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COVER STORY

## Taming the Oil Beast

**A sensible, step-by-step energy policy is within our reach. Here's what to do**

American troops are massing outside of Iraq, preparing to strike against Saddam Hussein. And as war jitters rattle the world, there's one inevitable effect: a rise in the price of oil. Crude is up more than 33% over the past three months, climbing to \$35 per barrel in the U.S. Economic models predict that if the price stays high for three months, it will cut U.S. gross domestic product by \$50 billion for the quarter. If the war goes badly, with Saddam destroying oil fields in Iraq and elsewhere, or if disaster or unrest chokes off oil flowing from other countries, the whole world's economy is in for a major shock.

There's no escaping the consequences of our thirst for oil. It fuels a vast engine of commerce, carrying our goods around the nation, taking mom and dad to work, and carting the kids to soccer practice. As long as the U.S. imports more than 11 million bbl. a day--55% of our total consumption--anything from a strike in Venezuela to unrest in the Persian Gulf hits us hard in the pocketbook. "We are vulnerable to any event, anyplace, that affects the supply and demand of oil," says Robert E. Ebel, director of the energy program at the Center for Strategic & International Studies (CSIS). In a Feb. 6. speech, President Bush put it bluntly: "It jeopardizes our national security to be dependent on sources of energy from countries that don't care for America, what we stand for, what we love."

It wasn't supposed to be this way. Remember how Richard Nixon insisted in 1973 that the nation's future "will depend on maintaining and achieving self-sufficiency in energy"? Or how Jimmy Carter proclaimed in 1979 that "beginning this moment, this nation will never again use more foreign oil than we did in 1977--never." Even Ronald Reagan said in 1982 that "we will ensure that our people and our economy are never again held hostage by the whim of any country or cartel."

How empty those vows seem now, when one nation, Saudi Arabia, is sitting on the world's largest proved reserves--265 billion bbl., or 25% of the known supplies--and can send global prices soaring or falling simply by opening or closing the spigot. For now, the Saudis are our friends. They are boosting production to keep prices from spiking too high. But what if Saudi Arabia's internal politics change? "The entire world economy is built on a bet of how long the House of Saud can continue," says Philip E. Clapp, president of the National Environmental Trust.

The good news is that we can make a safer bet. And it doesn't entail a vain rush for energy independence or emancipation from Middle East oil. Based on interviews with dozens of economists, oil analysts, environmentalists, and other energy experts, *BusinessWeek* has crafted guidelines for a sensible and achievable energy policy. These measures build on the positive trends of the past. If implemented, they would reduce the world's vulnerability to wars in the Middle East, production snafus in Russia, turmoil around the Caspian Sea, and other potential disruptions. The plan has the added benefit of tackling global warming, which many scientists consider the greatest economic threat of this century.

The energy policy *BusinessWeek* advocates comes down to six essential steps (table). To deal with oil supplies, the U.S. should diversify purchases around the world and make better use of strategic petroleum reserves. It must also boost energy efficiency across the economy, including making dramatic improvements in the fuel efficiency of cars and trucks. How do we accomplish this? Nurture new technologies and alternative energy sources with research dollars and tax incentives, and consider higher taxes on energy to more accurately reflect the true costs of using fossil fuels. Projecting the precise effects of these policies is impossible, economists warn. But *BusinessWeek* estimates that, at a cost of \$120 billion to \$200 billion over 10 years--less than the cost to the economy of a major prolonged oil price rise--it should be possible to raise energy efficiency in the economy by up to 50% and reduce U.S. oil consumption by more than 3 million bbl. a day.

These steps draw on the lessons of history and help highlight what not to do. Meaningful progress has long been held up by myths and misconceptions--and by the scores of bad ideas pushed in the name of energy independence. Remember "synfuels" in the 1970s? Today's misguided notions include trying to turn perfectly good corn into ethanol and rushing to drill in the Arctic National Wildlife refuge. Indeed, looking over the past couple of decades, "my reaction is, thank God we didn't have an energy policy," says David G. Victor, director of Stanford University's Program on Energy & Sustainable Development. "The last one had quotas and rationing, causing lines at the gas pumps and incredible inefficiencies in the economy."

