



November 16, 2010

# There Will Be Fuel

By **CLIFFORD KRAUSS**

HOUSTON

THREE summers ago, the world's supertankers were racing across the oceans as fast as they could to deliver [oil](#) to markets growing increasingly thirsty for energy. Americans were grumbling about paying as much as \$4 a gallon for gasoline, as the price of crude oil leapt to \$147 a barrel. Natural gas prices were vaulting too, sending home electricity bills soaring.

A book making the rounds at the time, "Twilight in the Desert," by Matthew R. Simmons, seemed to sum up the conventional wisdom: the age of cheap, plentiful oil and gas was over. "Sooner or later, the worldwide use of oil must peak," the book concluded, "because oil, like the other two fossil fuels, coal and [natural gas](#), is nonrenewable."

But no sooner did the demand-and-supply equation shift out of kilter than it swung back into something more palatable and familiar. Just as it seemed that the world was running on fumes, giant oil fields were discovered off the coasts of Brazil and Africa, and Canadian [oil sands](#) projects expanded so fast, they now provide North America with more oil than Saudi Arabia. In addition, the United States has increased domestic oil production for the first time in a generation.

Meanwhile, another wave of natural gas drilling has taken off in shale rock fields across the United States, and more shale gas drilling is just beginning in Europe and Asia. Add to that an increase in liquefied natural gas export terminals around the world that connected gas, which once had to be flared off, to the world market, and gas prices have plummeted.

Energy experts now predict decades of residential and commercial power at reasonable prices. Simply put, the world of energy has once again been turned upside down.

"Oil and gas will continue to be pillars for global energy supply for decades to come," said James Burkhard, a managing director of IHS CERA, an energy consulting firm. "The competitiveness of oil and gas and the scale at which they are produced mean that there are no readily available substitutes in either one year or 20 years."

Some unpleasant though predictable consequences are likely, of course, as the disaster in the

Gulf of Mexico this spring demonstrated. Some environmentalists say that gas from shale depends on drilling techniques and chemicals that may jeopardize groundwater supplies, and that a growing dependence on Canadian oil sands is more dangerous for the climate than most conventional oils because mining and processing of the sands require so much energy and a loss of forests.

And while moderately priced oil and gas bring economic relief, they also make renewable sources of energy like wind and solar relatively expensive and less attractive to investors unless governments impose a price on carbon emissions.

“When wind guys talk to each other,” said Michael Skelly, president of Clean Line Energy Partners, a developer of transmission lines for renewable energy, “they say, ‘Damn, what are we going to do about the price of natural gas?’ ”

Oil and gas executives say they provide a necessary energy bridge; that because both oil and gas have a fraction of the carbon-burning intensity of coal, it makes sense to use them until wind, solar, [geothermal](#) and the rest become commercially viable.

“We should celebrate the fact that we have enough oil and gas to carry us forward until a new energy technology can take their place,” said Robert N. Ryan Jr., [Chevron](#)’s vice president for global exploration.

Mr. Skelly and other renewable energy entrepreneurs counter that without a government policy fixing a price on carbon emissions through a tax or [cap and trade](#), the hydrocarbon bridge could go on and on without end.

So what happened to shift the energy world so drastically the last few years? Is the shift reversible once the economy picks up?

The [recession](#) throttled the world’s demand for energy, particularly in the United States and Europe, but that tells only part of the story. Periodic jolts, like the Arab oil embargoes in the 1960s and 1970s, are likely to recur in a world with unpredictable actors like Iran. Access to oil and gas may always be limited by geopolitics, especially in places like the Middle East. Just in the last few days, the decline in the dollar spurred a new spike in oil prices, along with those of other commodities.

Yet, the outlook, based on long-term trends barely visible five years ago, now appears to promise large supplies of oil and gas from multiple new sources for decades into the future.

The same high prices that inspired dire fear in the first place helped to resolve them. High oil and gas prices produced a wave of investment and drilling, and technological innovation has

unlocked oceans of new resources. Oil and gas from ocean bottoms, the Arctic and shale rock fields are quickly replacing tired fields in places like Mexico, Alaska and the North Sea.

Much depends, of course, on government policies in the coming decades. The International Energy Agency, the Paris-based organization that advises industrialized countries, projected this month that global energy demand would increase by an astounding 36 percent between 2008 and 2035, assuming the broad policy commitments already announced by governments were exercised. Oil demand is projected to grow to 99 million barrels a day in 2035, from 84 million barrels a day in 2009.

Even in an alternative world where there is a concerted, coordinated effort to reduce future carbon emissions sharply, the International Energy Agency projected oil demand would peak at 88 million barrels a day around 2020, then decline to 81 million barrels a day in 2035 — just fractionally less than today's consumption. Natural gas use, meanwhile, would increase by 15 percent from current levels by 2035. In contrast, global coal use would dip a bit, while nuclear power and renewable forms of energy would grow considerably.

No matter what finally plays out, energy experts expect there will be plenty, perhaps even an abundance, of oil and gas. IHS CERA, which monitors oil and gas fields around the world, projects that productive capacity for liquid fuels could rise to 112 million barrels a day in 2030 (including 2.75 million barrels in [biofuels](#)), from 92.6 million barrels a day this year.

“The estimates for how much oil there is in the world continue to increase,” said William M. Colton, [Exxon Mobil](#)'s vice president for corporate strategic planning. “There's enough oil to supply the world's needs as far as anyone can see.”

More promising still is that the growing oil production comes from a variety of sources — making the world less vulnerable to a price war with the Organization of the Petroleum Exporting Countries or an outbreak of violence in a major producing country like Nigeria. As IHS CERA and other oil analysts see it, new oil is going to come from both conventional and unconventional sources — from anticipated expansions of fields in Iraq and Saudi Arabia and from a continued expansion of deepwater drilling off Africa and Brazil, in the Gulf of Mexico and across the Arctic, where hopes are high in the oil world, although little exploration has yet been done.

