APRIL 9, 2012

The Trayvon Martin Case

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BOOKS

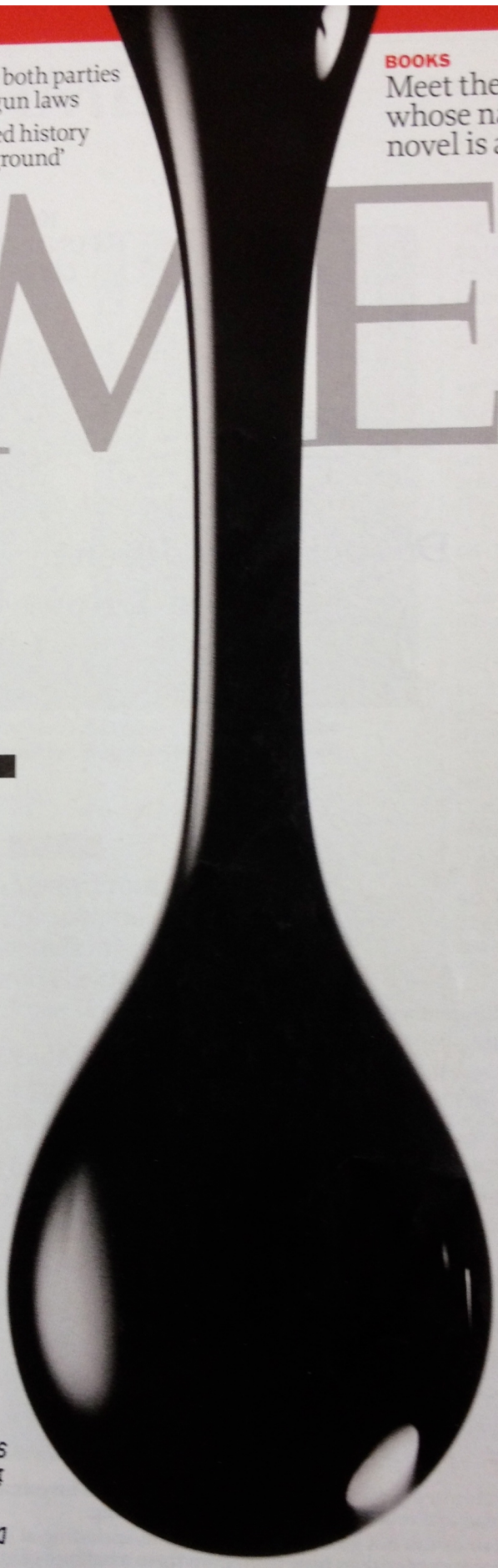
Meet the nice lady whose naughty novel is a huge hit

TIME

THE TRUTH ABOUT OIL

New breakthroughs are actually increasing U.S. supplies. But homegrown oil isn't going to lower prices at the pump

By Bryan Walsh



THE FUTURE OF OIL

EXTREME OIL—FROM THE DEEP ATLANTIC TO THE ARCTIC, FROM FRACKING IN THE U.S. TO SANDS IN CANADA—IS REPLACING DWINDLING SUPPLIES. BUT IT COMES AT A HEAVY ECONOMIC AND ENVIRONMENTAL COST

BY BRYAN WALSH

Crude oil's closeup. *The fuel that makes the global economy go is also a source of boom-bust cycles*

Photographs by Kenji Aoki for TIME

THE WATERS OF THE ATLANTIC Ocean 180 miles east of Rio de Janeiro are a cobalt blue that appears bottomless. But it only seems that way. Some 7,000 ft. beneath the choppy surface lies the silent seafloor, and below that is 5,000 ft. of salt rock, deposited when the continents of South America and Africa went their separate ways 160 million years ago.

Underneath it all is oil. By one count, the presalt reservoirs off the central coast of Brazil hold as much as 100 billion barrels of crude; that's another Kuwait. It's why former Brazilian President Luiz Inácio Lula da Silva called the presalt finds a "gift of God," and it's why the massive Cidade de Angra dos Reis floating oil-production facility—operated by Petrobras, Brazil's state-run oil giant—is anchored in the Atlantic, pumping 68,000 barrels of crude a day from one of the deepest wells in the world. The platform deck is so big you could play the Super Bowl on it, if not for the nest of interlocking pipes and valves that circulate oil, methane and steam throughout the ship. As I tour the deck in an orange safety jumper, a Petrobras engineer named Humberto Americano Romanus urges me to put a hand to one of the oil pipes. I can feel it pulse like an artery, the oil still warm from the deep heat of the earth. "It's 50 barrels a minute passing through here," he says over the din of the platform. "That's a lot of oil."