One false notion is that making the U.S. self-sufficient--or doing without Middle Eastern oil--would protect us from supply cutoffs and price spikes. In fact, oil has become a fungible world commodity. Even if we cut the umbilical cord with the Persian Gulf by buying more oil from Canada, Mexico, or Russia, or by producing more at home, other nations will simply switch over to buy the Middle Eastern oil we're shunning. The world oil price, and the potential for spikes in that price, remains the same. As long as there are no real oil monopolies, it doesn't matter so much where we get oil. What really matters is how much we use. Reducing oil use brings two huge benefits: Individual countries have less leverage over us, and, since oil costs are a smaller percentage of the economy, any price shocks that do occur have a less dramatic effect.

Yet reducing oil use has to be done judiciously. A drastic or abrupt drop in demand could even be counterproductive. Why? Because even a very small change in capacity or demand "can bring big swings in price," explains Rajeev Dhawan, director of the Economic Forecasting Center at Georgia State University's Robinson College of Business. For instance, the slowdown in Asia in the mid-1990s reduced demand only by about 1.5 million bbl. a day, but it caused oil prices to plunge to near \$10 a barrel. So today, if the U.S. succeeded in abruptly curbing demand for oil, prices would plummet. Higher-cost producers such as Russia and the U.S. would either have to sell oil at a big loss or stand on the sidelines. The effect would be to concentrate power--you guessed it--in the hands of Middle Eastern nations, the lowest-cost producers and holders of two-thirds of the known oil reserves. That's why flawed energy policies, such as trying to override market forces by rushing to expand supplies or mandating big fuel efficiency gains, could do harm.

The truth is, the post-1970s de facto policy of just letting the markets work hasn't been all bad. Painful oil shocks brought recessions. But they also touched off a remarkable increase in the energy efficiency of the U.S. economy. From the 1930s to the 1970s, America produced about \$750 worth of output per barrel of oil. That number doubled, to \$1,500, by the end of the 1980s. But the progress largely stopped in the past decade. Now we need policies to continue those fuel-efficiency gains, without the pain of sudden oil shocks.

The critical balancing act is reducing oil use without hurting the economy--or without allowing energy prices to fall so low that companies and individuals abandon all efforts to conserve. Successfully walking this tightrope can bring big gains. The next time we are hit with a spike in the price of oil, or even of natural gas or electricity, we may be able to avoid the billions in lost GDP that would otherwise result.

Here are the details.

## **1. DIVERSIFY OIL SUPPLIES**

The answer to the supply question is a delicate combination of technology, market forces, and diplomacy. New tools for drilling in waters nearly two miles deep, for instance, are opening up untapped sources in the Atlantic Basin, Canada, the Caribbean, Brazil, and the entire western coast of Africa.

That's helping to tip the balance of power among oil producers. In 1973, the Middle East produced nearly 38% of the world's oil. Now, that percentage has dropped below 30%. "Our policy has been to encourage oil companies to search for oil outside the U.S. but away from the Persian Gulf," explains CSIS's Ebel. "It's been rather successful."

There's plenty of oil to be tapped. While there are now about 1 trillion bbl. of proved reserves, estimates of potential reserves keep rising, from 2 trillion bbl. in the early 1980s to more than 3 trillion bbl. today.

The Caspian Sea area, for instance, promises proved reserves of 20 billion bbl. to 35 billion bbl.--but could have more than 200 billion bbl. Skeptics argue that this Caspian resource, surrounded as it is by Iran, Kazakhstan, Russia, Azerbaijan, and Georgia, is a bastion of instability and could easily become the backdrop for a future war linked to oil. But history shows that even bad guys are eager to sell their oil.

If energy policy were only about economics, we might argue that the world should take advantage of the ample supplies and relatively cheap prices and just keep consuming at a rapid rate. But there are additional costs of oil not included now in the price (step 6). And we have other important goals, such as doing more to protect the environment and reducing the political leverage of the Middle East. Says ExxonMobil Corp. ([XOM](#)) Chairman and CEO Lee R. Raymond: "The key to security will be found in diversity of supply." In other words, whimsical though it may seem, we should strive to maintain a Goldilocks price for oil: It should be high enough to keep companies and countries investing in oil fields but not so high that it sends the world into a recessionary tailspin.

