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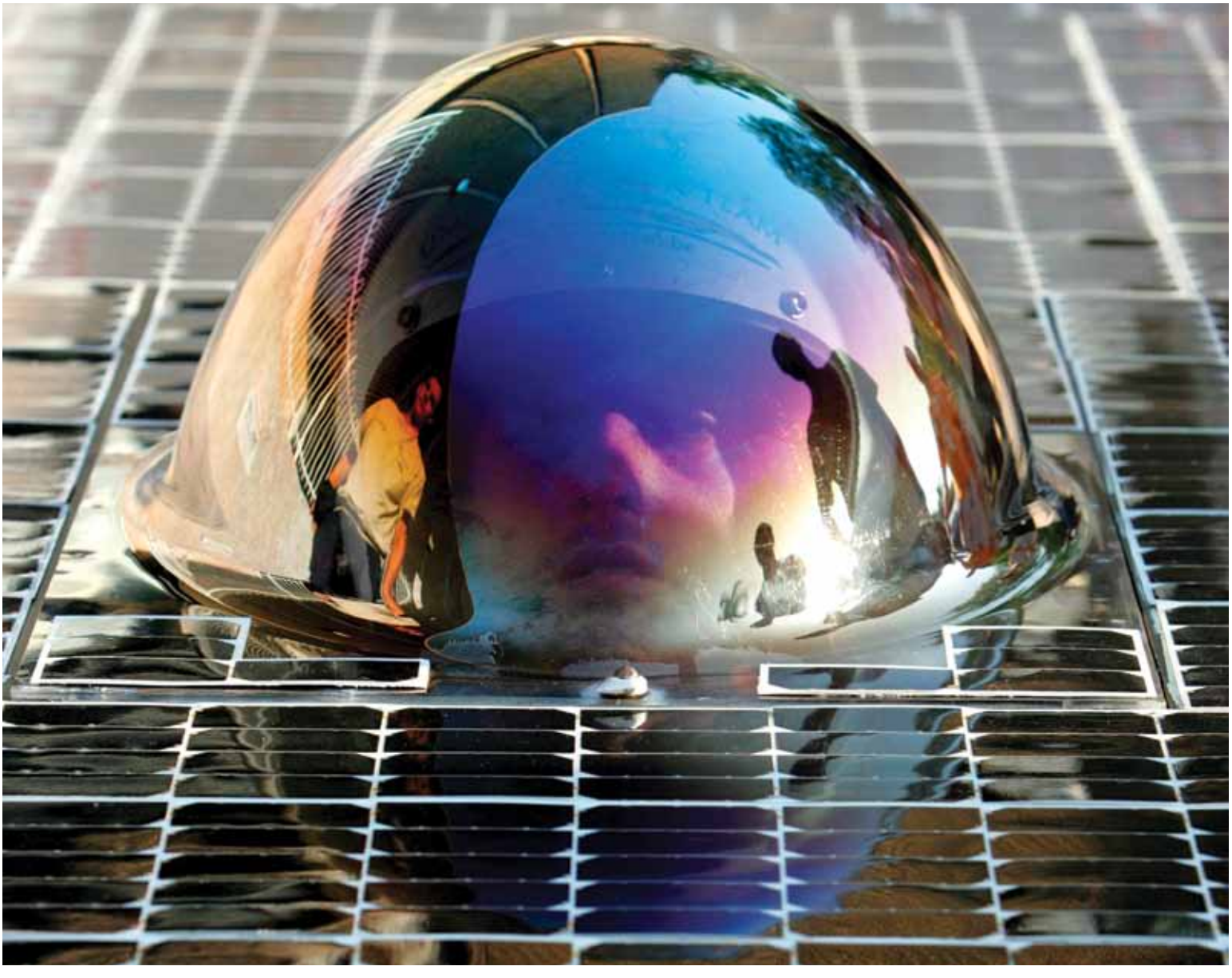
**Energy**
winter 09 reprint

