mbd to 4.5 mbd between 2010 and 2035.[19] Global biofuel production is forecast to grow from 1.3 mbd to 4.4 mbd over the same period.[20]

16 IEA, *Monthly Oil Market Report*, February 2012, at 58
17 Javier Blas and Guy Chazan, "Saudi Arabia targets $100 crude price," *Financial Times*, January 18, 2012
18 M.A. Adelman, "Prospects for OPEC Capacity," Energy Policy, Vol. 23, No. 3, p. 235-241 (1995); IEA, Monthly Oil Market Report, December 2011, at 22
19 IEA, *WEO 2011*, Table 3.5, at 126
20 Id.

Conventional Oil Discoveries and Production Worldwide

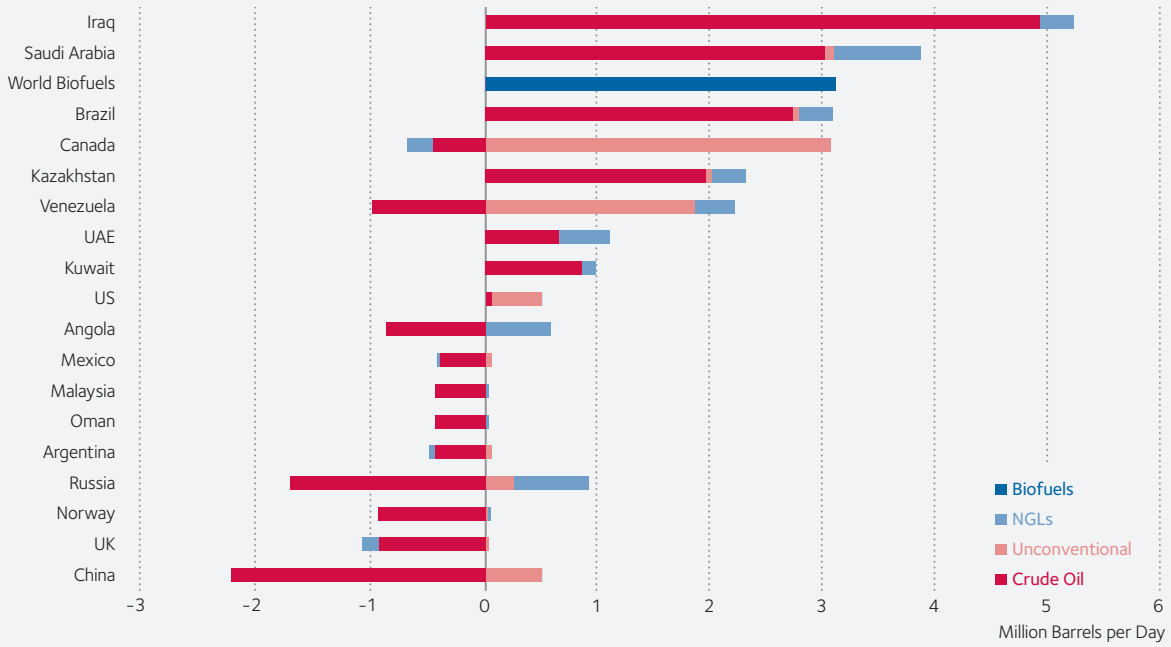


Source: IEA, *World Energy Outlook 2010*

» The average size and number of conventional oil discoveries has declined significantly over the past several decades. Moreover, new discoveries have tended to be in technologically complex environments and exhibit generally lower flow rates compared to discoveries in the early years of the oil industry.

» As worldwide demand for mobility continues to grow, oil markets are asking the question: where will new liquid fuel supplies come from?

Major Changes in Liquids Supply (2010-2035)



Source: IEA, *World Energy Outlook 2011*

The global liquid fuels market is expected to experience substantial changes over the coming decades. However, a handful of key themes dominate the outlook:

» **Continued Reliance on Middle East**: Saudi Arabia and Iraq dominate the outlook for growth in low-cost conventional oil production.

» **Growth in High Cost Reservoirs**: Conventional growth in both Brazil and Kazakhstan is likely to be characterized by projects with high capital costs, and thus high marginal production cost: pre-salt deepwater in Brazil and Caspian Sea production in Kazakhstan.

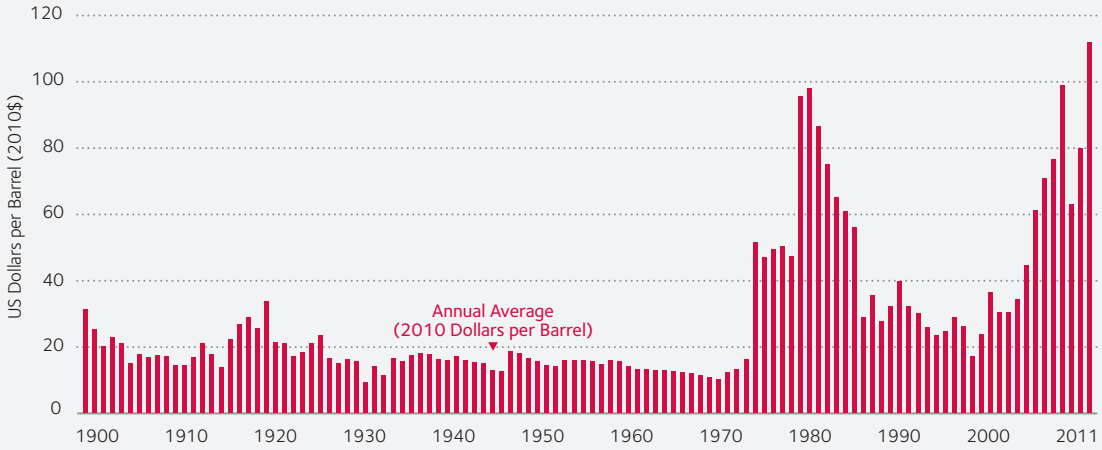
» **Expanding Role for Unconventionals and Alternatives**: Global biofuels production is expected to make a substantial contribution to future liquids growth, as are Canadian oil sands and Venezuelan heavy oil. Each of these resources depend on costly additional technology and infrastructure that necessitate higher oil prices to support investment.

» **Conventional Decline in Mature Regions**: Conventional crude oil production is expected to decline most significantly China, Russia, Norway, and the United Kingdom, all of which are mature production regions.

Oil Prices

Oil prices are set in open markets and are based on market perceptions of myriad factors that could impact the current and future balance of supply and demand. These factors include the level of government and commercial inventories, geopolitical instability, weather patterns, global economic growth, the strength of the dollar, the attractiveness of commodities as an investment vehicle, new oil discoveries, technological advancements, and others.

World Oil Prices (Brent)



Source: BP, plc., *Statistical Review of World Energy 2011;* DOE, EIA

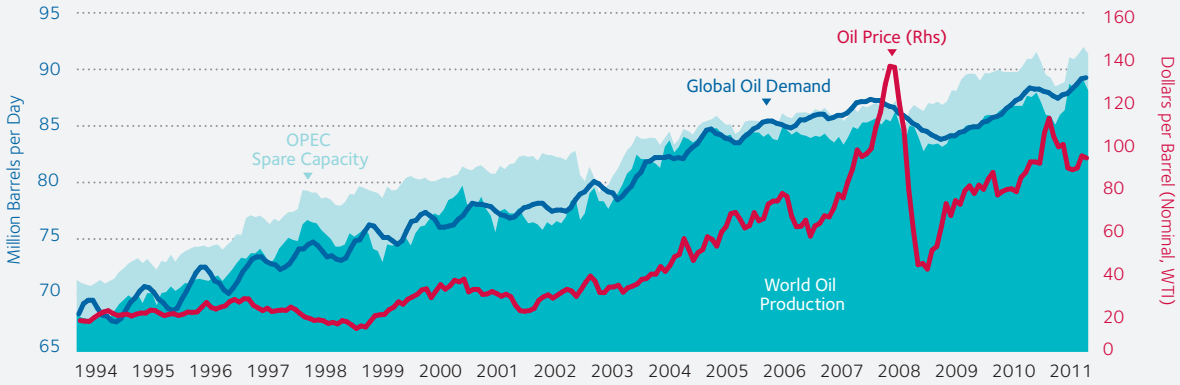
» Strong economic growth in emerging market economies is driving support for high oil prices. Markets expect that a burgeoning middle class in China and India, along with economic expansion in Latin America and the Middle East, will strain oil producers' ability to keep markets well supplied.

» The problem is compounded by ongoing political instability and weak investment programs in many oil-producing nations.

The Role of OPEC Spare Capacity in Oil Prices

OPEC spare capacity is the portion of its members' total production capacity left sitting idle at any given point in time. In general, only OPEC members maintain significant spare capacity, which is used to influence global oil prices. The majority is typically held by Saudi Arabia.

OPEC Spare Capacity and Oil Prices (1994–2011)



Source: DOE, EIA

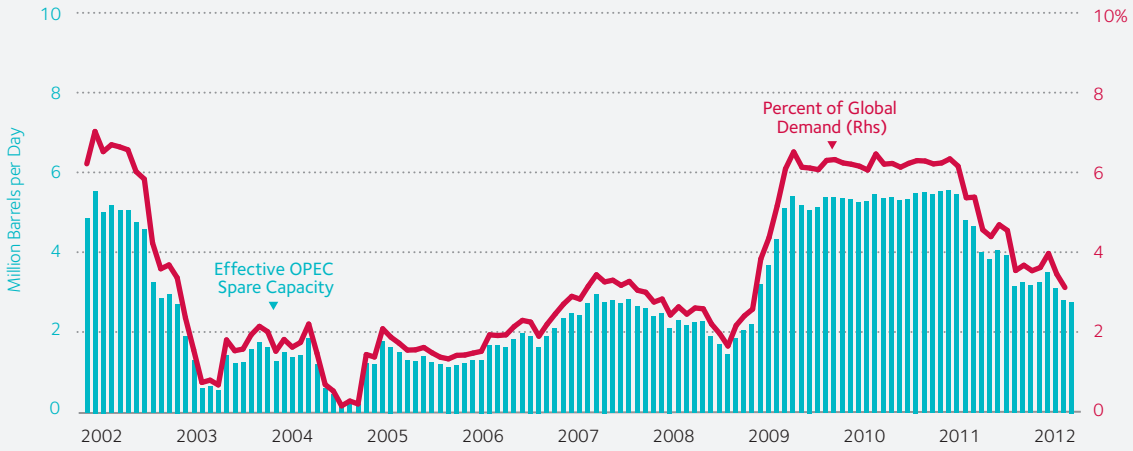
» Between 2003 and 2004, global oil demand rose sharply, forcing OPEC nations to increase oil production thus reducing spare capacity. At the same time, a strike in Venezuela and the beginning of U.S. operations in Iraq resulted in severely hampered oil output from those two nations.

» Over the following four years, oil prices mounted a dramatic climb as OPEC spare capacity stayed at historically low levels and demand continued to grow. The 2007-2009 recession cut oil demand globally and some OPEC members invested in expanded production capacity. As a result, spare capacity returned to flush levels near 6 million barrels per day, and oil price stabilized throughout much of 2009 and 2010.

» In 2011, civil war in Libya disrupted nearly 1.6 mbd of oil exports. Other OPEC members ultimately compensated for the lost supplies, but spare capacity fell as a result and markets tightened once again on the heels of strong demand growth in Asia.

» The ongoing tension in the Middle East and North Africa—from Iran developing its nuclear weapons program and threatening military actions, to continued political volatility sparked by the Arab Spring—has placed an ever higher "risk premium" on the price of oil.

OPEC Effective Spare Capacity (2002–2011)



Source: IEA, *Monthly Oil Market Report*, February 2012

» The IEA defines OPEC spare production capacity as additional supply that can brought to market within 30 days and sustained for 90 days. Effective spare production capacity excludes Iraq, Nigeria, and Venezuela.

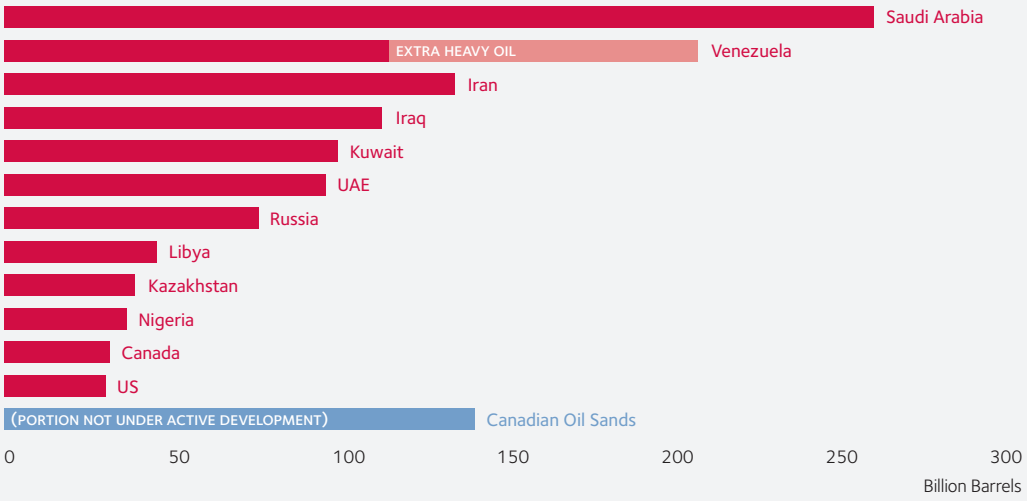
» Markets are generally comfortable when effective OPEC spare capacity is greater than or equal to about 4 percent of global liquid fuel demand. This buffer signals that the market is capable of withstanding most supply shocks or surges in demand.

» Effective OPEC spare capacity averaged 3.6 percent of global demand in the second half of 2011, largely as a result of the Libyan Civil War. This weakening of the global supply buffer played a strong role in driving international benchmark oil prices to their highest annual average in history.

Global Oil Reserves

Proved oil reserves are discovered resources that geologic and engineering analysis demonstrate are producible with existing technology and under prevailing market conditions.