## **2. USE STRATEGIC RESERVES**

The nation now has 599.3 million bbl. stored in underground salt caverns along the Texas and Louisiana Gulf Coast. That's enough to replace Iraq's oil production for at least six months. Yet this stockpile isn't being used correctly, and it never has been, many experts believe. In the 1991 Persian Gulf War, "oil prices were back to the normal level by the time the U.S. got around to releasing the strategic petroleum reserve," says energy economist W. David Montgomery of Charles River Associates Inc. We shouldn't make that mistake again. With oil prices already up, "we should release the stockpile immediately," he says.

Other experts argue that the reserve should be used as a regular hedging tool rather than being saved for extreme emergencies, which so far have never materialized. One idea: Allow companies to contract with the government to take out barrels of oil when they want to--as long as they agree to replace them later, along with a bit extra. That way, this big store of oil would smooth out glitches in supply and demand while also taking away some of OPEC's power to manipulate the market. There are similar reserves in

Europe, Japan, and South Korea--for a total of 4 billion bbl., including the U.S.--that should be used in this way as well. And by making the reserves bigger, we gain more leverage to dampen the shocks.

### **3. BOOST INDUSTRIAL EFFICIENCY**

After decades of concern over energy prices and the big improvement in the overall energy efficiency of America's economy, you would think that U.S. companies would be hard-pressed to find new gains. "In my experience, the facts are otherwise," says Judith Bayer, director of environmental government affairs at United Technologies Corp. ([UTX](#)) UT discovered savings of \$100,000 in just one facility by turning off computer monitors at night. "People talk about low-hanging fruit--picking up a dollar on the floor in savings here and there," Bayer says. "We picked up thousands off the ground. It's embarrassing that we didn't do it earlier."

Just last year, Salisbury (N.C.)-based Food Lion cut its energy consumption by 5% by using sensors to turn off lights in bathrooms and loading-dock areas and by installing better-insulating freezer doors. "The project saves millions a year," says Food Lion's energy-efficiency expert, Rick Heithold.

Even companies with strong efficiency track records are doing more. 3M Corp. ([MMM](#)) has cut use of energy per unit of output by 60% since the Arab oil embargo--but is still improving at about 4% a year. One recent innovation: adjustable-speed factory motors that don't require energy-sapping brakes. The efficiency gains "help us reduce our operating costs and our emissions--and the impact that sudden price increases have on our businesses," says 3M energy manager Steven Schultz.

Last year, the New York Power Authority put in a digitally controlled power electronics system--essentially, a large garage packed with semiconductor switches and computers--in a substation that handles electric power coming in from Canada and northern and western New York. Along with conventional improvements, this vastly improved the system's ability to manage power. The state now has the capacity to transfer 192 more megawatts of available electricity, or enough to power about 192,000 homes.

The nation's entire antiquated electricity grid should be refashioned into a smart, responsive, flexible, and digitally controlled network. That would reduce the amount of energy required to produce \$1 of GDP by 30% and save the country \$100 billion a year, estimates Kurt E. Yeager, CEO of the Electric Power Research Institute (EPRI). It would eliminate the need to build dozens of power plants, cut carbon emissions, and slash the cost of power disruptions, which run about \$120 billion a year. Such a network would also break down existing barriers to hooking up new sources of power to the grid, from solar roofs on thousands of houses to small, efficient heat and power generators at businesses. And soon, it will be possible to rack up big efficiency gains by switching to industrial and home lights made from light-emitting diodes (LEDs), which can use less than one-tenth the energy of incandescent bulbs.

These are exciting developments, but what do they have to do with oil? The answer lies in the idea of fungible energy: Eliminate the need for a power plant running on natural gas, and that fuel becomes available for everything from home heating to a source of hydrogen for fuel-cell vehicles. A subset of the nation's energy policy, therefore, should be doubling federal R&D dollars over the next five years to explore technologies that can boost energy efficiency, provide new sources of power, and, at the same time, address the problem of global warming.

### **4. RAISE CAR & TRUCK MPG**

To make a real dent in oil consumption, the U.S. must tackle transportation. The numbers here dwarf everything else, accounting for a full two-thirds of the 20 million bbl. of oil the U.S. uses each day. And after rising from 15 miles per gallon in 1975 to 25.9 mpg in 1988, the average fuel economy of our

vehicles has slipped to 24 mpg, dragged down by gas-guzzling SUVs and pickup trucks. Boost that to 40 mpg, and oil savings will top 2 million bbl. a day within 10 years.