## Fueling future growth

Building a sound and sustainable US energy policy



# Fueling

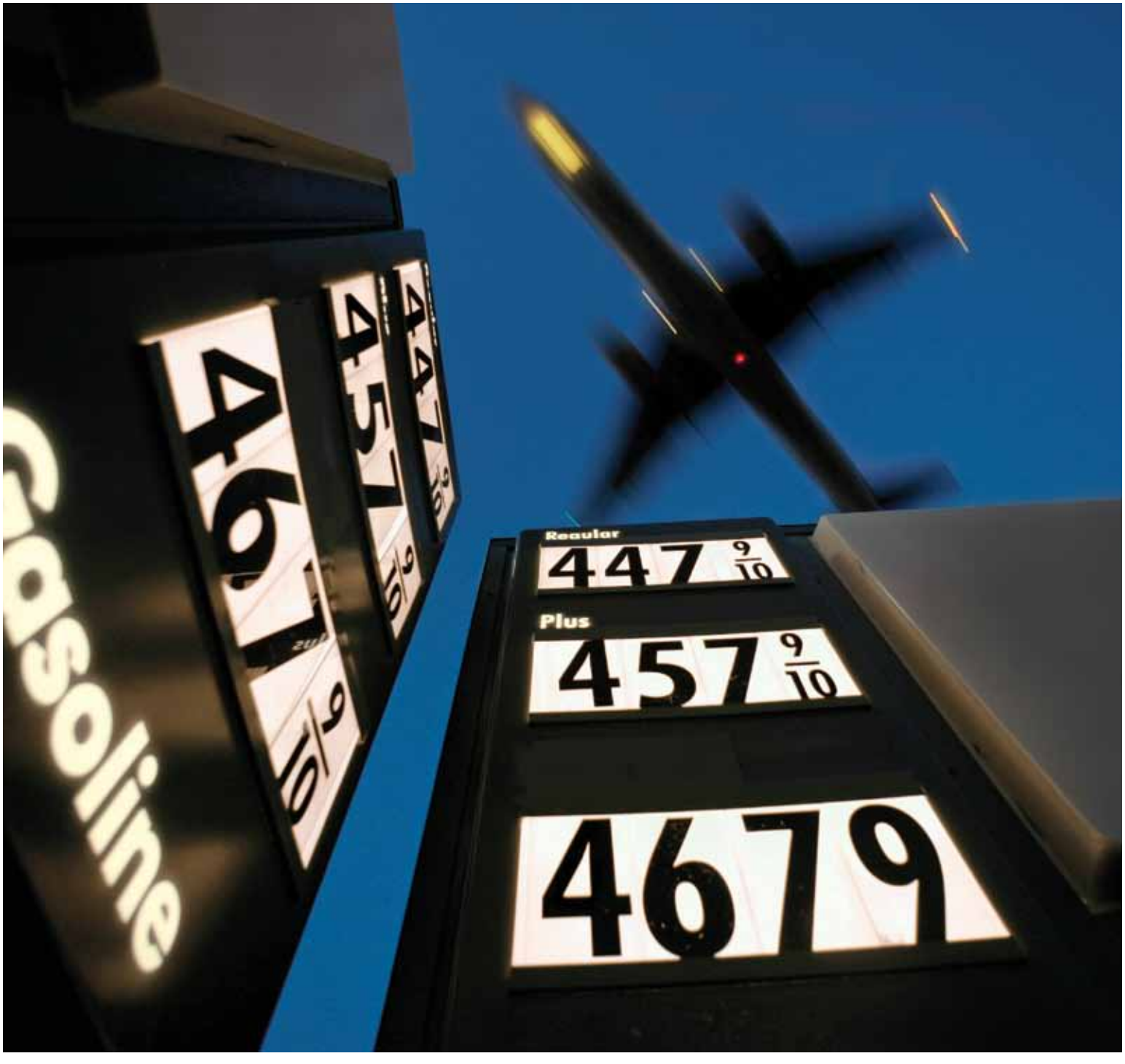
# future growth

By Richard Paterson

## Building a sound and sustainable US energy policy

**"A crisis is a terrible thing to waste,"** economist Paul Romer once said. At first blush that comment doesn't sit quite right, but on reflection, its simple wisdom becomes apparent. Not to learn from a crisis is to waste an opportunity. The current energy crisis is a case in point. When oil, gas, and power prices were skyrocketing only a few months ago, the call for long-term solutions was loud and widespread. But now, as prices fall and the crisis seems to wane, we are in danger of once again being lulled into complacency. Will we act now to avoid a more severe and damaging crisis in the future? Or will we waste the current crisis by failing to formulate a sound and sustainable energy policy for the United States? Author Richard Paterson argues that such a policy should be established and should be based on an understanding of the energy realities that face us, along with follow-on actions that will help promote a more secure energy future.

The US is in the midst of its third major energy crisis in the last 30 years. Companies, as well as consumers, are understandably concerned about rising energy prices and unpredictable availability.



The US is in the midst of its third major energy crisis in the last 30 years. Companies, as well as consumers, are understandably concerned about rising energy prices and unpredictable availability. While elected officials have given lip service to energy policy for decades, little has been accomplished, to the detriment of our economy and our standard of living. With energy prices now dropping precipitously, the time is right for US policy makers to get beyond the sound bites and rhetoric of the election and develop a solid and sustainable energy policy that supports economic growth in an interdependent world.

The fact that the energy crisis is not the only crisis we're facing complicates matters. The financial crisis, too, is likely to have a profound effect on energy supply. Feeling the credit crunch, many companies are cutting back on their energy investments—either voluntarily due to price volatility or involuntarily because credit may not be available or is too costly. Fewer investments will surely mean less energy to go around. The result? Higher price spikes and greater competition for limited supplies when the evolving global recession recedes. Failure to act now will harm the long-term prospects for our economy and, ultimately, our national security.

The stakes, therefore, are high for our nation, its consumers, and its businesses. While government is in the forefront, a sound and sustainable energy policy is everyone's responsibility. Many options and approaches are possible, but if we are to successfully mitigate the risks to US business and to America's economic future and national security, then a comprehensive, well-conceived energy policy that is grounded in reality rather than rhetoric is essential. At its foundation, such a policy should fully recognize four basic realities:

1. Past cycles of one-off, short-term solutions must be broken and give way to a long-term planning horizon—30 years or more. Long-term thinking must be applied not only to energy policy, but also to tax and regulatory policy, with which it must be fully aligned.
2. An energy policy that fosters the investment needed over the long term cannot be fully effective unless there is a clearly defined approach to carbon reduction requirements.
3. Policy makers must embrace a multi-resource mind-set. No single energy source will provide a solution in the near term.
4. The public and private sectors should collaborate on initiatives that leverage technology and people to promote increased supply and reduced demand.

### Breaking the cycle of short-term planning

During the recent election cycle, both parties promised to solve the energy price spiral—manifested in particular by prices at the gas pump—within a few years by investing billions of dollars in renewable sources while simultaneously curtailing foreign imports. While such simplistic political sound bites may be appealing during a campaign, they fundamentally ignore the realities of the energy marketplace.

In many developed and developing economies, energy companies are government owned or controlled, ensuring, in many respects, alignment of energy with broader regulatory and economic policies. But this is not the US model. Under our capitalist system, we rely on energy companies to make private-sector investments, and these companies are answerable to shareholders who risk significant amounts of capital and expect returns on their investments.

**27%**

is the increase over 2006's oil supply levels expected to be needed to meet global energy demands in 2030. That is almost the equivalent of the combined consumption of the United States and China today.[1]

1 © OECD/IEA, *World Energy Outlook 2008.*

# 16

years is the average time it takes from initial development work on a new oil or gas technology to its widespread commercial adoption.[2]

Energy infrastructure projects are hugely capital intensive and long term. For example, it may take decades to construct and produce energy from a nuclear facility as it evolves from planning and permitting to regulatory approvals and construction. Building a significant new offshore oil or gas production platform would be a similarly lengthy undertaking. According to a National Petroleum Council report, $5 billion was invested in the Hibernia Platform off the east coast of Canada, which took 19 years from discovery to production but represented only 0.2 percent of world oil demand.[3]

Therefore, a foundation of any sound energy policy is the recognition that continual short-term reactions to current events are hugely damaging to a country's energy policy. In addition, that policy cannot succeed in the absence of tax and regulatory policies that are equally focused on the long-term goal—a sustainable, reliable supply of affordable energy.