Proved Oil Reserves (2010)



Source: BP, plc., *Statistical Review of World Energy 2011*

» The top 10 holders of proved conventional oil reserves accounted for 75 percent of global reserves total at year-end 2010. However, these nations actually represented only about 49 percent of total oil production; many of them are either unstable, OPEC member states subject to quotas, or both.[21]

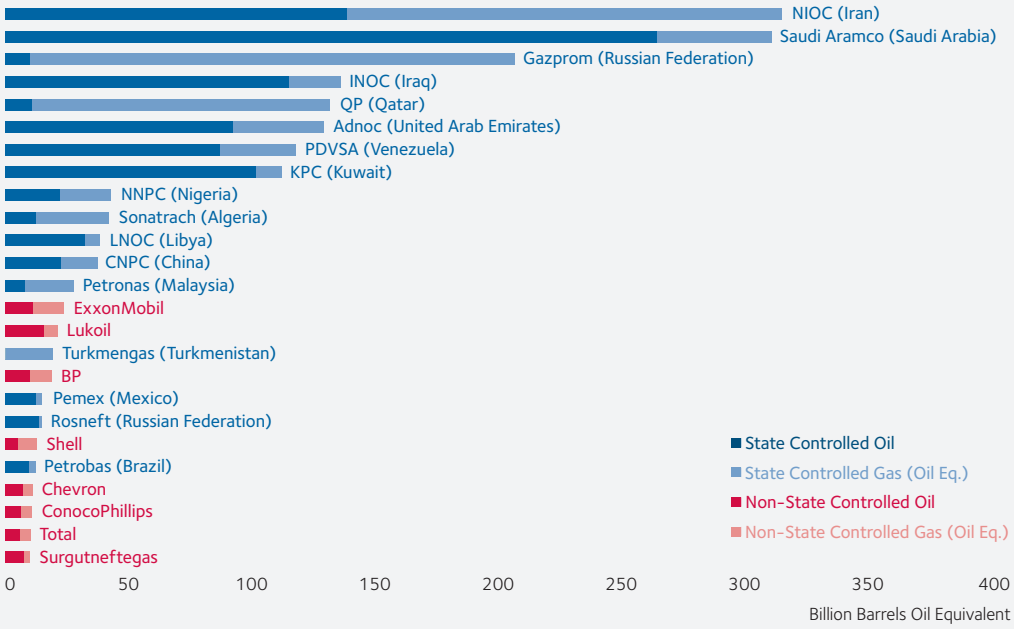
» Nearly 40 percent of the world's proved conventional oil reserves sit beneath Iran, Iraq, and Saudi Arabia.[22] A large portion of these reserves will be developed by national oil companies. It is also important to note that, based on data provided to the Department of Energy's Financial Reporting System by private energy companies, the costs for finding, developing, and producing Middle East oil reserves are among the lowest in the world. DOE reports total upstream costs for a barrel of Middle Eastern crude at $16.93 between 2006 and 2008. The cost was $73.47 per barrel for the U.S. offshore, $71.61 for Europe, and $38.36 for Canada.[23]

21 BP *Statistical Review*, at 6, 8
22 Id.
23 DOE, EIA, *Financial Performance of Major Energy Producers 2008*, Table 11

Defining Big Oil

While privately-run international companies continue to rank among the key producers of oil and gas today, their access to new reserves for future production is increasingly limited. State-run national oil companies dominate the list of the world's top reserves holders.

Proved Oil and Natural Gas Reserves (2007)



Source: IEA, *World Energy Outlook 2010*

» According to the International Energy Agency, more than 90 percent of global conventional proved oil reserves were held by state-run national oil companies (NOCs) as of 2007.[24]

» The top 13 holders of combined oil and gas reserves globally are NOCs. The highest ranked private firm is Exxon Mobil—at number 14 on the list.[25]

24 IEA, *World Energy Outlook 2008*, Table 14.1.
25 Id.

PART II

U.S. Oil Dependence

Securing America's Future Energy

U.S. OIL CONSUMPTION

The United States is the world's largest oil consumer. Over the five year period from 2007 through 2011, American oil consumption averaged 19.4 mbd, more than one-fifth of the global total.[26] U.S. households and businesses spent $895 billion on petroleum fuels in 2011—about 6.1 percent of GDP.[27]

Approximately 70 percent of U.S. oil demand is for transportation.[28] The nearly 240 million personal-use cars and light-duty trucks on the road in the United States in 2009 accounted for approximately 40 percent of total oil demand.[29] Throughout the transportation sector, 94 percent of delivered energy is derived from oil. Simply put, our economy is heavily dependent on oil, and there are no substitutes available at scale today.

U.S. OIL PRODUCTION

The United States remains the world's third largest oil producer, and the domestic oil production outlook is substantially better than it was as recently as five years ago. Between 2009 and 2011, U.S. crude oil production clocked three consecutive years of growth for the first time since 1983–85.[30]

Nonetheless, U.S. oil consumption still far outpaces domestic production, leaving the nation dependent on imported liquids for nearly half of total supplies in 2011. This too represents a significant improvement from recent years, when net imports met more than 60 percent of supplies. However, progressively higher oil prices have meant that the amount of money the United States spends on oil imports continues to increase. More importantly, oil price volatility continues to weaken household budgets, forestall private sector investment, and damage the macro economy.

26 DOE, EIA
27 SAFE analysis based on data from: DOE, EIA; BLS; and BEA
28 DOE, EIA, *Annual Energy Review 2010* (AER), Figure 5.0
29 DOE, EIA; Oak Ridge National Laboratory (ORNL), *Transportation Energy Data Book* (TEDB), Edition 30 (2011), Table 1.13, Table 4.1, Table 4.2
30 DOE, EIA

ECONOMIC COSTS OF OIL DEPENDENCE

America's heavy reliance on oil exposes the economy to the volatility of the global oil market. Each U.S. recession since 1970 has been preceded by, or occurred concurrently with, an oil price spike. Moreover, in a high price environment, our dependence on oil imports has had a sharply deleterious effect on America's current account balance. Net petroleum imports now typically account for more than 50 percent of the U.S. trade deficit on a month-to-month basis.[31] And in 2011, the average American household spent a record $4,059 on gasoline—equal to 8.2 percent of the median household income.[32]

NATIONAL SECURITY COSTS OF OIL DEPENDENCE

The importance of oil in the U.S. economy has given it a place of prominence in foreign and military policy.

In particular, two key issues related to oil affect national security. First, the vulnerability of global oil supply lines and infrastructure has driven the United States to accept the burden of securing the world's oil supply. Second, the importance of large individual oil producers sometimes constrains U.S. foreign policy options when dealing with problems in these nations.

THE MYTH OF FOREIGN OIL

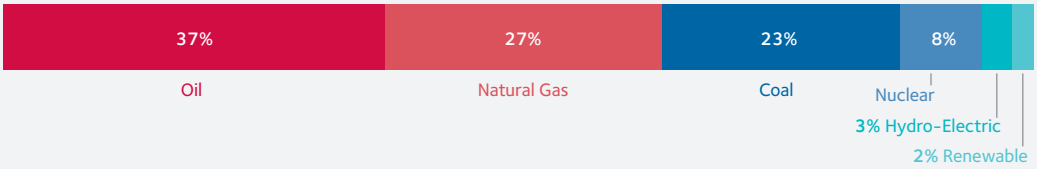
Oil is a fungible global commodity that essentially tracks a single price. Therefore, a supply disruption anywhere in the world affects oil consumers everywhere in the world. A country's exposure to world price shocks is a function of the amount of oil it consumes and is not significantly affected by the ratio of "domestic" to "imported" product.

31 SAFE analysis based on data from: U.S. Census Bureau, Foreign Trade Data
32 SAFE analysis based on data from: DOE, EIA; BLS; BEA

U.S. Oil Consumption

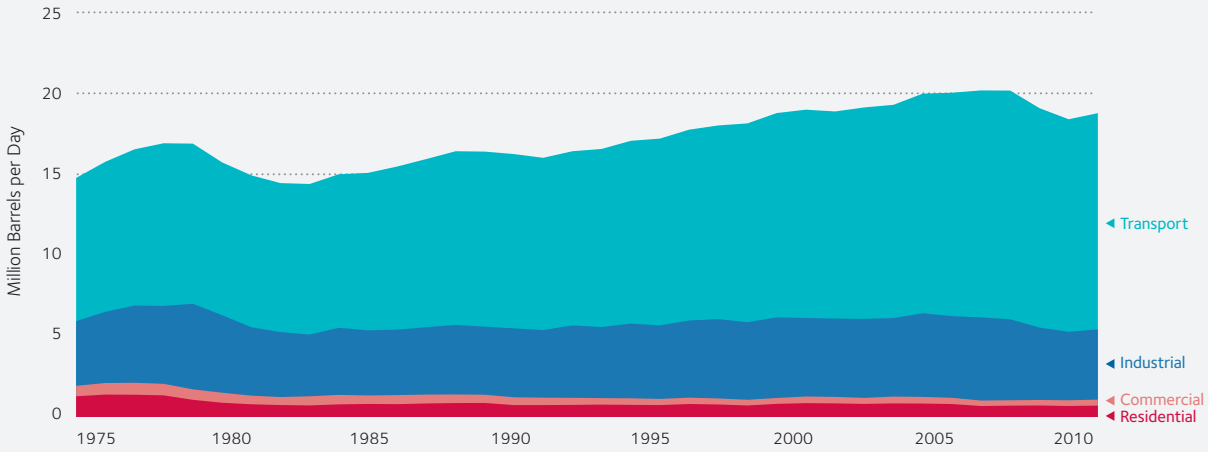
The 2007–2009 recession had a significant impact on U.S. oil consumption, driving annual demand down by nearly 10 percent. And yet, the United States is still heavily reliant on petroleum. In large part, this is because the United States still possesses the world's largest, most dynamic transportation system.

U.S. Primary Energy Consumption (2010)



Source: BP, plc., *Statistical Review of World Energy 2011*

U.S. Oil Demand by Sector (Historical)



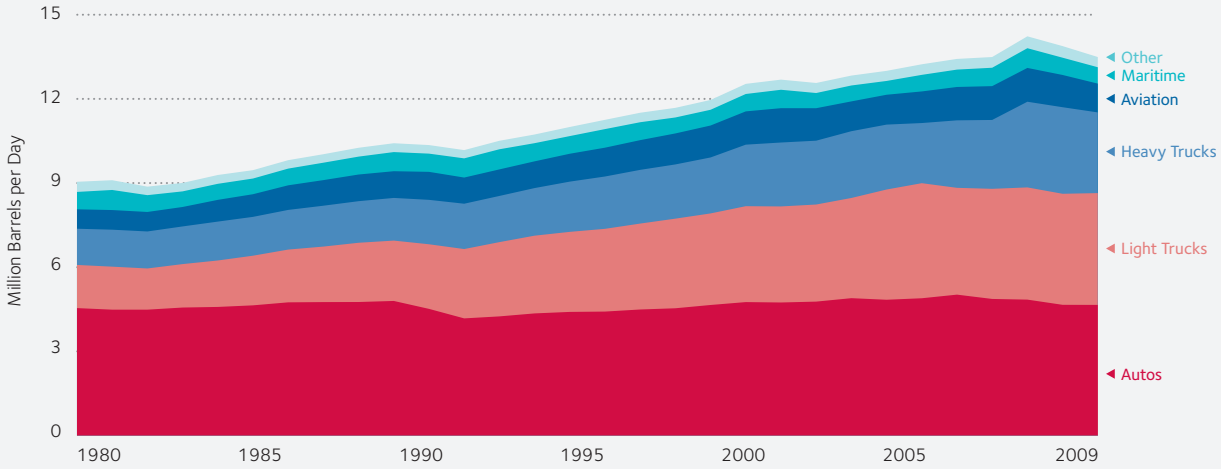
Source: EIA, *Annual Energy Review 2010*

» Petroleum accounts for approximately 37 percent of U.S. primary energy demand, more than any other individual fuel source.[33]

33 BP *Statistical Review*, at 41

» Oil-based fuels are primarily used in the transportation sector, though industrial processes account for a substantial share. A small amount of oil is also used for residential and commercial heating. Less than 1 percent of oil consumption occurs in the electric power sector today.[34]

U.S. Transport Oil Demand (1980-2009)



Source: ORNL, *Transportation Energy Data Book*, Ed. 30

» Transportation sector oil demand averaged 13.8 mbd for the five years ending in 2010.[35]

» America's 240 million passenger cars and trucks accounted for 8.7 mbd—nearly two-thirds of transportation oil demand in 2009.[36]

» The nearly 11 million medium- and heavy-duty trucks on the road accounted for an additional 2.9 mbd—21 percent of transportation oil demand.[37]

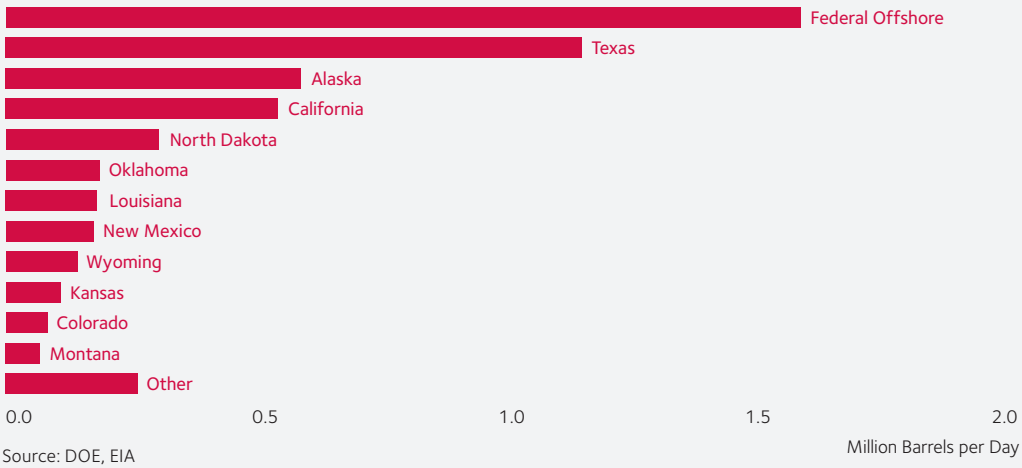
» In addition to being a large consumer of oil, the U.S. transportation sector is heavily reliant on oil: **94 percent of the energy that moves our cars, trucks, ships, and planes is oil-based, and there are no substitutes available at scale.**[38]

34 DOE, EIA, *AER*, Figure 5.0
35 ORNL, *TEDB*, Table 1.12
36 Id., Table 1.13
37 Id., Table 1.13, Table 5.1, Table 5.2
38 DOE, EIA, *AER*, Table 2.1e

U.S. Oil Production

The United States is currently the world's third largest oil producing nation. After decades of consistently declining production, the period from 2009 to 2011 saw notable increases in U.S. crude oil output.