But not enough. Demand for oil is still rising—set to grow 800,000 barrels a day this year despite a still sluggish global economy. Meanwhile, production from places like Russia, Iran and Kuwait seems to be plateauing. The rigs that have gathered along the coast of Brazil are drilling deeper than ever before, through layers of salt rock, in some of the most complex and risky operations the industry has ever seen. "This reservoir is very heterogeneous, very challenging," says Jose Roberto Fagundes Netto, general manager of research and development for Petrobras. "But we know an accident is unacceptable." A well blowout like the one that caused the BP oil spill in 2010 would be even harder to contain in the deeper presalt waters.

This is the new world of extreme oil. Petrobras can afford to push the frontiers of offshore drilling because the price of Brent crude, a benchmark used by oil markets, is more than $120 a barrel, and last year it averaged $111, the highest average cost since the Drake well in Titusville, Pa., began spewing wealth in 1859, launching the petroleum era. From that time on, even despite J.D. Rockefeller's attempt to monopolize it, oil has experienced a 150-year price slide, interrupted by periodic spikes. The prices of all commodities fluctuate, but oil's irreplaceability—it's the fuel that makes us go—ensures that those spikes hurt. Last year oil soared in part because of geopolitics, especially the threat that Iran would block the Gulf of Hormuz and cut supplies. That uncertainty contributed to a risk premium of perhaps $20 or more a barrel. A promise by Saudi Arabia in late March to bring spare oil production onto the market has done little to calm prices.

In the U.S., consumers face an extreme-oil paradox. We need more oil to achieve energy independence—and we're producing it in places like the Bakken shale formation in North Dakota—even as we are using less of it. A combination of recession, conservation and improved auto efficiency has helped the U.S. shed demand impressively. But demand in China, India and other developing nations has replaced it. Result: plentiful but expensive oil that translates into painfully high gas prices. Last year the average cost for a gallon of unleaded was $3.51, the highest on record, up from $2.90 a year before. On March 26 the national average was $3.90. That takes a chunk out of household budgets and threatens an already underwhelming economic recovery.

In an election year, gasoline prices can ignite volatile political debate. That's one reason President Obama showed up in Cushing, Okla., the main terminal for oil produced in the West and Canada, to promote a new pipeline that will deliver crude from Cushing to refineries along the Gulf Coast. "We're drilling all over the place right now," he said, defending his energy policy. Obama does not want to slip up on oil.

Not that long ago, the big worry about fossil fuels was how rapidly supplies were waning. Now new and unconventional sources of oil are filling the gaps. Ultra-deepwater reserves like those found off Brazil offer the promise of billions of barrels. Technological breakthroughs have unlocked what's known as tight oil in the shale rock of North Dakota and Texas, reversing what seemed like a terminal decline in U.S. oil production. Alberta's vast oil sands have given Canada the world's second largest crude reserves, after Saudi Arabia's, and offer the U.S. a friendlier crude dealer. As global warming melts the Arctic sea ice, an unexpected dividend is access to tens of billions of barrels of oil in the waters of the far north. "We've seen a paradigm shift over the past decade," says Daniel Yergin, chairman of the research group IHS CERA. "You look at tight oil and oil sands and deepwater, and you see the results."

Those results could be the problem. While unconventional sources promise to keep the supply of oil flowing, it won't flow as easily as it did for most of the 20th century. The new supplies are for the most part more expensive than traditional oil from places like the Middle East, sometimes significantly so. They are often dirtier, with higher risks of accidents. The decline of major conventional oil fields and the rise in demand mean the spare production capacity that once cushioned prices could be gone, ushering in an era of volatile market swings. And burning all this leftover oil could lock the world into dangerous climate change. "I'm less concerned about the absolute disappearance of fossil fuels than about the environmental consequences of pursuing what's left," says Michael Klare, an energy expert and the author of *The Race for What's Left*. There will be oil, but it will be expensive, dirty and dangerous.