Energy companies and their shareholders who risk capital over long periods of time expect policy that ensures stable, consistent tax regimes. Vilifying our energy companies for making large profits and threatening to confiscate those profits through higher taxes is extremely counterproductive. Windfall profits taxes (WPTs), for example, have been tried before and have failed because of negative unintended consequences. As public finance specialist Salvatore Lazzari points out, the WPT in effect from 1980 to 1988 "reduced domestic oil production anywhere from 1.2% to 8.0% (320 to 1,269 million barrels). Dependence on imported oil grew from between 3% and 13%."[4]

Profits, which for energy companies are average relative to other large corporations,[5] are the source of future investment capital. More and higher taxes mean that less capital will be available to foster investment that would ensure future supplies. The International Energy Agency (IEA) predicts that $26.3 trillion will be required to meet global energy demand in the next 22 years. Some $5.5 trillion will be necessary in North America alone. Investments must be made now to meet the predicted demand. Otherwise, down the road, energy will be less available, and increasingly costly. Certainly, in this troubled economic time, we cannot look to government to make these investments.

While tax policy focuses on prices and profits, regulatory policy must also be aligned with our long-term energy security goals. Policies that govern such matters as air and water quality and permitting of sites for nuclear, refinery, LNG re-gasification terminals, and offshore platforms must be aligned with our energy security goals. Consistently saying no—not in my backyard—is neither in the public interest nor in our national security interest. We must plan to develop more of our own abundant energy sources by aligning good policy with long-term energy supply goals.

If we expect to achieve stability regarding energy supply and cost, then tax, regulatory, and other government policies can't exist in a vacuum. Rather, they must work together to support energy investment and encourage and achieve energy efficiency. In other words, these policies must help promote private-sector investment rather than hinder efforts to reduce our energy vulnerabilities.

2 National Petroleum Council, *Facing the Hard Truths about Energy,* September 2007.

3 *Ibid.*

4 "The Crude Oil Windfall Profit Tax of the 1980s: Implications for Current Energy Policy," *CRS Report for Congress,* March 9, 2006.

5 According to the American Petroleum Institute, "The last published data for the second quarter of 2008 show the oil and natural gas industry earned 6.8 cents for every dollar of sales compared to 6.5 cents for all U.S. manufacturing and 8.5 cents for U.S. manufacturing, excluding the financially challenged auto industry." *America's Oil and Natural Gas Industry: Putting Earnings into Perspective,* November 2008.

# 38%

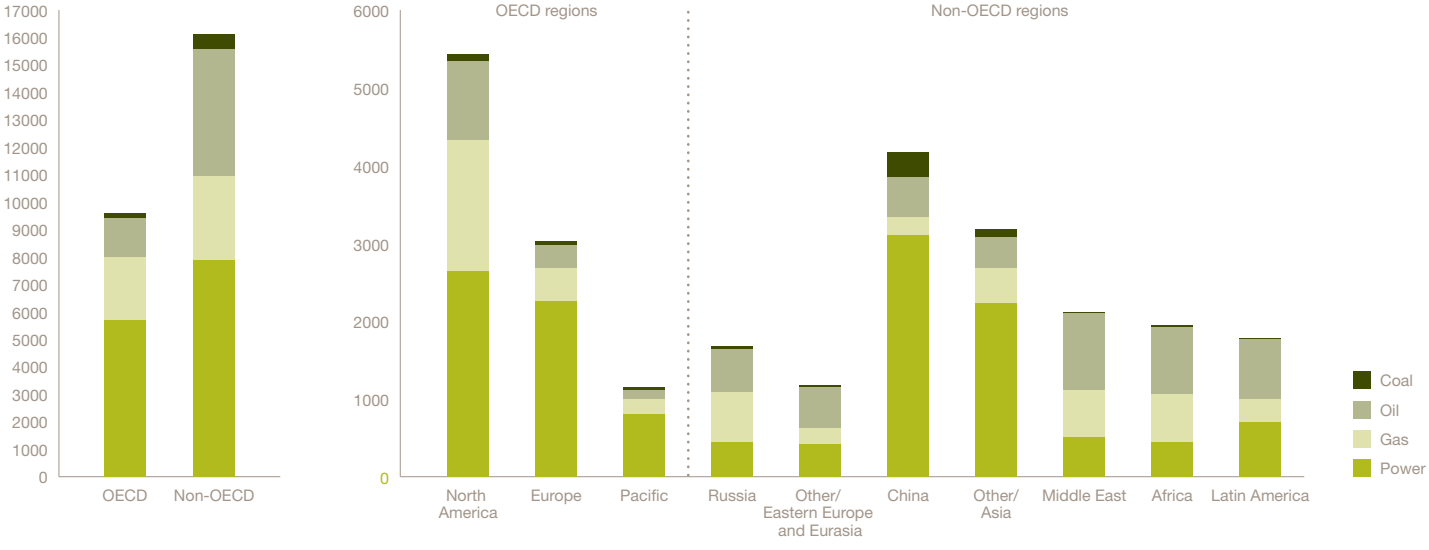
shortage of engineers and geoscientists and a 28 percent shortage of instrumentation and electrical workers in the US oil and gas industry are what the United States is expected to face in 2009.[6]

In addition, our policies must recognize that energy cycles often rise and fall with economic cycles and that short-term energy prices often are driven by economic forces that energy companies cannot control. For example, in the recent run-up of global oil prices to record levels—approaching $150 per barrel—oil company profits reached historically high levels. The reasons why are clear. The investments to support current production levels (and thus revenues) were made at a time when prices were considerably lower and at much lower costs. However, if the government changes the rules during up cycles and if companies are unable to reasonably predict the return on their investment, they and their shareholders will be less likely to invest for the long term.