U.S. Crude Oil Production by Region (2010)



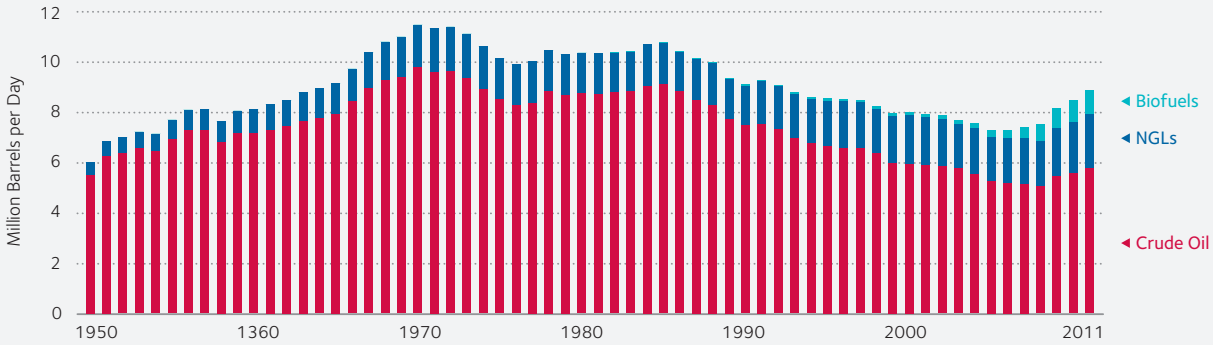
Source: DOE, EIA

» The United States produced 5.7 million barrels per day of crude oil in 2011. Natural gas liquids added an additional 2.2 mbd of oil equivalent, bringing total U.S. field production to 7.9 mbd.[39]

» There were 363,459 oil wells in the United States at year-end 2009. Nearly 85 percent of those wells each produced less than 15 barrels per day. The top 1 percent of U.S. oil wells produced nearly 50 percent of the nation's domestic crude oil.[40]

39 DOE, EIA, "Weekly Petroleum Status Report," January 5, 2012, Table 1
40 DOE, EIA, "Distribution of Oil and Gas Wells by Production Brackett," (2011)

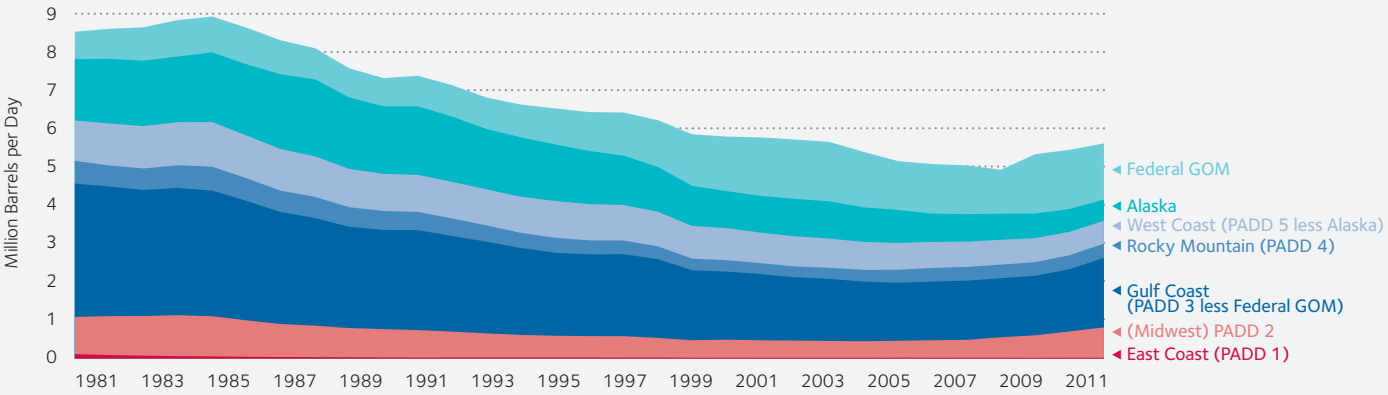
U.S. Domestic Liquids Production



Source: DOE, EIA

» The U.S. oil industry is experiencing a renaissance. At the end of 2011, U.S. field production of crude oil reached its highest level since mid-2002. In fact, if natural gas liquids and biofuels are included, U.S. liquid fuel production in 2011 reached its highest level since 1992. Consistently high oil prices are supporting higher investment levels, and new applications of technology are unlocking previously inaccessible resources.

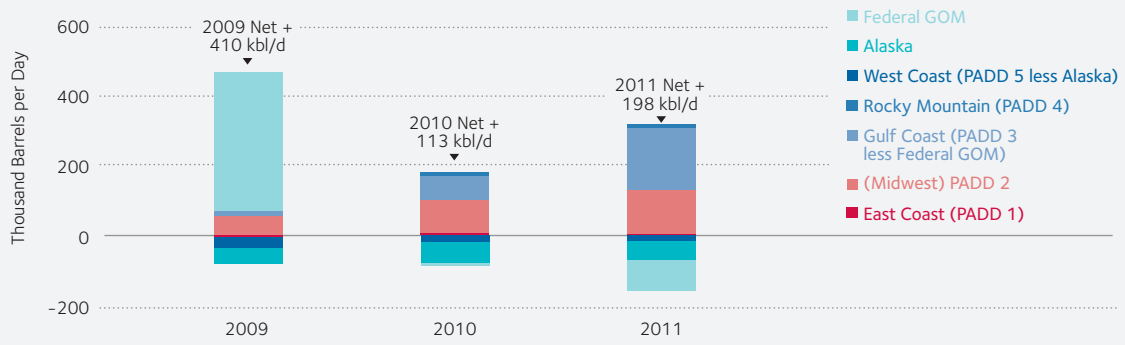
U.S. Crude Oil Production by PAD District



Source: DOE, EIA

» The recent surge in U.S. oil production is being driven by growth in a handful of key regions: the Midwest onshore, the Gulf Coast onshore, and the federal Gulf of Mexico offshore.

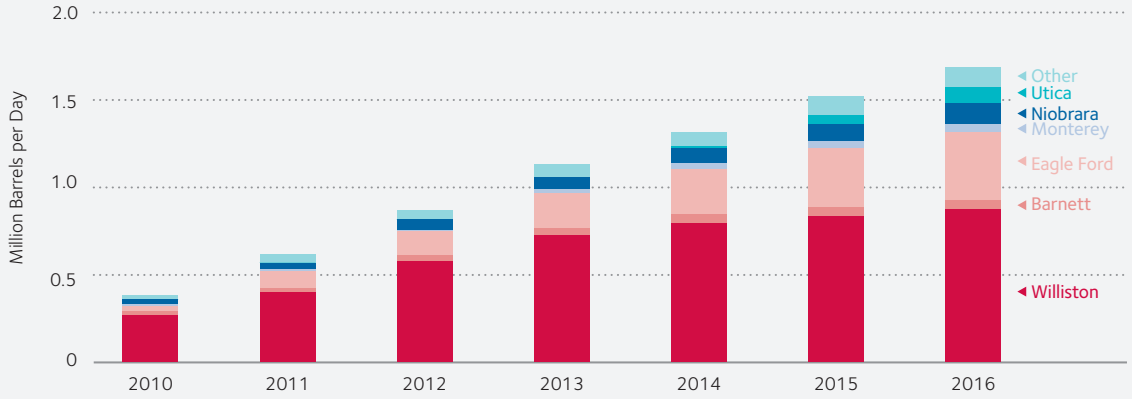
Change in Crude Production by Region (2009-2011)



Source: DOE, EIA

» Major gains in U.S. oil production in 2009 were driven by expanding output from projects in the deepwater Gulf of Mexico. In 2010 and 2011, production from the Gulf stalled in the wake of the Deepwater Horizon incident and subsequent moratorium. At the same time, onshore production in North Dakota and Texas began to surge, offsetting declines from the Gulf.

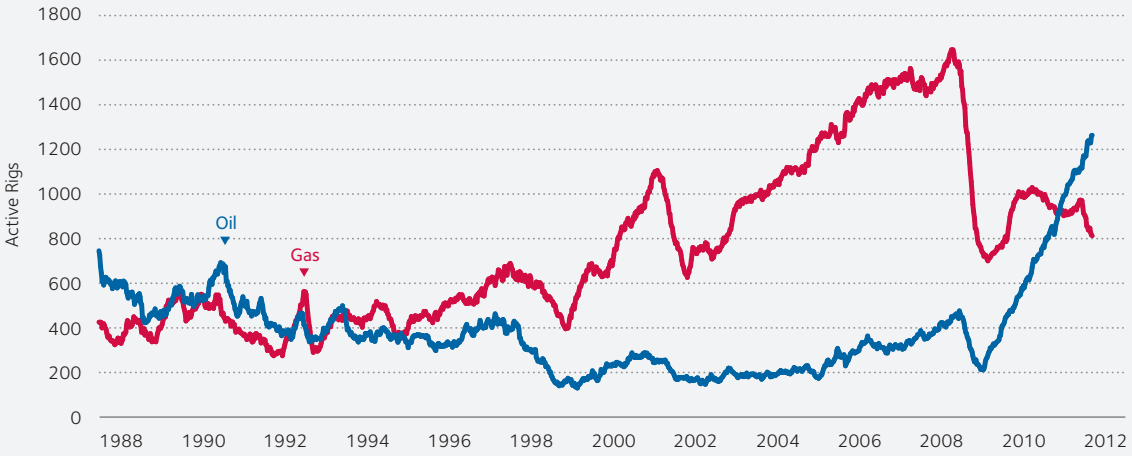
U.S. Oil Production from Shales (Historical and Forecast)



Source: IEA, December 2011 *Monthly Oil Market Report*

» In addition to natural gas, U.S. shale formations hold large liquid fuel reserves. As rising oil prices diverged from flat and falling natural gas prices in 2010, U.S. producers began shifting resources and equipment into liquids-rich plays. The result: horizontal drilling and multi-stage hydraulic fracturing—the same technologies that were used to exploit massive U.S. shale gas resources—have unlocked substantial new petroleum resources in the United States.

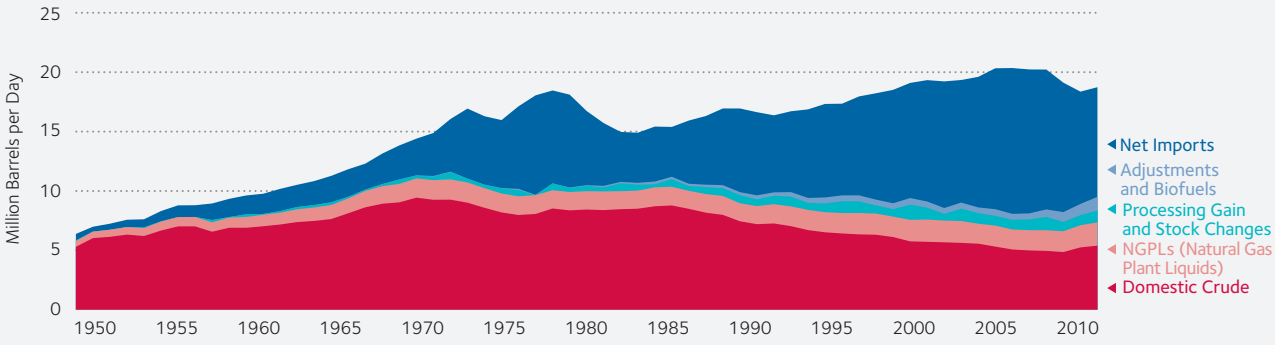
U.S. Rig Count (July 1987 through January 2012)



Source: Baker Hughes

» High oil prices and the search for shale oil resources have driven a surge in U.S. oil drilling. At more than 1,200, there are more rigs drilling for oil in the United States today than at any time in decades. In fact, the oil rig count passed the natural gas rig count in April of 2011 for the first time since the early 1990s.

U.S. Petroleum Source by Origination

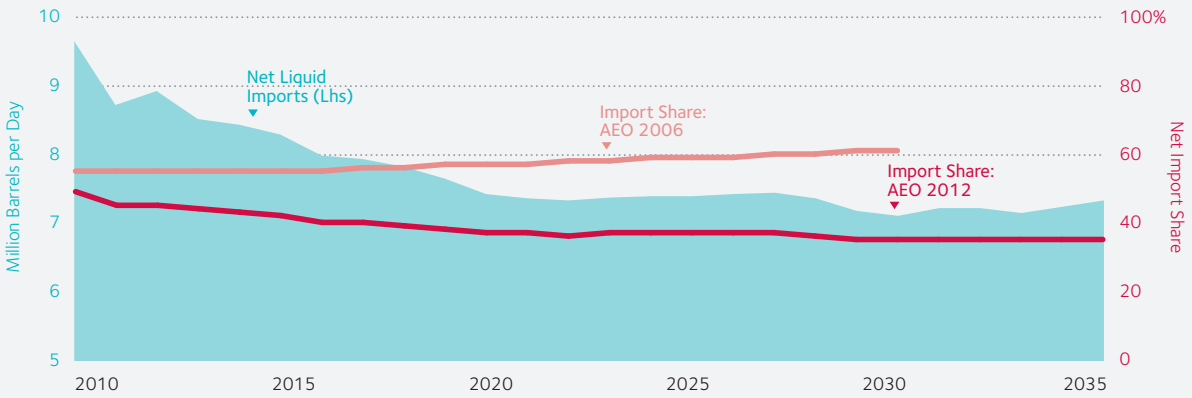


Source: DOE, EIA, *AER 2010*

» For decades, the combination of declining domestic oil production and rising U.S. fuel consumption resulted in ever-higher levels of net oil imports. Net imports of crude oil and petroleum products reached their all-time high of 12.5 mbd in 2005—equal to 60 percent of demand that year.[41]

41 DOE, EIA, *AER*, Table 5.7

U.S. Net Liquids Imports, Forecast



Source: DOE, EIA

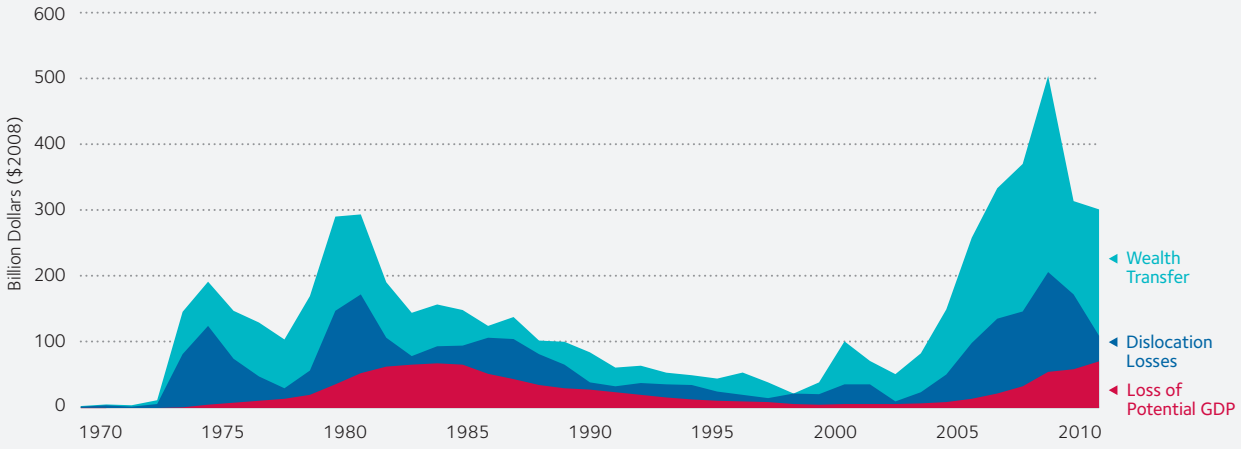
» Beginning in 2009, the outlook for U.S. oil imports began to shift dramatically. U.S. oil demand fell sharply during the recession and is projected to recover only modestly as new fuel-economy standards take effect. At the same time, a surge in domestic oil production associated with shale oil in Texas, North Dakota, and elsewhere has altered the future supply outlook.