OIL ON THE EDGE. BREAKTHROUGHS—AND HIGH PRICES—HAVE OPENED UP NEW FRONTIERS FOR PETROLEUM

TIGHT OIL

BACKGROUND Light crude oil that is bound tightly in **formations of relatively permeable shale.** Wells are drilled vertically and then horizontally into the shale layer. Hydraulic fracturing is used to break the rock underground, and oil flows up the well

ENVIRONMENTAL IMPACT Tight oil requires fracking, which involves **injecting millions of gallons of water mixed with chemicals deep into the ground.** There can be a risk of contamination to groundwater, though there have been no proven cases yet. Burning of excess methane from tight-oil wells can cause air pollution

RESERVES **Up to 300 billion** barrels globally

COST OF PRODUCTION **$50** per barrel

ARCTIC OFFSHORE

BACKGROUND As climate change melts Arctic sea ice, **vast areas of water that were once blocked are now opening for offshore drilling and oil shipping.** Call it the unexpected climate-change dividend

ENVIRONMENTAL IMPACT Even though the sea ice is melting, Arctic waters remain incredibly treacherous, with icebergs and storms threatening drilling ships. **Any oil spill would be much harder to clean up in the freezing water than in the warmth of the Gulf,** and the remoteness of the Arctic means that it would be difficult to stage a massive spill response

RESERVES Estimated **90 billion** barrels

COST OF PRODUCTION Unclear but likely **above $100** a barrel

PRESALT DEEPWATER

BACKGROUND Reservoirs of oil found **below thick layers of salt beneath the ocean floor that were deposited more than 150 million years ago.** Requires offshore drilling through as much as 9,000 ft. of water, additional rock and more than 5,000 ft. of salt

ENVIRONMENTAL IMPACT The presalt reservoirs represent some of the most technologically challenging offshore drilling. The wells are deeper than the Gulf of Mexico well that led to the BP oil spill in 2010. **A blowout would be incredibly difficult to control**

RESERVES **50 billion to 100 billion** barrels

COST OF PRODUCTION **$45 to $65** a barrel

OIL SHALE

BACKGROUND Shale that contains **a solid bituminous material called kerogen.** The rock has to be mined and then heated to a high temperature to separate the oil from the shale

ENVIRONMENTAL IMPACT **The cost of mining and processing oil shale is still too high to make the process worthwhile.** Oil shale requires significant amounts of land and water and produces toxic tailings. Oil-shale crude also has a larger greenhouse-gas footprint than conventional oil

RESERVES **800 billion** barrels, though estimates remain uncertain

COST OF PRODUCTION **Over $100** a barrel

OIL SANDS

BACKGROUND Loose sand or sandstone that's saturated with **a dense and viscous form of petroleum called bitumen.** The oil sands are exploited either through vast open-pit mines or through in situ wells that process the bitumen underground

ENVIRONMENTAL IMPACT Open-pit oil-sands mines **leave large piles of toxic tailings that can pollute nearby water sources.** Gasoline from oil sands results in **10% to 15% more greenhouse-gas emissions per barrel than conventional oil** because of the additional energy needed to refine it

RESERVES **169 billion** recoverable barrels

COST OF PRODUCTION **$50 to $75** per barrel

The Bakken Boom

IF YOU WANT TO FIND OIL IN THE U.S., OR a job, for that matter, head to North Dakota. The Peace Garden State is experiencing a remarkable oil boom in the midst of high gas prices, with production rising from 98,000 barrels a day in 2005 to more than 510,000 barrels by the end of last year—greater than the entire national output of OPEC member Ecuador. Thanks to shale oil in the Bakken formation, the petroleum workforce has risen from 5,000 in 2005 to more than 30,000 people. North Dakota's unemployment rate is the nation's lowest, 3.2%, and so many would-be roughnecks have flooded the state that workers are housed in temporary "man camps" like Wild West mining settlements. And North Dakota isn't the only state benefiting from the boom. Texas is pumping oil at rates that haven't been seen since the days of *Dallas*. "You can

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Where oil dwells *Clockwise from left: Canadian oil sands; temporary camps around tight-oil wells in North Dakota; the Deepwater Horizon spill; Arctic drilling*

NEW, REMOTE SOURCES PROMISE TO HE SUPPLY OF OIL FLOWING, IT WON'T BE AS EASY VAS FOR MOST OF THE 20TH CENTURY

go straight to those fields and get a good-paying job," says Scott Tinker, the state geologist of Texas. "The demand is there."