Because energy is such a central part of the infrastructure that makes the US economy run, continual short-term policy actions and reactions constrain the overall economy, slow the growth of US companies in virtually every industry, and, ultimately, have a negative impact on consumers. With US and global energy demand expected to grow dramatically, a long-range, cohesive energy policy that provides for consistency, continuity, and planning and that is designed to deliver a robust energy infrastructure far into the future is needed as never before. (See Figure 1.)

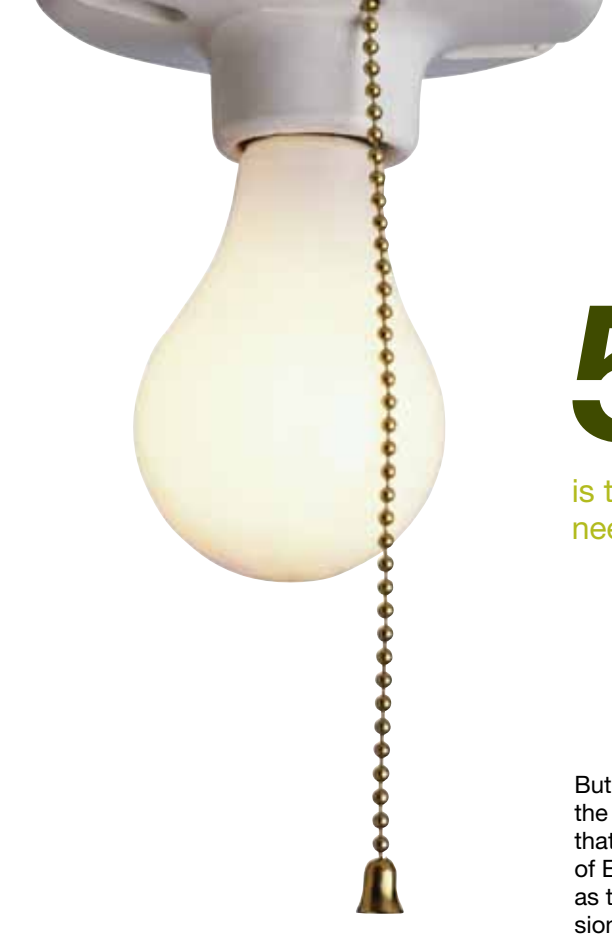
Several nations reached that conclusion some time ago and have acted accordingly. The French, for example, were hurt badly during the 1973 oil embargo. But nothing was allowed to stand in the way of a smart solution: The country turned to nuclear power and promoted long-term policy based on investment in nuclear that supported permitting, siting, and waste disposal. Today, about 78 percent of power production in France is nuclear. In Brazil, energy policy that promoted investment

**Figure 1: Investment forecast for energy-supply infrastructure, 2007-2030** ($ billion in year 2007 dollars)




Source: © OECD/IEA, World Energy Outlook 2008

6 National Petroleum Council, *Facing the Hard Truths about Energy,* September 2007.



# 52%

is the increase over 2006's natural gas supply level that is needed to meet global energy demands in 2030.[7]

in sugarcane-based ethanol, along with incentives for exploration and development of Brazil's offshore oil and gas resources, has been credited with making Brazil largely self sufficient.

While France's move to nuclear and Brazil's to ethanol are, obviously, not right for every country, the strategies and policies behind those moves are. Under long-term energy policies, both countries decided on a direction, stuck to it over the long term, and achieved desired results.

### Defining an approach to carbon reduction strategies

As discussed earlier, the goal of the US should be to align energy, tax, and regulatory policy to foster a friendly, non-combative, business climate where long-term investments in energy production and infrastructure will thrive. This is essential not only to our energy security, but also to the competitiveness of our economy and to our national security.

But aligning such policies is only part of the equation. Increasingly, the science that links human activity with the warming of Earth's atmosphere is being accepted as true. Many believe that carbon emissions are a direct contributing factor, and more and more, policy makers are recommending taking action soon to curtail the negative effects.

Throughout the election cycle, discussions occurred putting forward possible solutions to address carbon emissions. Some said they would tax anyone who emits carbon into the atmosphere. Others argued that a cap-and-trade system is the best solution. As one might expect, neither position is perfect. One thing, though, is certain: Under these policies, all forms of energy will be more expensive, and "cleaner" (less carbon intensive) energy sources will be favored.

Given the significant impact that such policies would have if implemented, investors need clarity on the direction that will prevail and assurance that all companies—not just energy companies—will bear the burden of carbon legislation. While huge, long-term investments will be required to solve our energy challenges, investors will understandably be reluctant to make such investments if a cloud of uncertainty surrounds carbon policy. Moving forward quickly to promote details on direction and timing is essential to unleashing the investment required. This kind of integrated approach is the only way companies can adequately plan to provide the energy we need for the future. For sure, such solutions will increase the cost of energy for everyone. That's why an approach that distributes the burden among all sectors, not just within the energy industry, is both fair and appropriate.