» The combination of increased domestic oil production and reduced demand growth due to fuel-efficiency standards has resulted in a sharp change to the outlook for oil imports. According to the Department of Energy's 2012 *Annual Energy Outlook*, the United States could be importing just 36 percent of its oil by 2035.

Economic Costs of U.S. Oil Dependence

Despite improvements in automotive efficiency and rising domestic oil production, the economic impacts of U.S. oil dependence have rarely been as stark as they are today. The trade deficit in crude oil and petroleum products soared past $300 billion in 2011, and the average American household spent a record $4,059 on gasoline—equal to 8.2 percent of the median household income.

Economic Costs of U.S. Oil Dependence



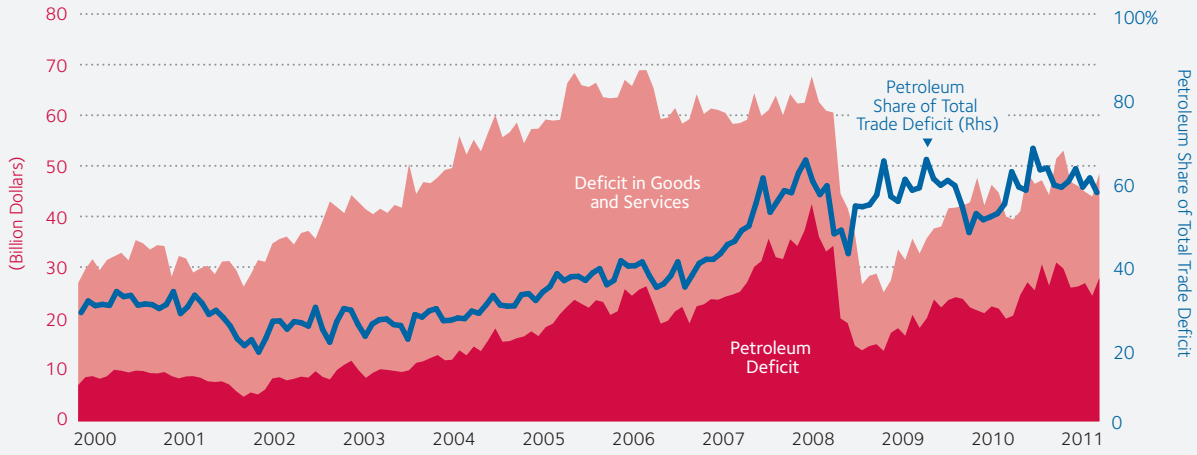
Source: ORNL, *Transportation Energy Data Book*, Ed. 30

» The combined economic costs of U.S. oil dependence exceed $5.5 trillion since 1970 (real 2008 dollars).[42]

» In addition to staggering wealth transfers, high and volatile oil prices generate significant uncertainty for households and businesses. The result is lost economic opportunity.

42 David L., Roderick Lee, and Janet L. Hopson, "OPEC and the Costs to the U.S. Economy of Oil Dependence: 1970-2010," Oak Ridge National Laboratory Memorandum, 2011.

Share of Petroleum Trade in U.S. Trade Deficit



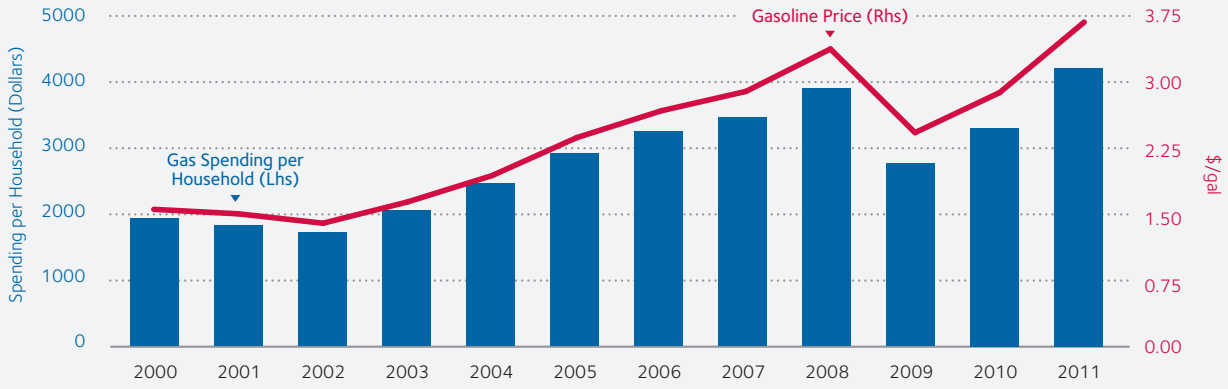
Source: U.S. Census Bureau, Office of Foreign Trade Statistics

» As oil prices began climbing in late 2007, petroleum's share of the U.S. trade deficit spiked. The portion of the trade deficit driven by petroleum imports now generally exceeds 50 percent and is greater than the imbalance in other goods and services with trade partners like China and NAFTA.

» Progressively higher oil prices seen in recent years have meant that, even as oil imports have declined in volume, they have remained high in cost. From 2007 through 2011, the United States ran an aggregate $1.4 trillion deficit in crude and petroleum product trade.

» In 2011, net U.S. import expenditures on crude oil and petroleum products were $320 billion—58 percent of the total trade deficit.[43]

Gasoline Prices and Household Spending



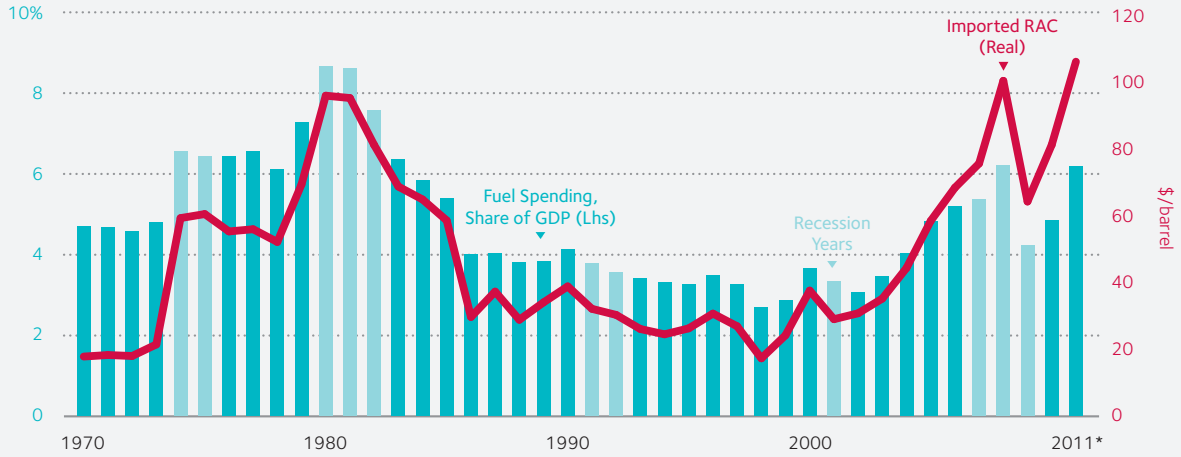
43 SAFE analysis based on data from: U.S. Census Bureau, Foreign Trade Statistics

» Rising gasoline prices have exerted a significant toll on U.S. household budgets over the past decade.

» In 2001, the average U.S. household spent $1,755 on gasoline. By 2008, that figure had increased to $3,760—an increase of more than $2,000. The cumulative impact of changes to the tax code over the same period increased household income by $1,900. Thus, rising fuels prices acted as a tax increase that fully offset the benefit of tax cuts.

» The same effect was witnessed in 2011, when record gasoline prices cost American households an additional $104.4 billion in fuel expenditures compared to 2010. This nearly offset entirely the benefits of the 2011 payroll tax cut, which gave households an added $108.6 billion in take-home pay.

U.S. Oil Intensity and Consumer Spending on Fuel



* Estimated
Source: EIA, *AER 2010*; Department of Commerce, Bureau of Economic Analysis; SAFE Calculations

» At more than 6 percent of GDP, consumer spending on petroleum fuels reached levels typically associated with recession in 2011. Every U.S. recession since the 1970s has been preceded by—or occurred concurrently with—an oil price spike. Price volatility contributes to an uncertain investment climate for households and businesses.

National Security Costs of U.S. Oil Dependence

Oil dependence weakens U.S. national security in at least two ways. First, our dependence undermines our foreign policy by limiting our options when dealing with key world oil producers. Second, U.S. armed forces are entangled as the primary guarantor of secure oil flows in several unstable parts of the world.

Chokepoint	2009 Oil Flow (mbd)	Narrowest Point	Oil Source of Origin	Primary Destination	Past Incidents
The Strait of Hormuz	17 (2011)	21 miles	Saudi Arabia, Iran, UAE	Japan, India, ROK, China	Iran has repeatedly threatened to close the Strait in 2011 and 2012 as the standoff over its nuclear program escalates.
The Strait of Malacca	13.6	1.7 miles	Persian Gulf, West Africa	Asia Pacific	Pirates a constant threat, including a terrorist attack in 2003. Collisions and spills are a problem. Poor visibility.
The Suez Canal*	1.9 (2010)	1,000 feet	Saudi Arabia, Iran, UAE	Europe and U.S.	Became a focus of attention in 2011 as political protests led to the fall of the Egyptian government. There were reports of threats against Egyptian energy infrastructure during the turbulence.
Bab el-Mandab	3.2	18 miles	Persian Gulf, West Africa	Europe and U.S.	Attack on USS Cole in 2001, French oil tanker in 2002, both off the coast of Yemen. Somali pirates a constant threat.
The Turkish Straits	2.9	0.5 miles	Russia, Caspian nations	Europe	Numerous past shipping accidents due to difficult geography.
The Panama Canal	0.8	110 feet	U.S.	U.S., Latin America	Suspected terrorist target.

* Does not include SUMED Pipeline flows, which were 1.2 mbd in 2010

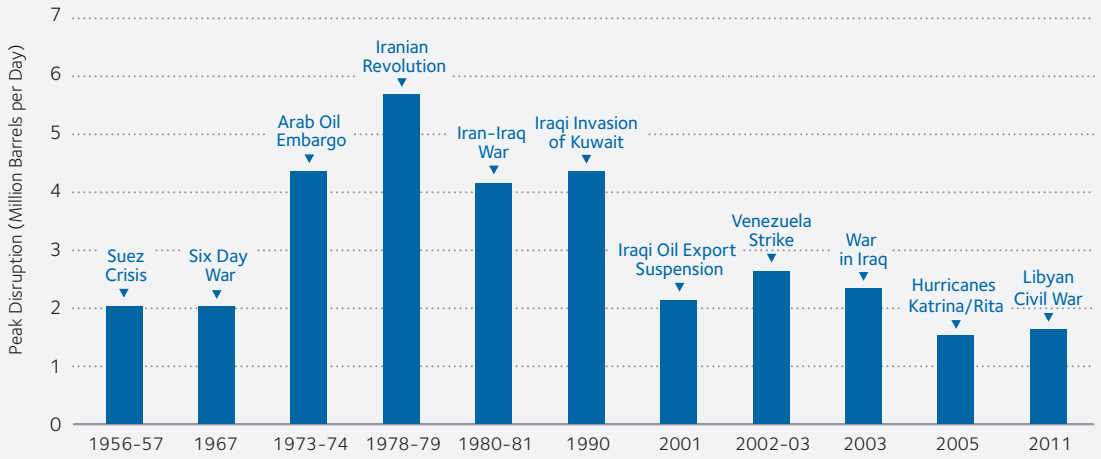
» In 2010, total world oil production amounted to approximately 88 million barrels per day, and more than 50 percent was moved by tankers on fixed maritime routes.[44] Seaborne oil tankers often must transit a number of strategic chokepoints that could present hostile actors with an opportunity to disrupt the global economy.

» A crippling disruption to global oil supplies ranks among the most immediate threats to the United States today. A prolonged interruption due to war in the Middle East or the closure of a key oil transit route would lead to severe economic dislocation.

44 DOE, EIA, "World Oil Transit Chokepoints," (2011)

» To mitigate this risk, U.S. armed forces expend enormous resources protecting chronically vulnerable infrastructure in hostile corners of the globe and patrolling oil transit routes. This engagement benefits all nations, but comes primarily at the expense of the American military and ultimately the American taxpayer. A 2009 study by the RAND Corporation placed the ongoing cost of this burden at between $67.5 billion and $83 billion annually, plus an additional $8 billion in military operations.[45]

Major World Oil Supply Disruptions



Source: International Energy Agency

» The global oil market generally operates as a just-in-time business. Disruptions to supply due to geopolitics, weather, or other events can be compensated by government and industry inventories or OPEC spare capacity, but such logistical adjustments are rarely perfect and always take time. In the past, major oil supply disruptions have contributed to significant oil price spikes.

45 RAND Corporation, "Imported Oil and U.S. National Security," at 60-62 (2009)

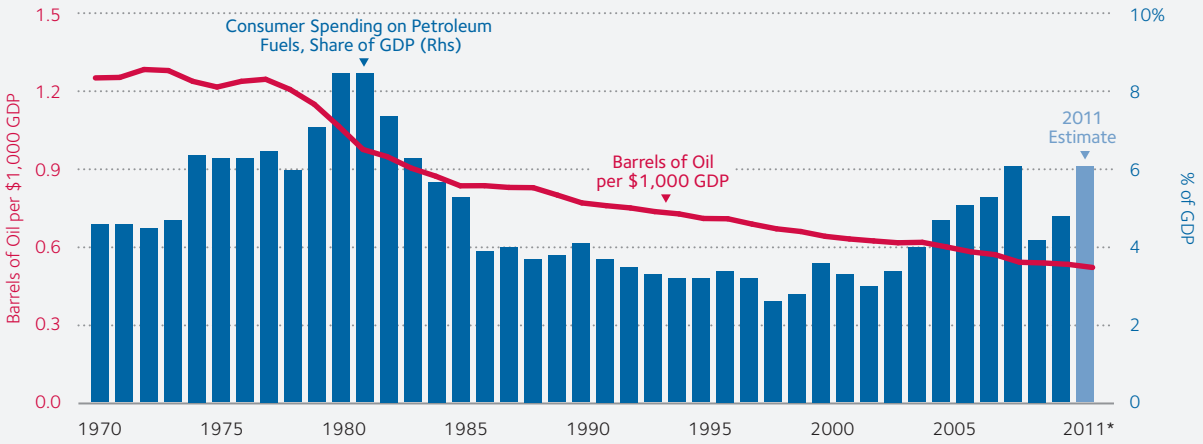
PART III

The Role of Public Policy

Oil Intensity and Vehicle Efficiency

Oil intensity of the economy—the volume of oil needed to produce each dollar of GDP—is a useful benchmark for tracking progress toward enhanced energy security. However, volume cannot be considered separately from cost. In recent years, rapidly rising oil prices have largely offset reduced overall oil intensity, meaning the United States now spends more on oil as a share of GDP than at any time since the early 1980s.