Detroit says that's too high a goal. But the technology already exists to get there. In early January, General Motors Corp. ([GM](#)) rolled out "hybrid" SUVs that use a combination of gas-engine and electric motors to bump fuel economy by 15% to 50%. That same technology is already on the road. Honda Motor Co.'s ([HMC](#)) hybrid Civic and Toyota Motor Corp.'s ([TM](#)) Prius, both big enough to carry four adults and their cargo, each top 45 mpg in combined city and highway driving.

Adding batteries and an electric motor to vehicles is just one of many ways to increase gas mileage. Researchers can also improve the efficiency of combustion, squeezing more power out of a given amount of fuel. In an approach called variable valve timing, they can adjust the opening and closing of an engine's intake and exhaust valves. Such engines, made by Honda, BMW, and others, are more efficient without sacrificing power. Researchers are now working on digitally controlled valves whose timing can be adjusted even more precisely. The gains? Well over 10% in many cases.

More improvement comes from reducing the power sapped by transmissions. So-called continuously variable transmissions eliminate individual gears so that engines can spend more time running at their most efficient speed. And auto makers can build clean-burning diesel engines, which are 20% to 40% more efficient than their gas counterparts.

Estimates vary widely on what it would cost to raise gas mileage to 40 mpg or higher for the entire U.S. fleet of cars. Assuming a combination of technologies, we figure the tab could be \$1,000 to \$2,000 per car, or \$80 billion to \$160 billion over 10 years. That's less than fuel savings alone over the life of the new vehicles. Carmakers already have the technology. What we need now are policies, ranging from higher gasoline prices to tougher fuel-economy standards, that will give manufacturers and consumers incentives to make and buy these vehicles.

The ultimate gas-saving technology would be a switch to a completely different fuel, such as hydrogen. Toyota, Honda, and GM already are testing cars that use fuel cells to power electric motors. Such vehicles are quiet, create no air pollution, and emit none of the carbon dioxide linked with global warming. They also are expensive, and 10 to 20 years away from the mass market.

There's one other problem: Where would the hydrogen come from? The element must now be extracted from gas, water, or other substances at relatively high cost. But there are intriguing ideas for lowering the tab, such as genetically engineering bacteria to make the gas or devising more efficient ways to get it from coal. We need a strong research program to explore these ideas, plus incentives to test fuel-cell technology in power plants and vehicles. President Bush's \$1.2 billion hydrogen initiative is just a start.

## **5. NURTURE RENEWABLE ENERGY**

Tim Grieves shares a vision with a growing number of energy giants: harnessing the wind to generate cheap, clean power. The superintendent of schools in Spirit Lake, Iowa, Grieves has overseen the installation of two wind turbines that hum away in a field not far from his office. They generate enough juice to allow Spirit Lake to proudly call itself the only electrically self-sufficient school district in the nation. "We're not dependent on the Middle East," says Grieves. "This is just smarter."

Although less than 0.5% of our power now comes from wind, it's the cheapest and fastest-growing source of green energy. The American Wind Energy Assn. believes the U.S. could easily catch up with Northern Europe, where wind supplies up to 20% of power. In the U.S., that's the equivalent of 100,000 megawatts of capacity--or more than 100 large fossil-fueled plants. The Great Plains could become the

Middle East of wind.

Without tax credits and other incentives, wind power couldn't flourish. But oil and other fossil fuels also have big subsidies. So we should either eliminate those or provide reasonable incentives for alternatives such as wind, solar, and hydrogen. Even if the new sources still cost more than today's power, continued innovation, spurred by the incentives, will lower the price. Moreover, having some electricity produced by wind turbines and solar panels helps insulate us from spikes in natural-gas prices. Some states now require that a percentage of power come from renewable sources. We should consider this nationwide, with a target of perhaps 15%, up from the current 6%.

## 6. PHASE IN FUEL TAXES

The main reason fuel-efficiency gains in the U.S. slowed in the 1990s is that the cost of oil--and energy in general--was so low. "Yes, we are energy hogs, but we became energy hogs because the price is cheap," says Georgia State's Dhawan.