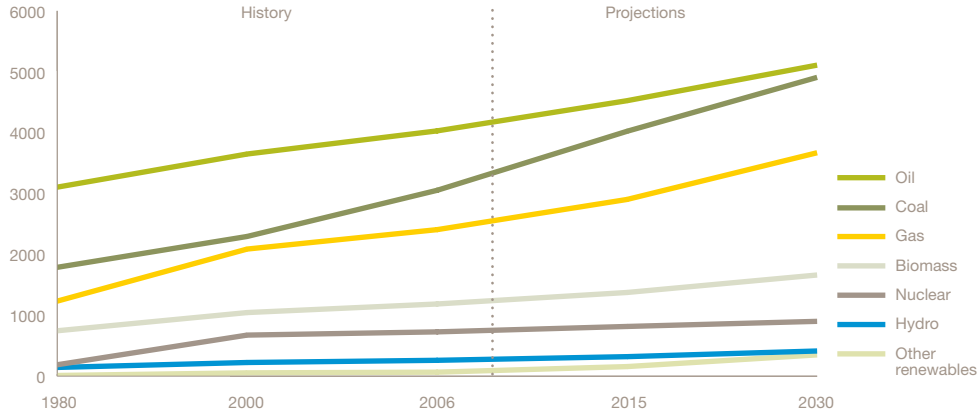
### Embracing a multi-resource mind-set

Why is a multi-resource mind-set required? The most important reason is that, as the IEA predicts, global demand for energy will continue to increase. All sources will be needed to meet this demand. As Figure 2 shows, global energy demand in 2030 will be approximately 45 percent higher than it is today. It also indicates that, in the same year, oil, gas, and coal (broadly referred to as hydrocarbons) will still represent 80 percent of the total energy mix versus 81 percent today.

Interestingly, these numbers do not show a significant shift in the sources of supply during this time horizon. According to the IEA outlook, while renewables (such as biomass, solar, and wind) will grow in importance—from 11 percent to 12 percent—they will continue to contribute a relatively small percentage of the overall supply mix, as they do today. (See also Figure 3.) In other words, while important, alternative sources of energy will not satisfy our total energy requirements.

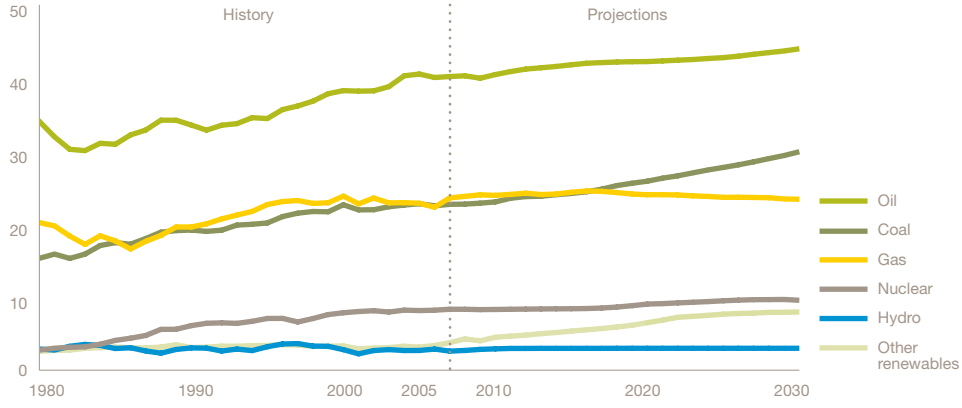
7 © OECD/IEA, *World Energy Outlook 2008.*

**Figure 2: World primary energy demand by fuel type, 1980-2030** (Mtoe)




Source: © OECD/IEA, World Energy Outlook 2008

**Figure 3: US energy consumption by fuel type, 1980-2030** (quadrillion Btu) Fossil fuels—coal, oil, and natural gas—currently provide more than 85 percent of all the energy consumed in the United States, nearly two-thirds of our electricity, and virtually all of our transportation fuels. Our reliance on fossil fuels is expected to increase at least over the next two decades even with aggressive development and deployment of new renewable and nuclear technologies.




Source: Energy Information Administration, http://www.eia.doe.gov/oiaf/forecasting.html

Why? As mentioned earlier, the investment cycle for these sources of energy is very long term, and it is difficult to plan on new sources of energy based on short-term policy mandates. For example, congressionally mandated ethanol production and use have had unforeseen consequences—significant inflation in core food costs and, perhaps, greater greenhouse gas emissions than would have resulted from burning pure gasoline.

Further, we can't possibly invest fast enough in alternative sources of energy to displace the significant contribution that hydrocarbons represent. Already, in the current credit crunch, investments in wind, solar, and other evolving technologies have been among the first to be cut. At a minimum, hydrocarbons will be a bridge to a future when investments in alternative sources will have more impact. But that is far down the road. For now, exploiting domestic hydrocarbons offers our best chance of reducing, but not eliminating, dependence on unpredictable foreign sources of energy.

Coal and oil shale are abundant in North America. When they're combined with domestic oil and gas resources, the US possesses as much hydrocarbon-based energy potential as Saudi Arabia. While it makes sense to promote a policy of investment in these hydrocarbon resources to encourage less energy dependence, doing so will require a long-term view, and we will need to make decisions about places that are currently restricted—the Arctic National Wildlife Refuge (ANWR), offshore, the Rocky Mountains, and so on. Past investments in research and technology can help us access these sources in environmentally friendly ways.

Along with these hydrocarbon resources, a substantially increased investment in nuclear power production must necessarily be a part of a long-term energy solution that increases energy supply while substantially reducing carbon emissions. With about 19 percent of its domestic power production derived from nuclear power plants, the US has demonstrated for decades that it can safely produce commercially viable nuclear energy. More needs to be done from a policy perspective to deal with the nuclear

# 85,000,000

barrels of oil are consumed globally each day. That number is expected to increase to 106 million barrels per day in 2030.[8]

waste issue, but we cannot close our minds to the potential advantages that this resource provides.

In addition, we need to understand that finding and developing energy sources is not the only challenge. For many new sources, we must also change our entire infrastructure to support the delivery of new fuel sources and end-user technology. Developing the energy is merely one part of the equation.

Finally, a word about *energy independence,* the clarion call of the majority of US politicians and other citizens. While this notion may resonate conceptually and politically, in reality, energy independence is not possible. Global demand for energy will grow much more rapidly in developing countries than it will in the US. The global competition for energy will steadily increase, making a multi-resource mind-set even more essential. We must help ourselves and remain focused on developing our own resources and technologies to the fullest extent possible, but we must also understand and accept the fact that energy increasingly is a global commodity for which we must compete in a global, interdependent marketplace. Our policies must reflect this fact.