The vast oil sands fields in western [Canada](#), deemed uneconomical by many oil companies as few as 15 years ago, are now as important to global supply growth as the continuing expansions of fields in Saudi Arabia, the current No. 1 producer.

“We've got a wealth of opportunities to address around the world,” said Mr. Ryan, Chevron's

vice president. “We have quite a few deepwater settings all over the world, some of them very new, like the Black Sea. There are Arctic settings. We have efforts under way re-exploring Nigeria, Angola, Australia. The easy stuff has been found, that’s true, but in the end, we still have many basins in the world to explore or to re-explore.”

The biggest wild card, and a potential game-changer, is Iraq, which now produces a modest 2.5 million barrels a day. With [Saddam Hussein](#) out of the picture, international oil companies have rushed there. If all the projects they have agreed to develop pan out, and if Iraq can contain its political turbulence enough to pump, production could mushroom to 12 million barrels a day by the end of the decade — well above what Saudi Arabia produces today.

But even if Iraq’s production does not rise to this level, IHS CERA predicts “it will eventually join Saudi Arabia and Russia as one of the largest global producers, with increasing influence on [OPEC](#) and world oil markets.”

New supplies are only part of the equation. Technological innovation has made the use of oil and gas more efficient, too, helping to keep rising demand for energy at least partly in check. Cars, buildings and appliances are becoming less wasteful, and biofuels are increasingly supplementing oil products and extending their reach.

Even in China, India and the rest of the developing world, where the demands of a growing middle class probably represent the world’s biggest energy challenge, there are positive signs.

China, for instance, is making a big push to reduce energy subsidies for exports like steel and aluminum. Countries around the developing world are severely cutting gasoline subsidies, forcing consumers of new cars to contain their exuberance. Cars that run on compressed natural gas are replacing more carbon-intensive gasoline-driven vehicles across Latin America and Asia. Natural gas sales should soar in Europe and the United States if the [electric car](#) takes off in the next couple of decades, as utilities are expected to phase out coal-burning plants in favor of gas.

Not surprisingly, the back-to-the-future world of oil and gas begins in the United States, still the biggest economy and the driver of energy markets since World War II.

For the last two decades, the United States has produced less oil each year and been increasingly dependent on imports than the year before. As recently as a decade ago, most experts predicted that the country had only 25 years of gas reserves, and that it would need to import at least half of its needs in the future.

Today the country has reversed both trends, chiefly because of new drilling techniques that have opened world-class oil and gas resources. In 2009, domestic production began to reverse

its annual decline for the first time since 1991. The Energy Department expects domestic supplies to grow through 2035, absent a significant decline in oil prices.

Largely shut out of the Middle East, international companies including [BP](#) and Shell began seriously looking at the deep waters of the Gulf of Mexico in the 1990s. Exploration and drilling below 10,000 feet of water and through miles of hard rock, thick salt and tightly packed sands required the development of supercomputers and three-dimensional imaging and equipment that could withstand the heat and pressures common at such depths, as well as submarine robots to make repairs.

After only a decade of serious deepwater drilling, the gulf is undergoing a drilling renaissance. Despite a decline in shallow-water production, gulf oil production has increased by more than 12 percent since 2000, to 1.7 million barrels a day, comparable to Libya's output. Those increases are bound to slow over the next year or two as the federal government recalibrates regulations after the BP accident, but oil executives say they are committed to continue the production boom.

“We'll see the industry ramp back up, go back to work and maybe in a year or year and a half, we'll be back in a normal pace,” Marvin E. Odum, president of [Shell Oil](#), a major Gulf producer, predicted.

Similar advances have made drilling gas and oil from shale possible on a large scale for the first time. Advances in so-called horizontal drilling allow well drillers to steer and carve through hard shale to expose more and hard-to-reach rock, and it also makes possible drilling under city neighborhoods, as in Fort Worth, which happens to sit atop a large gas field.

Horizontal drilling and advanced fracturing techniques across wide swaths of Pennsylvania, Texas, Oklahoma, Louisiana and Arkansas over the last few years have produced so much natural gas that experts now say the United States has reserves for more than 100 years. That means the country is not only going to have plenty of gas, but also is likely to become an exporter over the next decade.

The American gas glut has set off a glut around the world, because the building spree in recent years of Middle Eastern and Asian liquefied natural gas terminals was originally intended to send much of their gas to the United States.

“The technology producing these resources has absolutely made the difference,” Mr. Odum said. “It's the same with the Arctic, with the shale oil, all over the world. Technology is the key.”

Shale drilling is also beginning to produce significant amounts of oil in the United States. The

Bakken shale field centered in North Dakota has become the fastest-growing major oil field in the United States, with production rocketing to about 350,000 barrels a day, from 100,000 barrels a day a decade ago. In a recent report, the consultancy firm PFC Energy projected production would climb to 450,000 barrels a day by 2013.

Add up the shale, the deepwater drilling and Canadian oil sands, says Edward L. Morse, the head at commodity research at [Credit Suisse](#), and what you get is less dependency on OPEC and hostile countries like Venezuela. Synthetic oil made from Canadian oil sands has become the largest single source of imported oil this year, far more than from any OPEC country.

Mr. Morse said the demand side of the equation also helped. He noted that American demand for gasoline appeared to have peaked in 2007 and could decline by 15 to 20 percent by 2020 because of increasingly efficient cars and a federal mandate requiring that renewable fuels, like ethanol, blended into transportation fuels must increase to 36 billion gallons in 2022, from nine billion gallons in 2008.

“When you add it up,” Mr. Morse noted, “you get something that very closely approximates energy independence.”