So is the supply, thanks to innovations in hydraulic fracturing and horizontal drilling that have opened up reserves of oil previously considered unobtainable. Using a process similar to one employed in shale-gas exploration, which has flooded the U.S. with cheap natural gas, rigs drill down first and then horizontally into shale layers before fracturing the rock to release the tightly bound oil. "The same massive investment we saw with shale gas is now happening with tight oil," says Seth Kleinman, an analyst with Citigroup who recently wrote a research note on the potential of tight oil. "And it's going to play out in the same massive way."

Tight oil has helped revitalize the American drilling industry—there are now more rigs operating in the U.S. than in the rest of the world combined—and it could contribute significantly to global supplies, with the International Energy Agency (IEA) projecting that U.S. tight-oil production could reach 2.4 million barrels a day by 2020.

Thanks as well to greater efficiency, last year the U.S. imported just 45% of the liquid fuels it used, down from a peak of 60% in 2005, and just 1.8 million barrels a day came from the Persian Gulf. If domestic oil production continues to rise, the U.S. could actually approach a goal that has long seemed a political fantasy: energy independence.

But just how much more the U.S. will be able to produce is up for debate. While tight-oil reserves are plentiful, wells tend to dry up quickly, which means a lot of drilling is needed to keep the oil flowing. Even if the U.S. can't achieve energy independence, the oil-sand resources of Canada, already America's biggest oil supplier, could further reduce imports from the Middle East. High oil prices have boosted investment in the oil sands, and the Energy Information Administration (EIA), the analytical arm of the U.S. Energy Department, projects that oil-sand production will rise from 1.7 million barrels a day in 2009 to 4.8 million barrels in 2035—more than Iran's current output.

Brazil, with its deepwater resources, also looms as a friendlier and more secure dealer, something that has become all the more important in the wake of Arab Spring–related disruptions in oil-supplying countries like Libya. "We're seeing rapid and major changes in the geopolitics of oil," says Fatih Birol, chief economist at the IEA—most notably that the Americas, after years as oil customers, are poised to become sellers again.

So does that mean the return of $2-a-gal. gasoline? Nope. It's true that reducing oil imports is good for the U.S. economy. Americans spent $331.6 billion—the size of the entire agriculture industry—on oil imports last year, up 32% from 2010. Cutting imports keeps that money in the U.S., reducing a trade deficit that hit $560 billion last year. It's also, of course, good for international oil companies like Shell and Chevron, which are increasingly being squeezed out by massive state-owned companies. You may not like Exxon because of the pump price or its oversize profits, but how much love do you have for autocratic petrostates like Iran or Russia? Exxon's growth trickles down; the oil-and-gas industry created 9% of all new jobs last year, according to a report by the World Economic Forum, even as oil companies booked multibillion-dollar profits.

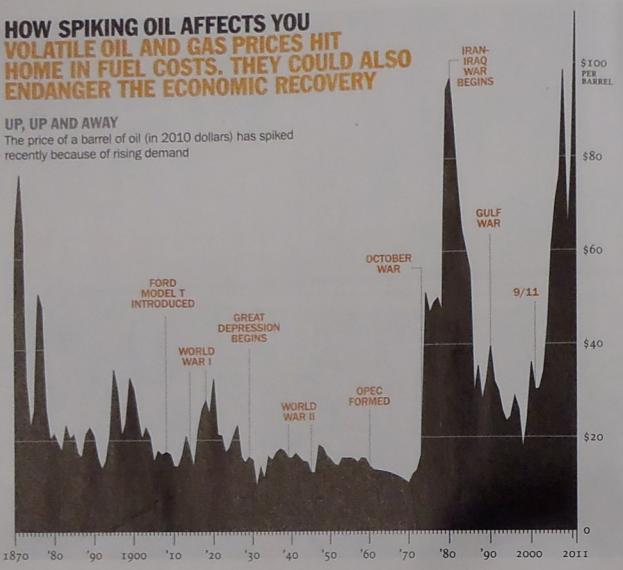
But contrary to what the drill-here, drill-now crowd says, oil companies could punch holes in every state and barely make a dent in gasoline prices. Even a more energy independent U.S. can't control prices, not with a thirsty China competing on the globalized oil market. "Energy security is fine, but it doesn't have that much meaning in a globalized economy," says Guy Caruso, a former head of the EIA. "More production adds fungibility to the world market, but we're still vulnerable to shocks in other countries." The oil the U.S. uses may be American, but that doesn't mean it will be cheap.