8 © OECD/IEA, *World Energy Outlook 2008.*

### Leveraging public- and private-sector technology initiatives

The energy crisis of the 1970s was prompted by the supply shock caused by the oil embargo. During this period, pundits predicted that the US would effectively run out of oil by the 21st century. Yet today we still have substantial quantities of untapped oil and gas—not because these fuels are more abundant but because energy companies have developed better technologies to capture them. Oil and gas that were once written off as unrecoverable can now be reached; fuel that was considered impossible to find is now discoverable.

The energy industry is brimming with new technologies involving both nontraditional forms of energy and alternatives designed to make traditional fuels more environmentally palatable. Many, for example, are emerging around oil shale in the US and tar sands in Canada. Technology has been developed that can convert coal and natural gas to transportation fuels such as diesel. Companies are using new technologies to experiment with carbon molecules and are attempting to convert them to useful fuels through environmentally friendly methods.

Hydrocarbons remain plentiful, but they are being depleted. “Easy resources” are increasingly hard to find. Our ability to efficiently access remaining supplies is directly linked to the power of new technologies. The US has sources we should want to develop, such as tight gas, oil shale, oil in deep waters, and coal. And the industry possesses the technology to extract them in an environmentally safe way. New innovations continually are being introduced.

Technology also provides the hope of potential breakthroughs in the future that will result in new sources of energy to replace hydrocarbons. These might include hydrogen, new applications for nuclear,


or something we can't yet imagine. Such innovations will be big factors in our energy security going forward, but it is important to understand that they come at a higher cost than traditional fossil fuels. Alternatives will mean prices and supply that are more predictable, but they will not mean cheaper energy.

While the role of technological innovation in promoting new supplies of energy is clear, improved technologies also are likely to mitigate current environmental concerns around the issue of global warming. Carbon sequestration technology exists today that will enable the production of so-called "clean coal" and other hydrocarbon sources that will not damage the environment. Commercializing these technologies is essential to solving both supply issues and global warming.

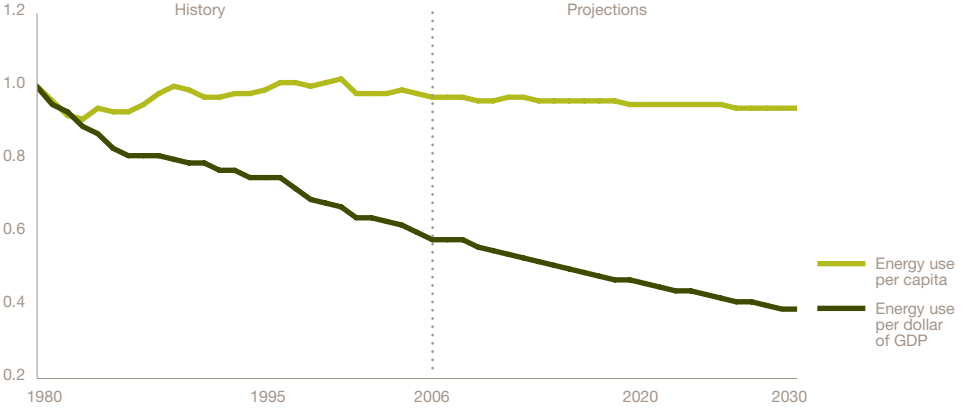
Conservation is an aspect of energy policy that does not get as much attention in the US today as it deserves. Yet it is a critically important element in the energy equation. As Figure 4 shows, energy use per dollar of gross domestic product is declining. And that's a good thing. Energy saved through efficiency is the only "free" source of energy we have. However, if significant reductions in per capita energy use are to occur, huge technological advancements will be required. As we develop more and better technologies, these efficiencies will enable us to maximize our precious energy resources, meet our long-term energy challenges, and revolutionize energy usage in transportation and in industry.

Of course, none of these innovations will occur without considerable investment. Today, both the public and private sectors are investing in emerging technologies. From a policy perspective, the key is to promote an environment that enables energy companies and other organizations to move forward collaboratively and in sync with one another. In this way, we will optimize our R&D spend and will develop commercially viable applications. A sound energy policy encourages an environment of collaboration within and across sectors to promote discovery of new sources as well as the efficient use of the energy we have.

### How should your company deal with these energy realities?

Energy is a huge cost of doing business. Unanticipated decreases in availability and highly volatile costs can be game changers for any company. While the domestic airline and auto industries are clear examples, any company can be impacted. Everyone has a role in promoting good energy policy. The following are a few ways in which every company can make a difference.

**Figure 4: Energy use per capita and per dollar of GDP, 1980-2030** (Index, 1980 = 1)




Source: Energy Information Administration, http://www.eia.doe.gov/oiaf/aeo/demand.html

# 75%

is the approximate drop in enrollment in petrotechnical programs that has occurred over the last quarter century.[9]

- Make a commitment to learning the facts about energy policy and take a stand with policy makers. Policy will benefit from a clearly articulated business point of view that is grounded in an understanding of energy fundamentals and realities. All companies—not just energy organizations—will be impacted by energy policy directives and by efforts to restrain carbon emissions. We all should take advantage of the resources that are available to bring us up to speed on today's energy realities. (See sidebar, "Energy information sources.")
- Make an investment in educating your employees. They too have a role to play in influencing energy policy, but as the sidebar "America's energy IQ" indicates, far too few have an understanding of the facts. Recent evidence demonstrates that high costs and unpredictable supplies can drive public opinion quickly. Polls around the desirability of offshore drilling changed dramatically as the potential for $4-per-gallon gasoline loomed. Policy makers listened. You are well positioned to arm your employees with the knowledge they need to conserve and to have a positive impact on policy.
- Help the US maintain leadership by supporting programs that promote training generally in science and mathematics and specifically in the petrotechnical industry. While enrollment in petrotechnical programs has declined by 75 percent over the past 25 years,[10] the news is not all bad. As the National Petroleum Council reports in its update to *Hard Truths,* "enrollments in petroleum engineering have doubled since 2005."[11] This increase, however, may be due to the prospect of high salaries that jobs in the petroleum engineering sector offer. In terms of total numbers, however, competitor nations are showing significant numbers of college students choosing to enter science programs. Long-term investment in education will be required in order to equip students with the skills they need to work in the energy industry of the future. That talent will be required to accelerate development of new products that are more energy efficient and compatible with new energy sources.