U.S. Oil Intensity and Oil Spending



Source: EIA, *AER 2010;* Department of Commerce, Bureau of Economic Analysis; SAFE Calculations

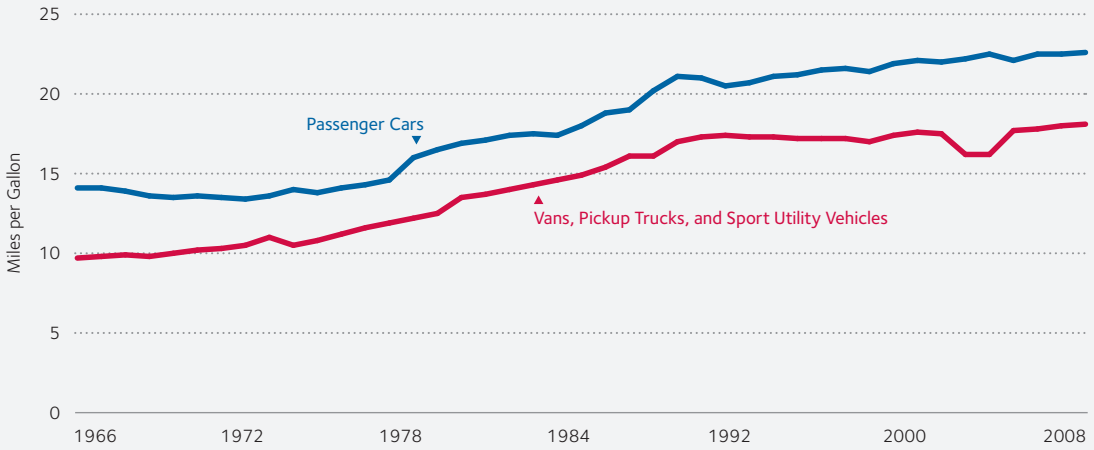
» Immediately following the oil crisis of the early 1970s, the federal government engaged in an ambitious effort to reduce the oil intensity of the U.S. economy.

» The Energy Policy and Conservation Act of 1975 mandated an improvement in the efficiency of the American automotive fleet. The Fuel Use Act of 1978 was primarily responsible for reducing the use of petroleum in the electric power sector from 15 percent of net electricity generation in 1975 to 4 percent in 1985.[46] In total, petroleum intensity of the U.S. economy fell by 25 percent between 1975 and 1985.[47]

46 DOE, EIA, *AER*, Table 8.2a
47 SAFE analysis based on data from: DOE, EIA, *AER*; BEA

» While oil intensity has maintained its steady rate of decline in recent years, increasing oil prices have meant that the United States spends more on oil even as it uses relatively less. In 2008 and again in 2011, spending on petroleum fuels reached 6.1 percent of GDP—the highest levels recorded since the early 1980s. As oil prices increase and become increasingly volatile, the United States needs to focus on accelerating reductions in oil use.

U.S. Motor Vehicle Fuel Efficiency (On-Road Stock Average)



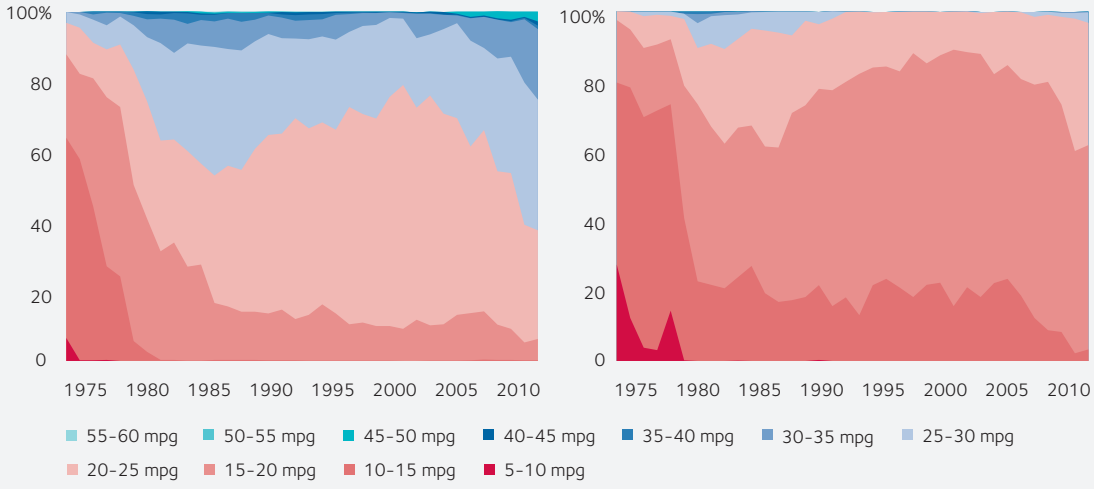
Source: DOE, *Annual Energy Review 2010*

» On-road fuel efficiency by U.S. motor vehicles improved sharply beginning in the mid-1970s and continuing throughout the 1980s. Miles per gallon efficiency of all U.S. passenger cars improved by 44 percent between 1975 and 1990. However, because CAFE standards were frozen for nearly two decades, car efficiency improved by just 12 percent between 1990 and 2008.[48]

48 DOE, EIA, *AER*, Table 2.8

New Car Market Share by Fuel Economy (MY 1975-2010)

New Light Truck Market Share by Fuel Economy (MY 1975–2010)



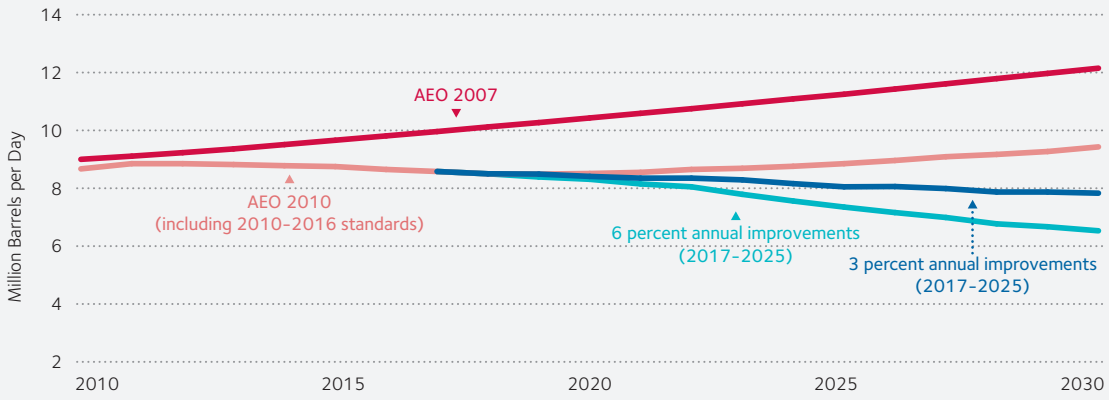
Source: DOE, EERE, Vehicle Technologies Program

» There have been notable improvements in passenger vehicle fuel economy in recent years, partially driven by increased fuel prices and also by the implementation of new standards.

» As recently as 2005, just 38.6 percent of all new cars sold had a fuel-economy rating of 25 mpg or better. By 2010, that figure had increased to 62.6 percent.

» A similar trend can be noted for light trucks. In 2005, just 19.2 percent of all new light trucks sold had a fuel-economy rating of 20 mpg or more. By 2010, that figure increased to 38.2 percent.

Projected Fuel Consumption by Light Duty Vehicles

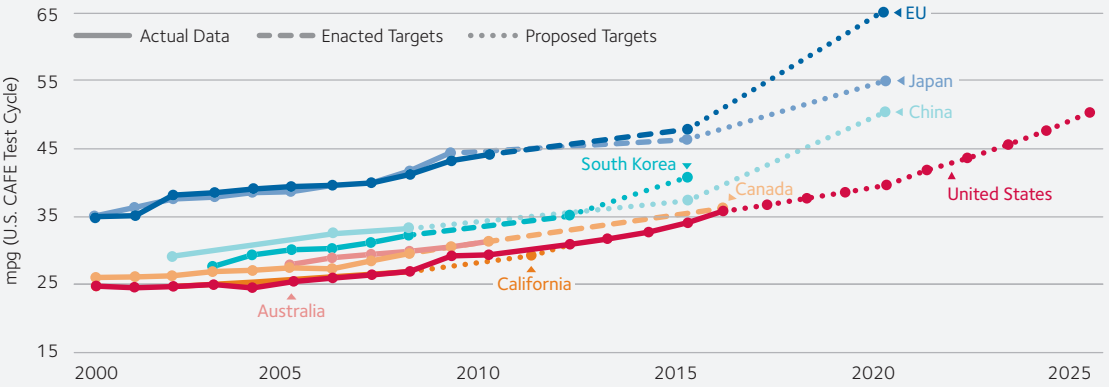


Source: DOE, EIA; SAFE Analysis

» Standards and mandates for new vehicles have an ongoing, important role to play in improving U.S. energy security. Fuel-economy provisions enacted in 2007 and finalized in 2010 will increase the efficiency of new cars from 27.5 MPG to approximately 35.5 MPG in 2016, improving transportation efficiency over the next two decades.

» Modeling conducted by Securing America's Future Energy suggests that the new standards will result in 2030 oil consumption that is at least 3 million barrels per day less than was estimated prior to the 2007 law.

Passenger Vehicle Fuel Economy Fleet Average Standards



Source: International Council on Clean Transportation

» The Environmental Protection Agency (EPA) is currently finalizing new standards that would require significant additional improvements in fuel efficiency between 2017 and 2025. Stronger standards enacted or targeted globally suggest that vehicle efficiency in the United States can still be improved by a substantial margin.

Domestic Oil Production

Although U.S. oil and gas production has increased substantially in recent years, the United States is not accessing all of the hydrocarbon resources at its disposal. In particular, domestic oil production levels could be much higher if the United States chose to develop resources in federal territories such as the Eastern Gulf of Mexico, the Arctic National Wildlife Refuge (ANWR), and along the Atlantic and Pacific Coasts.

Petroleum Resources and Access

All data are in billion barrels of oil

OCS Region	Status	Mean Estimate, Undiscovered Technically Recoverable Resources	Recoverable at $60 oil price	Recoverable at $110 oil price
Beaufort Sea	No statutory restrictions; leases granted, but development delayed by litigation	8.2	4.4	6.3
Chukchi Sea	No statutory restrictions; leases granted, but development delayed by litigation	15.4	5.2	11.5
Other Alaska OCS	North Aleutian Basin withdrawn through 2017; Proposed Cook Inlet sale in 2013	3.0	1.9	2.2
Eastern Gulf of Mexico	Access restricted by Congressional Moratorium through 2022	5.1	4.1	4.4
Atlantic OCS	No statutory restrictions; not included in Interior's 2012-2017 Proposed Plan	3.3	1.9	2.1
Pacific OCS	No statutory restrictions; not included in Interior's 2012-2017 Proposed Plan	10.2	6.7	7.7
Western and Central Gulf of Mexico	First post-Macondo lease sale held in Q4 2011; twelve proposed lease sales in Interior's 2012-2017 Plan	43.3	36.2	39.2
Total Undiscovered Oil Resources Offshore		*88.5*	*60.3*	*73.5*
Onshore Region				
Federal Lands within ANWR	Access restricted by law	7.7	N.A.	N.A.
Total Undiscovered Resources*		**139.0**		

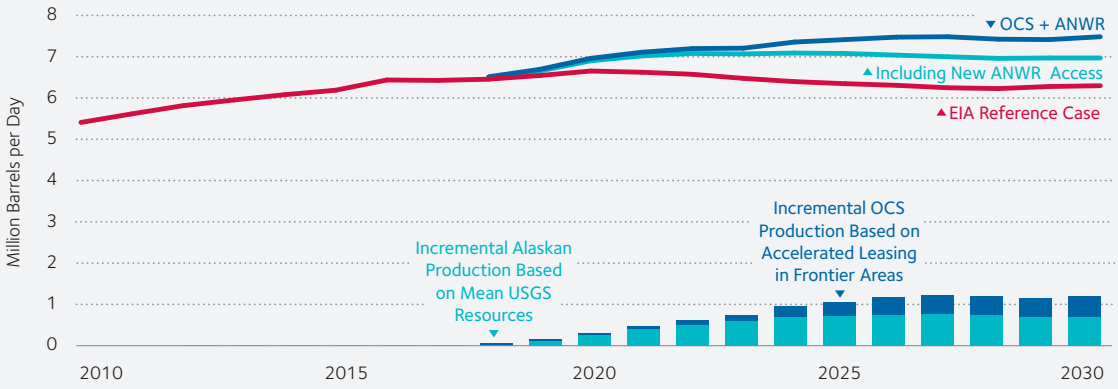
Note: Total includes other onshore resources not listed here.
Source: Department of Interior

» Congress and the President allowed statutory moratoria on development in the Atlantic and Pacific areas of the Outer Continental Shelf (OCS) to expire in 2008, and portions of the mid- and south-Atlantic planning areas were being considered for inclusion in the 2012-2017 Five Year Plan as recently as April 2010. However, in the aftermath of the Gulf of Mexico oil spill, the Department of Interior (DOI) recently indicated that no new leases would be granted in those areas until at least 2017.[49]

» Congress maintains a statutory moratorium on development in the Eastern Gulf of Mexico through 2022, and DOI has not included this region for analysis in its 2012-2017 Plan.[50]

» While no statutory moratoria exist on areas off the coast of Alaska in the Beaufort or Chukchi Seas—and new leases were in fact granted in 2008—development has been stalled by litigation.[51]

Projected Impact of Expanded Access on U.S. Oil Production



Source: SAFE analysis based on: DOE, EIA, *Analysis of Crude Oil Production in the Arctic National Wildlife Refuge* (2008); DOE, EIA, *Annual Energy Outlook 2011*; DOE, EIA, *Annual Energy Outlook 2009*

» Development of petroleum resources in frontier areas of the Outer Continental Shelf and the federal portion of the Arctic National Wildlife Refuge would yield notable increases in domestic oil production.[52]

» Based on data produced by DOE in 2008 and 2009 regarding ANWR and OCS access, initiating the leasing process in these areas today could increase domestic production of crude oil by as much as 4.6 percent in 2020 and 19 percent in 2030 (compared to the AEO 2012 baseline).[53]

49 U.S. Department of Interior (DOI), Bureau of Ocean Energy Management (BOEM), "Proposed Outer Continental Shelf Oil and Gas Leasing Program," November 2011

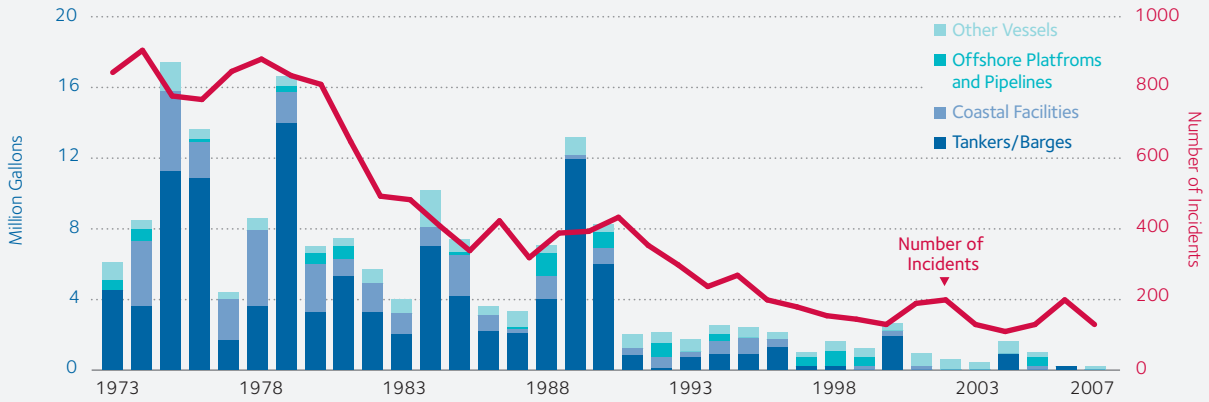
50 Id.