HOW SPIKING OIL AFFECTS YOU

VOLATILE OIL AND GAS PRICES HIT HOME IN FUEL COSTS. THEY COULD ALSO ENDANGER THE ECONOMIC RECOVERY

UP, UP AND AWAY

The price of a barrel of oil (in 2010 dollars) has spiked recently because of rising demand



Boom and Bust

THERE IS NO SUBSTITUTE FOR OIL, WHICH is one reason it is prone to big booms and deep busts, taking the global economy along with it. While we can generate electricity through coal or natural gas, nuclear or renewables—switching from source to source, according to price—oil remains by the far the predominant fuel for transportation.

When the global economy heats up, demand for oil rises, boosting the price and encouraging producers to pump more. Inevitably those high prices eat into economic growth and reduce demand just as suppliers are overproducing. Prices crash, and the cycle starts all over again. That's bad for producers, who can be left holding the bag when prices plummet, and it hurts consumers and industries uncertain about future energy prices. Low oil prices in the 1990s lulled U.S. auto companies into disastrous complacency; they had few efficient models available when oil turned expensive.

The advantage of OPEC and especially Saudi Arabia, with its vast, easily tapped oil fields, is that producers could work together to manage prices, increasing production when demand rose and throttling back when prices were about to fall. It's not exactly the invisible hand at work, but the promise is more predictability, which helps consumers, producers and governments plan with confidence.

Those days are gone. Today major oil producers are pumping flat out. The Russians and Saudis, for instance, need expensive oil to power their wobbly economies and placate their people. It suggests more booms and busts ahead, especially if the global economy slows again. "If OPEC can't play that price-stabilizing role anymore, then we can't banish oil's natural volatility," says Robert McNally, founder of the Rapidian Group and a former White House adviser on energy. "That means we could see prices ranging from $200 to $30."

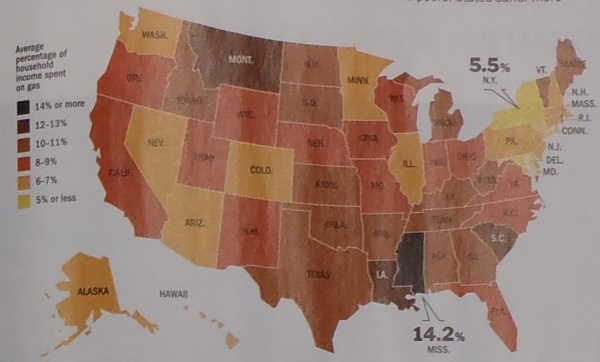
We've already seen something like it. When the economy crashed, so did oil, falling from $145 a barrel in mid-2008 to $30 by the end of that year. Now prices have spiked again, high enough that economists are warning that oil costs could endanger the economic recovery, which would send prices spinning down again.

The True Price of Oil

THEN THERE'S THE ENVIRONMENTAL COST. Oil has never exactly been clean, but the new sources coming online tend to be more polluting and more dangerous than conventional crude. Producing oil from the sands in northern Alberta can be destructive to the local environment, requiring massive open-pit mines that strip forests and take years to recover from. The tailings from those mines are toxic. While some of the newer production methods eschew the open-pit mines and instead process the sands underground or in situ, which is much cleaner, they still require additional energy to turn oil sands into usable crude. As a result, a barrel of oil-sand crude usually has a 10% to 15% larger carbon footprint than conventional crude over its lifetime, from the well to the wheels of a car. Given the massive size of the oil-sand reserve—nearly 200 billion recoverable barrels—that's potentially a lot of carbon. It's not surprising that environmentalists have loudly opposed the Keystone XL pipeline, which would send 800,000 barrels of oil-sand crude a day to the U.S. "There's enough carbon there to create a totally different planet," says James Hansen, a NASA climatologist and activist.