In addition, companies should make educated, regular risk assessments to gauge their own energy sustainability and energy risk over time as part of their overall enterprise risk management (ERM) program. The following are factors for you to consider when assessing the impact of energy market risks on your company:

- The relative proportion of energy costs to overall direct or indirect costs
- The impact of energy price volatility or supply disruptions on your customers and suppliers and on their customers and suppliers
- The speed at which increases in energy prices can be passed on through increases in the selling price of your products, if they can be at all
- The potential impact of future emissions reduction policy (for example, carbon tax and/or emissions caps) on your company's operations, energy supplies, cost structure, or market for your products
- The potential impact of future deregulation or re-regulation of energy markets
- The best way to assess rate of return on energy conservation investments in an unpredictable price and regulatory environment.

Currently, volatile energy prices are having a significant impact on credit risk and liquidity, intensifying the challenges of the current financial crisis by affecting hedging strategies, working capital demands, and credit risk management practices:

- Although hedging can provide greater control over and certainty about energy prices, it creates liquidity risk when collateral must be posted unexpectedly. Sudden market moves can create unpredictable near-term cash demands that exceed the capacity of existing cash reserves and credit lines. In response, companies entering into hedging programs should carefully consider the potential liquidity demands in the event of sudden large price movements like those we have seen recently.
- High energy prices have created greater working capital demands, while adverse energy price movements have lowered the credit rating of some energy and utility companies. Companies doing business in sectors with large exposure to energy prices should work toward improving credit risk management practices. Traditional backward-looking

9 National Petroleum Council, *Facing the Hard Truths about Energy,* September 2007.

10 *Ibid.*

11 National Petroleum Council, *Facing the Hard Truths about Energy—One Year Later,* September 2008.

methods of assessing creditworthiness are proving insufficient in the current financial crisis and should be supplemented with more responsive, forward-looking measures. Credit policies and analyses need to be reevaluated and updated more frequently than in more stable times.

In-depth understanding of these factors and their implications will provide companies with clearer insights into ways to achieve their corporate objectives and mitigate risk. Further, armed with insights about energy facts and realities, companies can and should actively participate in the national energy policy debate and voice their points of view to policy makers. All of us have a shared responsibility to ensure that our elected officials have the depth of information necessary to make informed decisions on these critical matters.

### Protecting our future

Clearly, sound energy policy is complex, and it will be difficult to implement. But without a sound and sustainable energy policy, US business will not remain competitive. If we become more dependent on imported oil and gas, if we don't conserve and take the other actions necessary to make our own energy supply more sustainable, we will remain an energy importer that sends exorbitant amounts of our money abroad. That is not good for US business and it is not good for the US economy. If we want to remain a viable economic power, we require access to energy that is affordable and plentiful. For that to occur, a sound and sustainable energy policy based on recognition of our energy realities is essential.

Richard Paterson is PwC's global leader for energy, utilities, and mining.

## Getting informed and involved

# Energy information sources

US companies can and should be part of the energy policy dialogue. The following are organizations and resources that provide good starting points for doing so.

**Carbon Disclosure Project** The Carbon Disclosure Project (CDP) plays a vital role by promoting an ongoing dialogue between institutional investors and senior corporate management on global energy and by encouraging organizations in the private and public sectors to measure, manage, and reduce carbon emissions and climate change impacts.

**Energy Information Administration** Created by Congress in 1977, the Energy Information Administration (EIA) is a statistical agency of the US Department of Energy. Its mission is to provide policy-neutral data, forecasts, and analyses to promote sound policy making, efficient markets, and public understanding regarding energy and its interaction with the economy and the environment. The EIA publishes *Annual Energy Outlook.*

**International Climate Change Partnership** The International Climate Change Partnership (ICCP) is a global coalition of companies and trade associations in diverse industries that are committed to constructive, responsible participation in the international policy process regarding global climate change.

**International Energy Agency** The International Energy Agency (IEA) is dedicated to ensuring reliable, affordable, and clean energy by acting as an energy policy adviser to 28 member countries. The IEA mandate has evolved from coordinating measures during the oil crisis of 1973 to promoting the "Three E's" of balanced energy policy: energy security, economic development, and environmental protection. The IEA publishes *World Energy Outlook* on an annual basis.

**National Petroleum Council's *Facing the Hard Truths about Energy*** *Facing the Hard Truths about Energy* takes a realistic, global view of energy challenges to 2030. The report focuses on critical topics, including the changing world energy map, as well as investing in global energy development and addressing carbon constraints.

Test your knowledge

# America's energy IQ

Understanding energy supply, consumption, and true costs, among other factors, is crucial to our nation's formulating a sound energy policy. Yet when asked about energy fundamentals, American consumers reveal they have much to learn, as evidenced by their responses to the American Petroleum Institute Energy IQ survey conducted by Harris Interactive. How do your own responses measure up?

**1** What percent of the world's 10 biggest oil and natural gas companies based on reserves are owned and operated by foreign governments?

A 25%
B 50%
C 75%
D 100%
E Not sure

Source: *Oil & Gas Journal,* September 17, 2007.

**2** What percent of the world's proven oil reserves do US oil companies control?

A 0% to less than 10%
B 11% to less than 20%
C 21% to less than 30%
D 31% to less than 40%
E Not sure

Source: *Oil & Gas Journal,* December 24, 2007.

**3** In 2007, how many cents did the US oil and natural gas industry earn on every dollar of sales?

A 0 to 10 cents
B 11 to 20 cents
C 21 to 30 cents
D 31 to 40 cents
E Not sure

Source: *Oil Daily,* March 17, 2008, Profit Profile section.