51 See e.g., Kim Chipman, "Shell says slow U.S. drill permits in Alaska "Irresponsible," Bloomberg News, April 26, 2011; and Katarzyna Klimasinska, "Shell wins U.S. air permit for oil exploration off Alaska," Bloomberg News, October 21, 2011; and Phil Taylor, "In victory for Shell, EPA board affirms air permits in Alaska," Greenwire, February 13, 2012

52 See, e.g., Wood Mackenzie, "U.S. Supply Forecast and Potential Jobs and Economic Impacts (2012-2030)," September 7, 2011

53 SAFE analysis based on data from: DOE, EIA, "Analysis of Crude Oil Production in the Arctic National Wildlife Refuge," May 2008; and DOE, EIA, "Impact of Limitations on Access to Oil and Natural Gas Resources in the Federal Outer Continental Shelf," 2009

U.S. Annual Volume and Number of Oil Spills from Selected Sources (1973–2007)

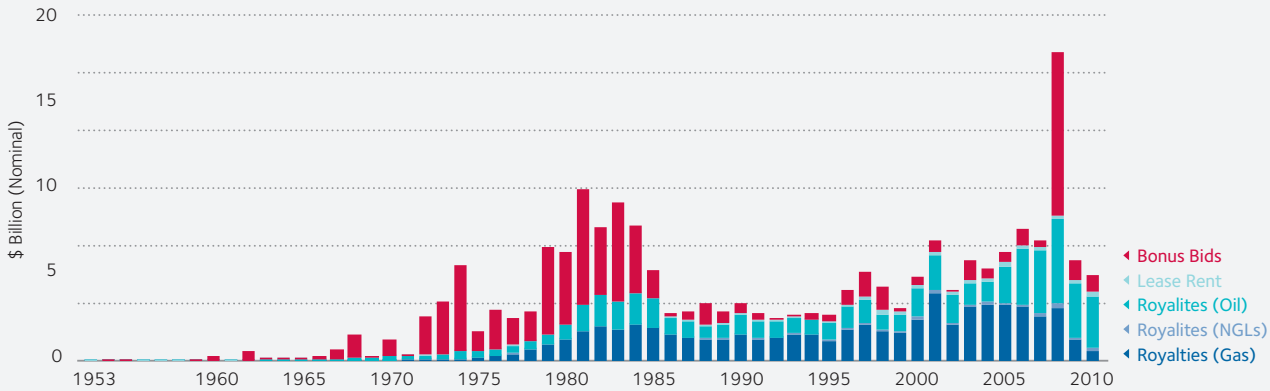


Source: Congressional Research Service

» In the wake of the *Deepwater Horizon* incident, regulation of offshore oil and gas development in the United States has been largely restructured and arguably strengthened significantly. Nonetheless, the spill and its consequences have impacted the debate about oil and gas leasing in federal waters.

» In this context, it is important to note that prior to *Deepwater Horizon*, the number of incidents and volume of oil spilled in U.S. coastal waters had been in steady decline for nearly two decades.

Federal Royalties Collected from OCS Activites



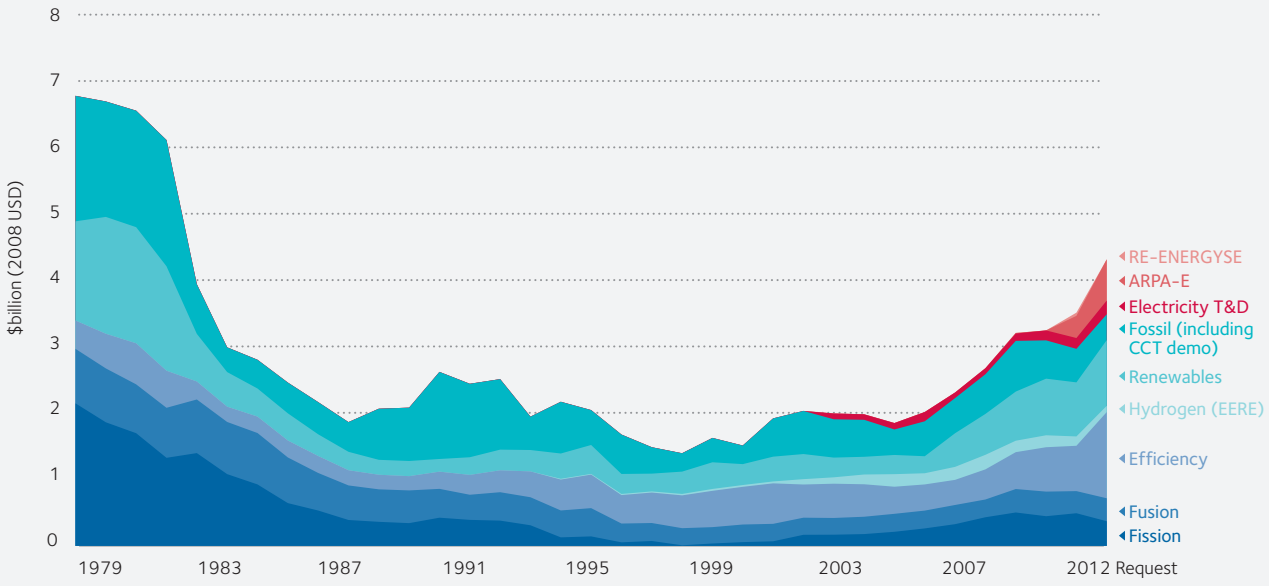
Source: Department of Interior, Office of Natural Resource Revenue

» At a time when national lawmakers are struggling to deal with issues related to debt and the deficit, it is important to note that leasing of offshore oil and gas resources generates significant federal revenue.

Research and Development

Addressing America's energy challenges will likely require the development and commercialization of advanced energy technologies. However, actual public spending on energy-related R&D has fallen over the past 30 years. In fact, the level has also fallen when compared to R&D funding for other economic sectors as well as the level of commitment by our economic competitors.

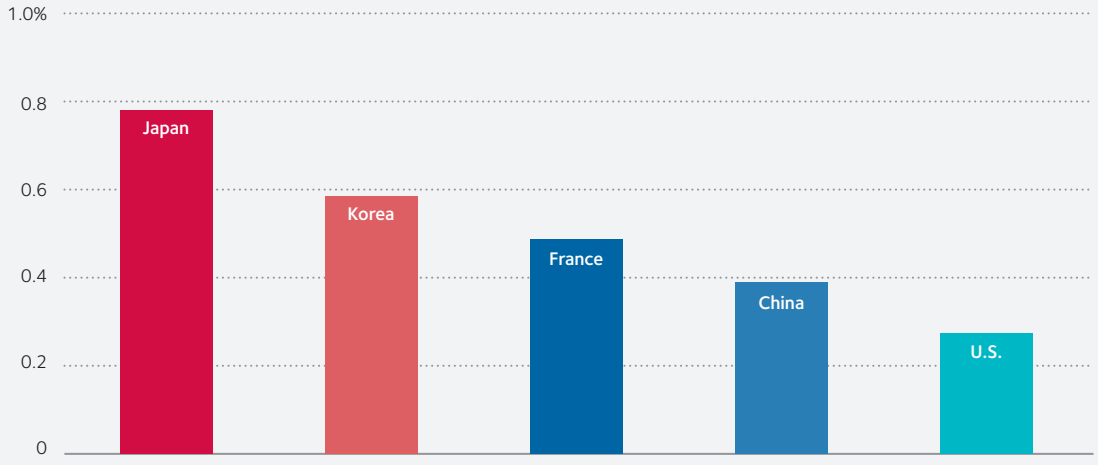
U.S. DOE Spending on Energy Research and Development*



* Does not include one-time stimulus funding.
Source: Gallagher, K.S. and L.D. Anadon, "DOE Budget Authority for Energy Research, Development, and Demonstration Database," Energy Technology Innovation Policy, John F. Kennedy School of Government, Harvard University, March 22, 2010.

» Government-funded research and development can play a critical role in spurring deployment and commercialization of new energy technologies. However, setting aside one-time funding provided by the American Recovery and Reinvestment Act of 2009, federal energy Research, Development, and Deployment (RD&D) spending is still well below the levels reached in the late 1970s.

Public Energy RD&D Spending as a Share of GDP (2007)



Source: American Energy Innovation Council

» Public energy R&D spending pales in comparison to research spending on other critical components of the economy. The $1.8 billion the United States spent in 2007 on energy-related R&D was just 6.5 percent of the $27 billion spent on health-related R&D and 2.5 percent of the $77 billion spent on defense R&D.[54]

» Public spending on energy-related R&D is also a far smaller percentage of our economy than it is for several of our economic competitors.

» The private sector may find it difficult to fully capture the benefits of energy-related R&D because of the spill-over effect of such investment. This suggests that there is an advantage to second-movers who can free ride on other firms' investments. This results in under-investment in R&D in the absence of government funding.

54 American Energy Innovation Council, *A Business Plan for America's Energy Future*, at 25

PART IV

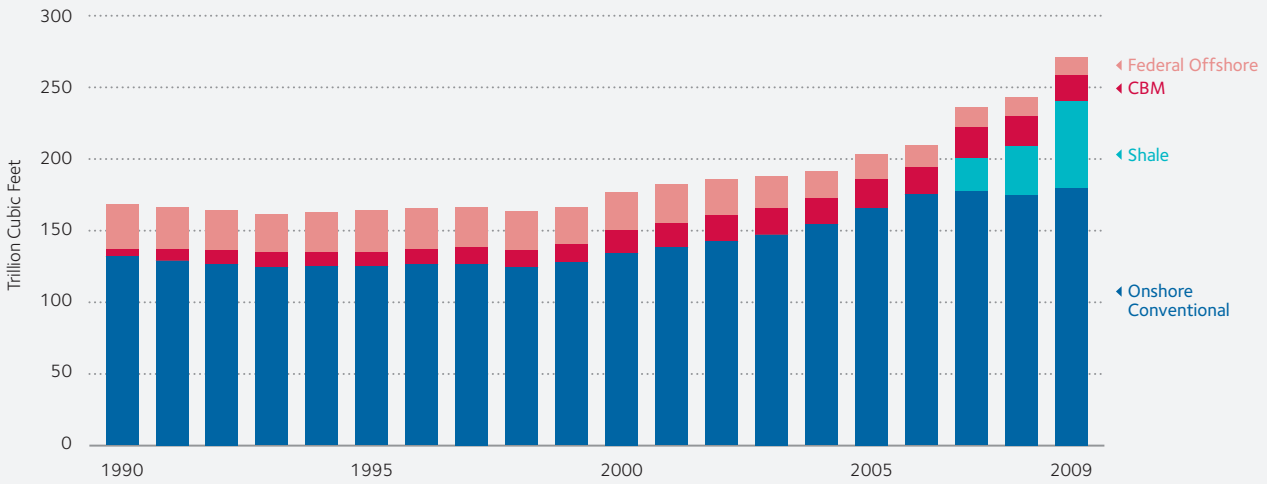
Perspectives on Alternative Vehicle Technologies

Securing America's Future Energy

Natural Gas Vehicles

Domestic natural gas supplies are plentiful, and recent advancements in the recovery of natural gas resources from unconventional reservoirs like shale gas, coal bed methane, and tight gas sands have led to wide consensus that undiscovered technically recoverable reserves are well in excess of 1,000 trillion cubic feet (tcf). Total proved reserves of dry natural gas are estimated at 273 tcf; annual consumption averaged 23 tcf between 2006 and 2010.[55] This abundance of resources has generated considerable interest in expanding the role of natural gas in the U.S. energy portfolio. In particular, some policymakers and industry leaders are calling for the deployment of natural gas in the transportation sector.