WHERE HIGH GAS PRICES HURT THE MOST

Household spending on fuel is tied to geography and poverty. Rural and poorer states suffer more



INCOME AND GAS

Poorer households are hit hardest by high gas prices

9.2% FAMILIES EARNING $20,000 A YEAR

6.4% FAMILIES EARNING $40,000 A YEAR

3.6% FAMILIES EARNING $80,000 A YEAR

SAVING FUEL

WHAT YOU CAN DO TO LESSEN THE PAIN AT THE PUMP

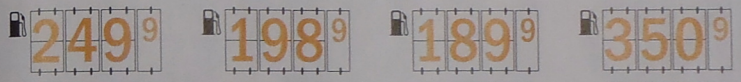
Drive 60
The optimal speed for fuel efficiency for most cars is about 60 m.p.h. At higher speeds, gas mileage tends to decrease rapidly

Inflate your tires
Bump up your gas mileage by up to 3.3% by keeping your tires properly inflated. Efficiency drops 0.3% for every lb.-per-sq.-in. drop in pressure

Watch your weight
Don't treat your car as a mobile storage locker. An extra 100 lb. can reduce gas mileage by as much as 2%

A RECORD PRICE FOR REGULAR

Even adjusted for inflation, the price of gasoline last year was the highest in history. Four historically high prices:



Sources: New America Foundation *Energy Trap* report; U.S. Energy Information Administration; U.S. Department of Energy

Tight-oil production isn't as polluting as extracting from oil sands, but it does make use of fracking, which has quickly become the most controversial technique in energy. Fracking fluids contain small amounts of toxic chemicals, and there have been allegations in Pennsylvania—where fracking has been used to produce shale natural gas—that it contaminates groundwater. The federal government is considering stricter regulations on the practice. "The federal rules have loopholes, and the state rules are too weak," says Amy Mall, a senior policy analyst for the Natural Resources Defense Council. "There are risks to groundwater, and there are risks to air." So far, there have been few complaints of water pollution from tight-oil wells in North Dakota and Texas, though both those states have notably oil-industry-friendly attitudes.

If tight-oil production spreads to more densely populated states like Ohio and California, both of which have shale plays, we could see those states gripped by the same controversies that have come with shale gas in Pennsylvania and New York. Sparse North Dakota is struggling to deal with the sudden influx of workers and equipment as well as the air pollution that results from tight-oil production. Even the oil industry is realizing that it needs to assuage public concerns. "We cannot ignore parts of the public that don't trust our industry and our ability to operate safely," Statoil CEO Helge Lund said at a recent energy conference. "This is a fundamental issue affecting us all."

The offshore drilling in Brazil's presalt reservoirs and in the Arctic waters being opened up by climate change is cleaner, but as seen with the Deepwater Horizon spill, if something goes wrong, it means catastrophe. If you think cleaning up an oil spill in the Gulf of Mexico was tough, try doing it in the remote, forbidding Arctic. But even greater than the immediate environmental danger posed by unconventional oil is the larger risk to the climate. One of the expected consolations of peak oil was the assumption that running out of conventional crude would finally force us to develop carbon-free alternatives such as wind and solar. Extreme oil means there will still be enough—more than 1 trillion barrels by one estimate—to keep cooking the planet if we decide to burn it all. Deborah Gordon, an expert at the Carnegie Endowment for International Peace, says that "21st century oil is not 20th century oil. New, unconventional oils are going to recarbonize global petroleum supplies."

So this is the future of oil: as costly as it is polluting. But if we can't ensure cheap oil, we can become more resilient when fuel becomes expensive. That requires continued improvements in energy efficiency. The U.S. has made some strides recently in that area (new vehicles get better mileage now than ever before), but it still lags the rest of the world. Obama's push to increase corporate average fuel-efficiency standards for vehicles to 55 m.p.g. by 2025 is vital. After all, doubling the mileage of your car is the equivalent of cutting the price of gasoline in half. Other kinds of energy alternatives must be developed to break the monopoly of crude, for environmental and economic reasons. Diversifying your energy supply is as wise as diversifying your portfolio. "We've got to develop every source of American energy, not just oil and gas but wind power and solar power, nuclear power and biofuels," Obama said in a recent speech. "That's the only solution to this challenge."

From Brazil to Bismarck, human ingenuity (and tens of billions of dollars in investment) has extended the age of oil, as well as our anxiety about it. There's no reason the same formula can't eventually bring it to an end—on our terms. ■