Even though it seems like the market is working in this regard, it really isn't. There's widespread agreement that the current price of oil doesn't reflect its true cost to the economy. "What Americans need to know is that the cost of gasoline is much more than \$1.50 a gallon," says Gal Luft of the Institute for the Analysis of Global Security. But the invisible hand could work its magic if we include costs of so-called externalities, such as pollution or the tab for fighting wars in the Middle East. That would raise the price, stimulating new energy-efficiency measures and the use of renewable fuels.

The tricky part is pricing these externalities. Some economists peg it at 5 cents to 10 cents a gallon of gas. Others see the true cost as double or triple the current price. Just by adding in the more than \$100 billion cost of having troops and fighting wars in the Persian Gulf, California State University economist Darwin C. Hall figures that oil should cost at least \$13 per barrel more. "That is an absolutely rock-bottom, lowball estimate," he says. More dollars come from adding in numbers for the costs of air pollution, oil spills, and global warming.

Imagine, though, that in an ideal world, we could settle on the size of the externalities--maybe \$10 per barrel. We obviously don't want to suddenly slap a \$10 tax on oil. Doing so would slice more than \$50 billion out of GDP and send the economy into a recession, forecasters calculate.

But phasing it in slowly, over 10 years, would give the economy time to adopt fuel-efficiency measures at the lowest cost. We should also consider additional taxes on gasoline, since a \$10-per-barrel price rise amounts to only about 25 cents per gallon of gas--not enough to make a big change in buying habits. This approach works even better if the revenue from those taxes is returned to the economy in a way that stimulates growth and productivity--by lowering payroll taxes, for example. Plus, there are big environmental benefits from reduced pollution.

There's a fierce debate about whether the economy gains or loses from such tax-shifting. Many economists agree, however, that the bad effects would be relatively small. "There may not be a free lunch, but there is almost certainly a lunch worth paying for," says Stanford economist Lawrence H. Goulder.

If energy taxes prove politically impossible, there's another way to achieve realistic fossil-fuel prices: through the back door of climate-change policy. Already, Europe is toying with carbon taxes to fight global warming and multinationals are experimenting with carbon-trading schemes to get a jump on any future restrictions. Even Republicans such as Senator John McCain (R-Ariz.) are pushing curbs on carbon dioxide. If the U.S. put its weight behind efforts to fight climate change, it could help push the

entire world toward lower emissions--and moderately higher oil prices. The best approach: a combination of carbon taxes and a cap-and-trade system, wherein companies can trade the right to emit. That way, the market helps find the greatest reductions at the lowest cost. Economists figure that a \$100-per-ton tax on carbon emissions, for example, would equal a rise of 30 cents in the cost of a gallon of gas.

Under the Bush Administration, this, too, may be difficult to enact. What's left are regulations and mandates. There may be just enough political will to boost CAFE (corporate average fuel efficiency) standards for vehicles--and to remove the loopholes that hold SUVs to a lower standard. But we need a smarter rule than the current one.

One good idea: give companies whose cars and trucks do better than the fuel-economy target credits that they could sell to an auto maker whose fleet isn't efficient enough. That way, "good" companies such as Honda are strongly motivated to keep improving technology. By being smarter about regulations and mandates, "we could do a lot better than what we are doing now," explains Stanford professor James L. Sweeney.

If we implement these policies, here's what we'll get: A reduction in projected levels of oil consumption equal to 3 million bbl. a day or more within 10 years. That means we could choose not to import from unfriendly countries (although they will happily sell their oil to others). In addition, oil-price shocks should be fewer and smaller, allowing us to avoid some of those \$50 billion (or more) hits to GDP. A more fuel-efficient economy will free up oil for countries such as China and India, notes Platts Global Director of Oil John Kingston. And the technologies we develop will help those economies become more efficient.

Economists will argue about the costs of these measures. But the benefits of greater energy efficiency and reduced vulnerability should, over the long run, outweigh the \$120 billion (or more) cost of getting there. Painful though they were, the oil shocks of the 1970s sent the U.S. down the road toward a more energy-efficient--and less vulnerable--economy. Our task now is to find a smoother path to continue that journey.

By John Carey

With Laura Cohn in Washington, Stanley Reed in London, David Welch in Detroit, and Adam Aston in New York

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