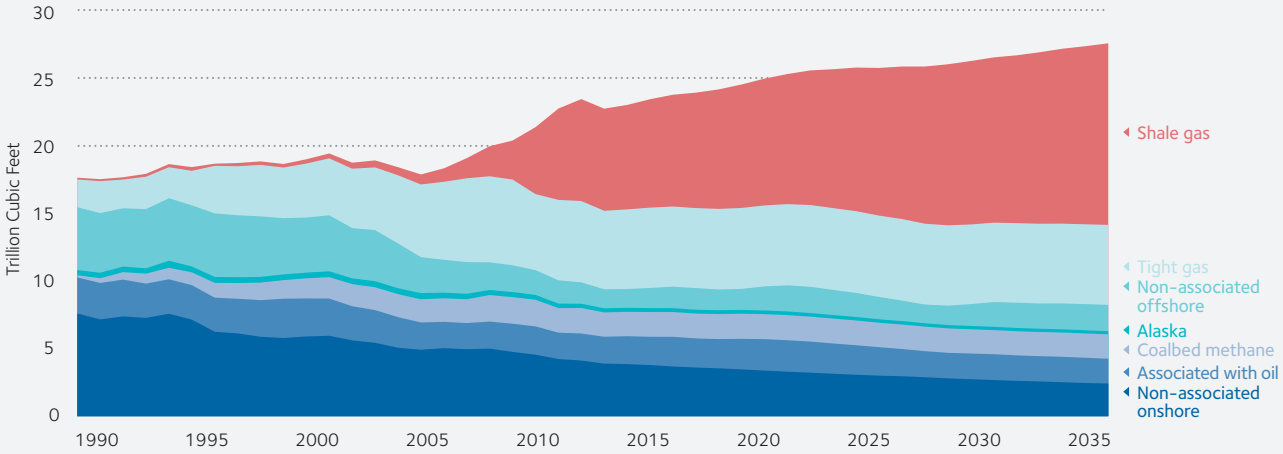
U.S. Proved Reserves, Natural Gas



Source: DOE, EIA

55 BP *Statistical Review*, at 20; DOE, EIA, *AER*, Table 6.1

U.S. Natural Gas Production (Historical and Forecast)



Source: DOE, EIA

» Compressed natural gas (CNG) and liquefied natural gas (LNG) are two fueling options for natural gas vehicles (NGVs). On an equivalent basis, both are less expensive than petroleum fuel in the United States. As of year-end 2011, there were 910 CNG stations and 45 LNG stations in the United States, though many are not accessible to the public.[56]

» Currently there is only one personal-use natural gas vehicle available in the United States, the Honda Civic GX, which has been marketed since 2005. However, a number of automakers are beginning to offer natural-gas fueled trucks to commercial fleet customers in the United States. In early 2012, AT&T announced that it would purchase 1,200 CNG-fueled Chevy Express vans.[57] As of 2009, there were 114,270 CNG vehicles on U.S. roads.[58]

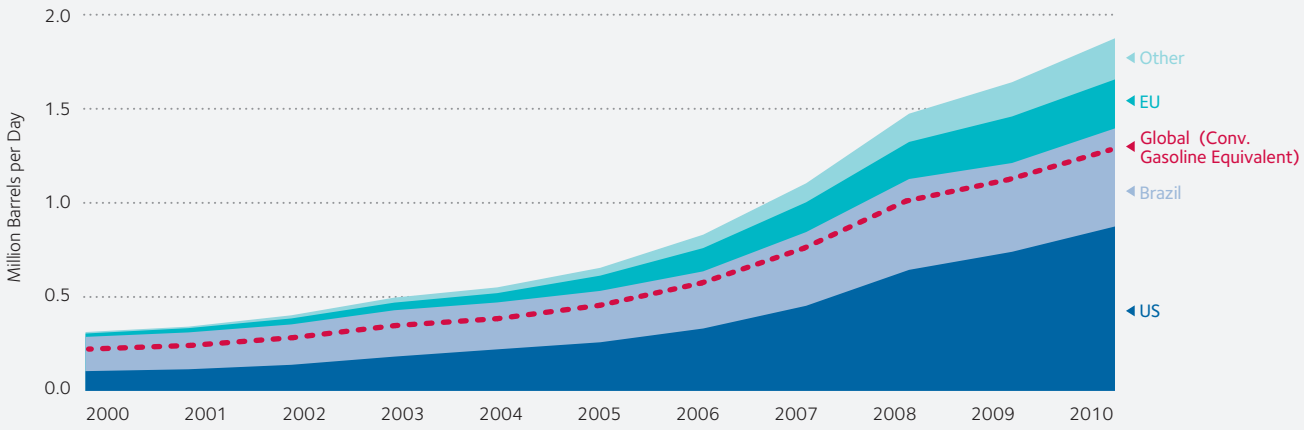
» The deployment of a natural gas refueling infrastructure is a significant obstacle to widespread NGV adoption that will require public and private sector investment. The cost of installing a natural gas fueling station in a private garage can be as high as $8,500, assuming that the home already has natural gas service, which more than 30 percent of U.S. households lack. In 2011, Chesapeake Energy and Clean Fuels Corporation announced matching $150 million investments in LNG refueling infrastructure targeting long-haul freight customers in the United States.

56 DOE, Office of Energy Efficiency and Renewable Energy (EERE), Alternative Fuels and Advanced Vehicles Data Center
57 Green Fleet Magazine, "AT&T Orders 1,200 CNG-Powered Chevrolet Express Vans," January 31, 2012
58 ORNL, *TEDB*, Table 6.1

Biofuels

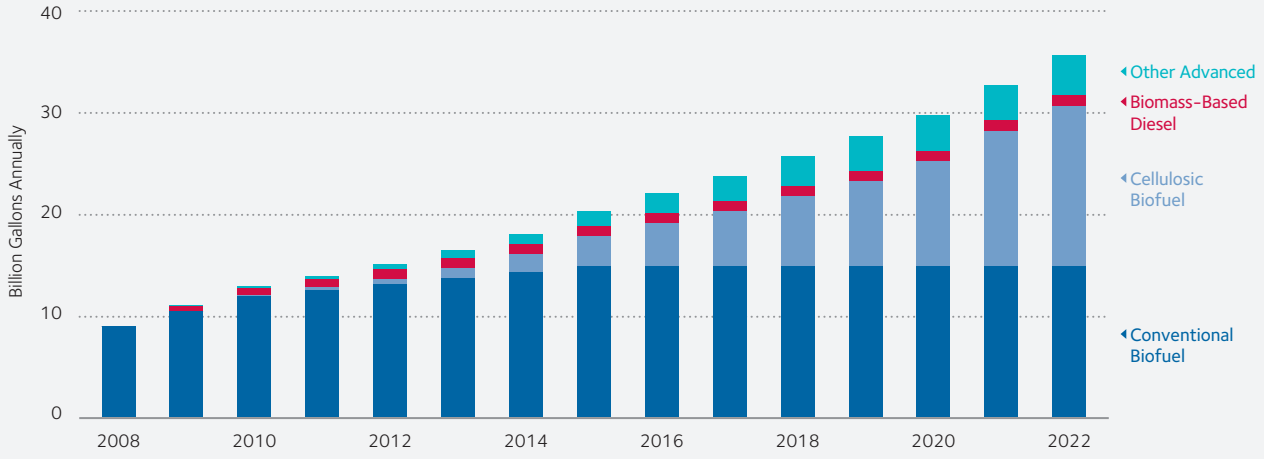
The United States is the world's largest producer of liquid fuels derived from biomass, with total annual production approaching 1 million barrels per day.

Global Biofuels Production



Source: BP, plc., Statistical Review of World Energy 2011

U.S. Renewable Fuels Standard



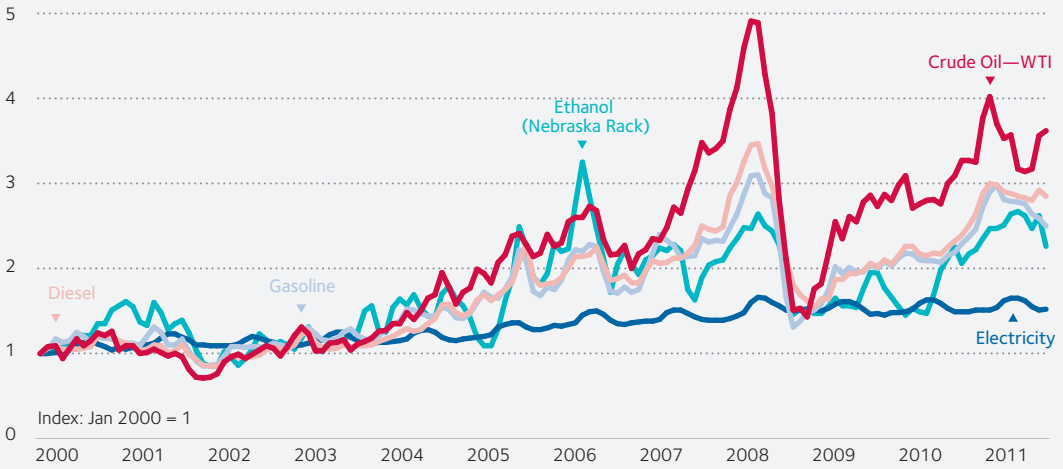
Source: Environmental Protection Agency

» Over the past several years, a number of policies have been put in place to spur production of biofuels—most notably corn ethanol—in the United States. Biofuels blended into gasoline represent more than 5 percent of U.S. marketed fuel.[59] Most biofuels consumed in the United States are produced domestically, which has a positive impact on the trade deficit and helps to create jobs.

» As of 2009, there were 504,297 vehicles on the road in the U.S. capable of running on an 85 percent ethanol fuel blend.[60] There were 2,442 E85 refueling stations in the U.S. at the end of 2011.[61]

» Advanced biofuels could play a key role in offsetting oil consumption in the shipping and aviation industries in the future.

Fuel Price Volatility Index



Source: IEA, Medium-term Oil Market Report 2010

» Biofuel prices tend to track oil price volatility closely. This is because the market price is determined by the marginal price of adding another barrel of liquid fuel, and the extra barrel comes from the global oil market. Therefore, when gasoline rises to $4 per gallon, so does ethanol (adjusted to account for its lower energy content). When the price of gasoline falls below the marginal cost of producing ethanol, production of ethanol declines.

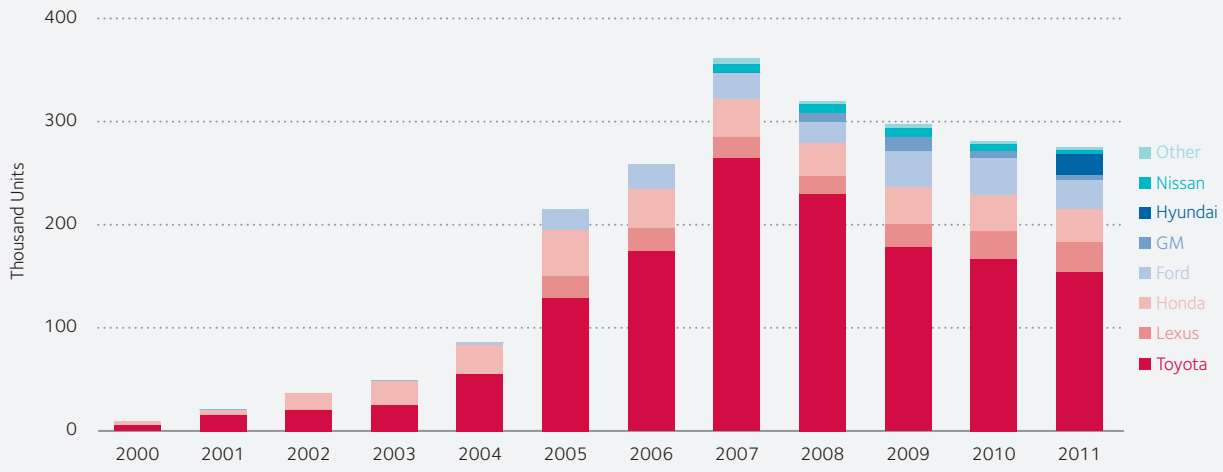
» Biofuel profitability is heavily impacted by the price of its feedstock components (e.g., sugar or corn) and the price of both oil and natural gas.

59 DOE, EIA, *AER*
60 ORNL, *TEDB*, Table 6.1
61 DOE, EERE, Alternative Fuels and Advanced Vehicles Data Center

Electric Drive Vehicles

Gasoline electric hybrid vehicles were first introduced in the United States in late 1999. At the end of 2010, the first models in a new wave of plug-in electric vehicles powered by electricity from the grid began entering U.S. showrooms.

Annual U.S. Hybrid Sales by OEM



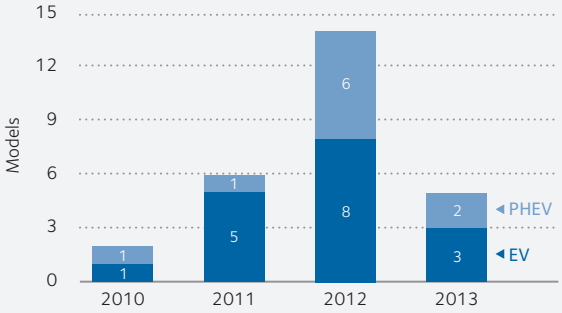
Source: DOE, EERE through 2010. Data for 2011 from Hybridcars.com

» Electric drive vehicles—including traditional hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (EVs)—each rely on electricity for motive power in varying degrees. In general, electric drive offers the most significant, commercially-available improvements in vehicle energy efficiency today.

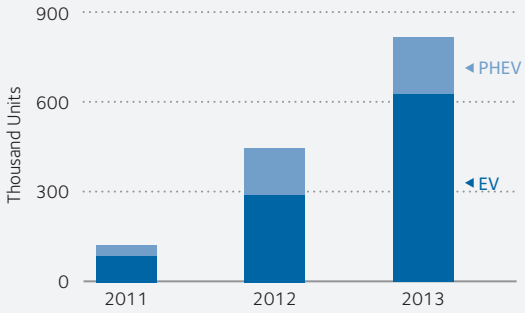
» HEVs use a small battery to support the vehicle's internal combustion engine (ICE) at low speeds and during acceleration. The most sophisticated hybrids offer efficiency gains of 50 percent versus comparable ICE models. Some basic hybrid technologies simply allow the ICE to shut off while the vehicle is stopped, providing relatively inexpensive efficiency gains of 6 to 10 percent.

» PHEVs are a step-change from traditional hybrids in that their larger batteries can store electricity from the grid by plugging in. In this application, the battery is capable of providing 100 percent of a vehicle's energy/power needs over a moderate distance (around 40 miles as of 2010/2011). A PHEV could theoretically use zero petroleum while operating in this mode. A PHEV also retains the use of an internal combustion engine to provide a full driving range similar to a conventional vehicle.

Expected PEV Launches by Major OEMs



Announced PEV Production Capacity of Major OEMs



Source: Bloomberg New Energy Finance

» EVs do not include an internal combustion engine and are powered solely by the battery via electricity from the grid. EVs entering the market today have driving ranges of 60 to 120 miles, after which they need to recharge.

» Consumer adoption of each electric drive technology is currently hindered by battery cost. At the low end of the cost range, a typical nickel-metal hydride battery adds $1,800 to the cost of a conventional hybrid passenger car. Moving progressively higher, the lithium-ion battery in a plug-in hybrid passenger car can add between $3,000 and $10,000 to the cost of the vehicle. Finally, the lithium-ion battery in a fully-electric passenger car with 100 miles of driving range adds approximately $12,000 to the cost of the vehicle. While the low operating cost of these vehicles can help the purchaser recoup battery expense over time, the payback periods are still too long in most cases to appeal to mainstream consumers.

» Vehicles operating on grid electricity provide a number of energy security and economic benefits:

1. Electricity is produced from a diverse portfolio of domestic fuels.
2. Electricity prices are extremely stable.
3. The power sector has substantial spare generation and transmission capacity.
4. The network of infrastructure already largely exists.

MEDIA CLIPS

Recent Press on Energy Security

Securing America's Future Energy

POLITICO

Shed Reliance on Oil, Boost Strategy

Author: Adm. Dennis Blair | May 12, 2011

The death of Osama bin Laden is good news but will not make the United States safe enough. One real danger of Al Qaeda is that it has no central leadership. Instead, it is a widely dispersed, anti-hierarchical group of franchises and agents, funded by loose petrodollars in the Middle East.