**4** What percentage of US oil companies' stocks are owned by pension plans and retirement accounts?

A 0% to 15%
B 16% to 30%
C 31% to 45%
D 46% to 60%
E Not sure

Source: SONECON Report: The Distribution of Ownership of US Oil and Gas Companies, September 2007.

**5** What percent of US oil companies' stocks are owned by corporate insiders?

A 0% to 5%
B 6% to 15%
C 16% to 25%
D More than 25%
E Not sure

Source: SONECON Report: The Distribution of Ownership of US Oil and Gas Companies, September 2007.

**6** From 2000 through 2005, US oil and gas companies invested how many billions of dollars on emerging energy technologies in North America (such as biomass, wind, solar, alternative fuel vehicles, gas-to-liquids, and oil shale)?

A $1 billion to less than $25 billion
B $25 billion to less than $50 billion
C $50 billion to less than $75 billion
D $75 billion to $100 billion
E Not sure

Source: Oil and Gas Industry Investments in Alternative Energy, Frontier Hydrocarbons and Advanced End-use Technologies, IER/CEE. May 2006.

**7** If corn ethanol were to replace gasoline, what percentage of US passenger cars could be fueled using all of the corn harvested in 2006?

A 0% to 15%
B 16% to 30%
C 31% to 45%
D 46% to 60%
E Not sure

Source: Office of Highway Policy Information – Federal Highway Administration, "Highway Statistics 2006." Section V, Table VM-1. Last updated April 9, 2008. http://www.fhwa.dot.gov/policy/ohim/hs06/xls/vm1.xls.

**8** According to *Oil & Gas Journal,* at 2007 production rates, about how many years will the global "known reserves" of oil last?

A 10 to 20 years
B 21 to 40 years
C 41 to 60 years
D 61 to 80 years
E Not sure

Source: Oil & Gas Journal, Worldwide Report, December 24, 2007.

**9** According to 2008 projections, what percentage of US energy use is currently supplied by renewable sources?

A 0% to less than 10%

B 11% to less than 20%

C 21% to less than 30%

D 31% or more

E Not sure

Source: EIA, *Annual Energy Outlook 2008,* Table A1.

**10** According to 2008 projections, what percentage of US energy use will be supplied by renewable sources by 2030?

A 0% to less than 10%

B 11% to less than 20%

C 21% to less than 30%

D 31% or more

E Not sure

Source: EIA, *Annual Energy Outlook 2008,* Table A1.

**11** In 2007, which of the following countries was the largest US supplier of imported oil?

A Saudi Arabia

B Canada

C Venezuela

D China

E Not sure

Source: EIA, *Petroleum Supply Monthly,* February 2008, Table 52 and 4. http://tonto.eia.doe.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbbl_a.htm;. May 2008.

**12** In 2007, what percent of oil the US consumed came from the Persian Gulf countries?

A Less than 15%

B 16% to 30%

C 31% to 45%

D 46% to 60%

E Not sure

Source: EIA, *Petroleum Supply Monthly,* February 2008, Table 52 and 4.

**13** In 2007, what percent of oil and natural gas the US consumed was produced in North America?

A Less than 15%

B 16% to 30%

C 31% to 45%

D 46% to 70%

E Not sure

Source: BP Statistical Review of World Energy 2007.

**14** In 2007, the US imported about what percent of its oil?

A 20%

B 40%

C 60%

D 80%

E Not sure

Source: EIA, *Petroleum Supply Monthly,* February 2008, Table 52 and 4.

## Answers Percentage of respondents in parentheses (X%)

**1**
A 25% (6%)
B 50% (17%)
C 75% (42%)
**D 100% (6%)**
E Not sure (29%)

**2**
**A 0% to less than 10% (16%)**
B 11% to less than 20% (27%)
C 21% to less than 30% (17%)
D 31% to less than 40% (9%)
E Not sure (30%)

**3**
**A 0 to 10 cents (13%)**
B 11 to 20 cents (17%)
C 21 to 30 cents (11%)
D 31 to 40 cents (27%)
E Not sure (32%)

**4**
A 0% to 15% (10%)
B 16% to 30% (16%)
**C 31% to 45% (15%)**
D 46% to 60% (13%)
E Not sure (45%)

**5**
**A 0% to 5% (6%)**
B 6% to 15% (12%)
C 16% to 25% (11%)
D More than 25% (35%)
E Not sure (37%)

**6**
A $1 billion to less than $25 billion (30%)
B $25 billion to less than $50 billion (14%)
C $50 billion to less than $75 billion (11%)
**D $75 to $100 billion (6%)**
E Not sure (38%)

**7**
**A 0% to 15% (30%)**
B 16% to 30% (17%)
C 31% to 45% (11%)
D 46% to 60% (8%)
E Not sure (33%)

**8**
A 10 to 20 years (16%)
B 21 to 40 years (20%)
**C 41 to 60 years (14%)**
D 61 to 80 years (14%)
E Not sure (36%)

**9**
**A 0% to less than 10% (37%)**
B 11% to less than 20% (22%)
C 21% to less than 30% (7%)
D 31% or more (2%)
E Not sure (32%)

**10**
**A 0% to less than 10% (10%)**
B 11% to less than 20% (23%)
C 21% to less than 30% (18%)
D 31% or more (13%)
E Not sure (36%)

**11**
A Saudi Arabia (59%)
**B Canada (11%)**
C Venezuela (12%)
D China (1%)
E Not sure (17%)

**12**
**A Less than 15% (7%)**
B 16% to 30% (15%)
C 31% to 45% (23%)
D 46% to 60% (32%)
E Not sure (24%)

**13**
A Less than 15% (27%)
B 16% to 30% (25%)
C 31% to 45% (14%)
**D 46% to 70% (8%)**
E Not sure (25%)

**14**
A 20% (4%)
B 40% (9%)
**C 60% (30%)**
D 80% (33%)
E Not sure (24%)

# Contacts

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