These Al Qaeda-inspired agents pose the immediate danger — and they still exist. They know they can't beat us on the battlefield, so they target critical infrastructure and soft targets. Petroleum facilities are high on Al Qaeda's hit list, as they seek to wreak economic damage in the U.S.

Our best strategy for follow-up is multifaceted: Continue to hunt and kill terrorists, and reduce our dependence on petroleum, a commodity for which there is no free market.

Taking these necessary steps on energy can ensure that our economy is not held hostage to terrorist actions. We can reduce the need to send troops to the Middle East and stop the transfer of wealth from the U.S. to oil-producing nations, like members of the Organization of Petroleum Exporting Countries.

Our plan of attack:

Produce more oil here at home. We send billions of dollars overseas every year to pay for our addiction, all while sitting on significant unexploited petroleum resources. We can tighten safety standards, and we can drill more. And we should do both.

Use oil more efficiently. As long as gasoline vehicles make up most of our fleet, they must get higher mileage. Great gains in fuel efficiency are being made now, and we need to keep the pressure on.

Break oil's stranglehold by electrifying transportation. Electricity is produced from a diverse range of largely domestic fuels, including natural gas, coal, uranium, flowing water, wind and sunshine. Retail electricity prices are incredibly stable — and have actually fallen in real terms over the past 25 years. There is substantial spare generating capacity at night to power electric vehicles without building new power plants. Electric vehicles are starting to hit the showroom, and we must take action so they can win a major market share.

Act now. The reason U.S. forces were able to kill bin Laden was because they acted on the intelligence. We have more than enough information to see that now is the time to pass comprehensive energy reform.: the Arab Spring rippling throughout the Middle East, civil war in Libya and an economic recovery being threatened by oil and gas prices at near record levels. In the U.S., this is a time for bipartisan leadership at both ends of Pennsylvania Avenue. No less than our national security is at stake.

Wednesday, Sens. Lamar Alexander and Jeff Merkley introduced critical legislation that would accelerate the deployment of electric vehicles. Similar bipartisan legislation has been introduced in the House.

When I first joined the Navy, our military footprint in the Middle East consisted of a one-star admiral and three ships. We now have multiple three- and four-star generals, and 150,000 men and women of the armed forces are deployed at great expense to our blood and treasure.

It is no coincidence that as our nation's reliance on oil has grown, so has our military presence in this area, which is rich in oil and ripe with volatility.

Reforming our energy policy will take time and political will, but the stakes to our national security are too high not to act. It took nearly a decade to find bin Laden. Let's start our next attack on Al Qaeda right now — working to end our oil dependence. ■

Retired Adm. Dennis Blair served as director of national intelligence and commander in chief, U.S. Pacific Command. He is a member of the Energy Security Leadership Council, a nonprofit organization advocating energy reform.

FINANCIAL TIMES

"We Must Electrify the Transport Sector"

Author: Author: Frederick W. Smith | May 9, 2011

It is tempting to say that the headlines about rising fuel prices, Libya and other events in the Middle East will be a wake-up call to the dangers of oil dependence. But such calls have been repeated for almost 40 years, and yet the vulnerability — both in the US and across the globe — remains.

Our mobile economy remains defenceless against oil-price shocks and supply interruptions. In the US, transport accounts for 70 per cent of petroleum consumed. 97 per cent of transport fuel in the US is derived from oil, and there are no plausible substitutes. When prices go up, there are only two choices: drive less or pay more. If supplies are disrupted for any reason, the choices are even worse. This must change.

Every American recession over the past 35 years has been preceded by — or occurred concurrently with — an oil-price spike. The last time this happened, just a few years ago, the average retail price of gasoline in the US increased from $1.46 to $3.27, costing typical households $2,115 a year in increased fuel expenses. That price spike contributed greatly to the recession and financial crisis which the world is still struggling to recover from.

This addiction has also led the US to commit its young men and women in uniform to protecting the world's oil infrastructure. And it means that western diplomacy is handicapped by the need to placate oil-producing nations, including those that do not share America's views or values.

So what can be done? First the US should produce more oil at home. Increased safety and environmental standards must come hand-in-hand with this increased production, but such standards — along with stalled permit processes and endless litigation — must not stop the US from exploiting its domestic resources.

Drilling is not the sole answer to this problem, far from it; but considering that last year the US sent more than $260bn overseas to pay for oil, and it is highly likely it will surpass that number in 2011, the wisdom of producing more domestically becomes clear.

Second, America must continue on the path started by George W. Bush and continued by President Barack Obama to make cars, light trucks and commercial vehicles more fuel-efficient. The less oil used to drive the transport system, the less effect a price spike will have.

But these are interim measures. The only way to truly end the threat is to move toward millions of vehicles that are powered not by oil, but by a vast diversity of domestic power sources. And the best way to do that is with a large electrified transport sector.

Only electricity can give the transport sector the flexibility to switch fuels when one or more become too expensive. Electricity from homegrown sources — wind or solar, coal or hydro, natural gas or nuclear — would free America's mobile economy from dependence on a single source. And unlike some alternatives, the infrastructure backbone for "refuelling" electric vehicles already exists in the US national grid, which offers significant spare generating capacity at night, when it is needed for this purpose.

I am not someone who tends to advocate for increased government involvement in the private sector. Free-market solutions to these economic threats would be ideal. But there is no free market for oil. To the contrary, today more than 90 per cent of proved conventional global oil reserves are held by national oil companies that are either fully or partially controlled by foreign governments, whose interests often have as much or more to do with geopolitical considerations than free-market principles.

Every time we make an investment decision at FedEx, we ask ourselves: "What is the return on this investment?" That is the question we must ask here. The Electrification Coalition, an organisation of which I am a member, has put forward a plan to deploy electric vehicles at scale throughout the US. These policies would cost far less over all of the years of their implementation than the hundreds of billions of dollars America sends overseas to pay for oil in a single year. In almost every conceivable area, the coalition's plan represents a positive return on investment, from a $127bn improvement in the US balance of trade to millions of new jobs.

We cannot fix today's gasoline price spike. But we can finally put ourselves on the path to a future in which we are in much stronger control of the fuel supply that drives our vehicles – and our economy. Little has been done to address this problem for the past 40 years. The time to do so without truly calamitous consequences is rapidly running out. ■

The writer is chairman, president and chief executive officer of FedEx Corporation.

FOX NEWS

Solve the Next Crisis Before it Happens

Author: Stephen Hadley | July 26, 2011

Ratings agencies are threatening to downgrade the U.S. dollar. Our biggest creditor, China, is telling us to get our fiscal house in order. Congress can't seem to find common ground to meet this moment of crisis. Can things possibly get worse? Yes, they can.

Just imagine what would happen if another disruption in the global oil market were added to the already explosive situation we are in.

If terrorists were to strike the major oil production facility in Saudi Arabia, or if the countries of Iran and Venezuela jointly decided to cut a significant amount of oil production, an enormous spike in energy prices would be guaranteed. The U.S. economy would slide back into a nearly catastrophic recession. It would take much more than a simple vote of Congress to get the rating agencies to restore the U.S. dollar as the most stable currency in the world.

Unfortunately, these international energy disruptions are all too possible. What's worse, they are completely out of our control because we are utterly dependent on the petroleum that is produced in regions of the world that are relatively unstable, do not have America's best interests at heart, or both.

Unlike the current debt ceiling debate we are in though, we may have time to act before a crisis occurs.

I recently participated in an war-game called Oil ShockWave, where a simulated cabinet had to grapple with economic and national security consequences of these international energy crisis scenarios involving Saudi Arabia, Iran and Venezuela. It was a sobering exercise that showed how little we can do once oil prices are sent skyrocketing.

Oil ShockWave showed that the best way to solve a crisis is to not get in one. As we see from the current debate surrounding the debt limit, a crisis will certainly motivate action, but during the crisis is when we have the fewest options.

True leadership and vision comes from seeing an opportunity to solve a problem before it becomes an emergency. In energy, just as with the debt ceiling, we've seen for a very long time just how vulnerable we are. The only question that remains is, will we wait for a potentially catastrophic energy disruption to take action, or will we put in place a real set of solutions to avoid a real Oil ShockWave?

Energy security receives a lot of lip service, but it is something that has eluded us as a nation. Everyone understands the importance of reducing our dangerous dependence on oil, but the facts are that it requires a series of short- and long-term policies. Yes, we must produce more domestic oil while conserving as much possible, but simply drilling more and using less won't insulate the U.S. from an oil price shock.

Because 90 percent of proved oil reserves are held by state-owned enterprises, there is no free market for oil. The Organization of Petroleum Exporting Countries (OPEC) engages in collusion that would be illegal in the United States. Iran, which currently chairs OPEC, wants to keep production at current levels so energy prices remain high. Other key players want to increase production so prices will be lowered to a point where the West doesn't pursue alternatives to oil. Heads they win, tails we lose.

As such, the reality of the situation is that unless we dramatically reduce our dependence on petroleum, we will never fully be in control of our energy future. In addition to producing more American oil as soon as possible, we must also take advantage of our other abundant sources of domestic energy that are used to power the electrical grid, including coal, natural gas, wind, nuclear, solar, and more.

The U.S. uses 70 percent of its oil in the transportation sector, so the best way to truly displace petroleum is to connect the electric grid to the transportation sector through electric vehicles. This long-term goal of electrifying the transportation sector requires action and problem solving from both the public and private sectors. It is an opportunity for leadership that can have a profound impact our national and economic security.

During the Oil ShockWave simulation in which I took part, the credit ratings agencies threatened to downgrade the U.S. dollar because skyrocketing energy prices crippled the economy and severely weakened our GDP. A few hours later, in real life, the ratings agencies threatened a downgrade because of the failure to respond to the approaching debt ceiling and deficit crisis.

Personally, I don't take a lot of comfort when life imitates a war game. I do however think there is a lot that can be learned from the current debt debate, and applied to the area of energy security.

The first and most important lesson: don't wait for the crisis to happen. ■

NATIONAL GEOGRAPHIC

"War Game Exposes Grim Reality: Few Oil Crisis Options"

Author: Chris Landers | July 14, 2011

Terrorists strike the world's largest oil production facility in Saudi Arabia, sending global oil prices skyward: What should the U.S. president do?

For three hours Wednesday, a group of former high-ranking U.S. government and military officials and business experts weighed the options should this hypothetical — yet realistic — scenario unfold. Amid moody war room lighting in a hotel ballroom in Washington, D.C., flanked by giant video screens, the cadre reached a bleak, if unsurprising, conclusion: There are few weapons, in the short term, for fighting an energy crisis.

"How did we let this happen?" asked Stephen Hadley, reprising his role as national security adviser in the George W. Bush administration. "How does the president answer the question that 'We've known we were dependent on oil for 20 years, and everybody's been talking about energy independence, how come we're at this point?'"

Raising that question was the central aim of the Oil Shockwave simulation, staged by the nonprofit advocacy group Securing America's Future Energy (SAFE) — a coalition of retired military leaders and business officials who aim to frame energy as a national security issue.

Drawing on its military members' real experience in war gaming, SAFE has organized Oil Shockwave simulations several times since it was founded in 2005. But that was when the price of oil was pushing $60, not $100 as it is today, SAFE President Robbie Diamond noted to the audience. "Unfortunately . . . it's much easier to write the scenario now than it was in 2005," he said.

Ripping the Saudi Safety Net

The real-life events that helped set the stage for this year's Oil Shockwave, of course, were the "Arab spring" and Libyan conflict, during which world oil prices have soared to their highest levels since the recession had knocked them down in 2008. Despite the upheaval in the Middle East and the loss of Libyan oil to the market, the world has not faced a true shortfall in oil supply. Keeping the situation in check is the market's confidence that the one nation with true spare oil production capacity, Saudi Arabia, can pump out more petroleum if needed.

So naturally, the Oil Shockwave simulation pressed the government role players to game out the options for the president should that safety net be shredded, by imaging a direct strike at Saudi Arabia's huge oil facility at Abqaiq. (Abqaiq was site of a real-life terrorist attack in 2006, which caused oil prices to spike briefly before it became clear the damage was contained.)

As the surrounding video screens warned that U.S. gasoline prices were on track to shoot to $6 per gallon ($1.58 per liter)—about 70 percent higher than they are in real life today—the first option on the table was release of the Strategic Petroleum Reserve. But the role players noted that it already had been tapped by the Obama administration in a coordinated move with European nations to prod the slow economy.

"The more you use it, the less value it has in terms of price impact," said Stuart Eizenstat, playing the role of Treasury secretary, drawing on his experience not only as deputy secretary during the Clinton

NATIONAL GEOGRAPHIC

administration but as chief domestic policy adviser to President Jimmy Carter during the 1970s oil crises. "Using [the SPR] in the Libyan situation has already, in effect, devalued it. Using it again, unless it's a true emergency — a genuine shortage — would further devalue it."

Former White House press secretary Ari Fleischer, playing the role of counselor to the president, brought up ideas for increased oil production that were favored by the administration of George W. Bush, but for which he could never gain congressional approval—including opening up the Arctic National Wildlife Refuge in Alaska to drilling. But he conceded that there might be another direction to take.

"[Either] open up America, and take tracts of land that were previously totally closed: ANWR, offshore oil, domestic oil, and open them up . . . or go in the opposite direction and make America green once and for all," Fleischer said. "Anything else is just doodling in the margins of history."

But Hadley was not convinced that the choice was either-or. "Ari, you put them as alternatives," he said. "Let me ask the secretary of energy, are they alternatives, or can they be complementary?"

A Battery-Buying Spree?

John Hofmeister, the former president of Shell Oil Company, playing the role of energy secretary, noted that there was a difference between trying to plan a long-term energy policy and trying to cope with an immediate crisis.

"We have a need in the short- and medium-term which can only be met with more hydrocarbons," he said. "With all the cars we have, nobody's going to rush out and buy batteries tomorrow, because the cars aren't available. We have to make way for the next 10 or 15 years for healthy supplies of domestic hydrocarbon energy, and make a pathway for green economy."

With short-term options few, the mock cabinet instead focused on the long-term and — unsurprisingly — arrived at much the same strategy advocated by SAFE (which is partner with the electric car advocacy group, the Electrification Coalition): Use increased domestic oil production as a stopgap while developing electric vehicles to reduce oil dependence.

"The best way to insulate our economy and our national security options is to sever our link between transportation and oil," said SAFE spokesman Justin Kitsch in an interview before the simulation. "When people say we need more solar energy and wind energy and coal energy to reduce our dependence on foreign oil, well, that oil is used to for transportation. Those other sources are used for electricity generation. The only way you can do it is to link transportation to the electrical grid."

Of course, the move to electric cars will take years. It's not a solution for a sudden oil shortage today. But as Hadley noted toward the end of the Shockwave simulation, only long-term thinking can provide more short-term options in an energy crisis.

"The president has to do something bold — it's a real challenge for his leadership, it's an opportunity for him actually to become a great president," he said. "We need to become the arsenal of energy, but as part of that leadership, we need to sketch out a comprehensive energy plan." ■

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