crude

THE STORY OF OIL

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the preceding decade. Bush's plan was, therefore, essentially no different from business-as-usual.[70] Environmentalists saw through the ruse but for those not following the arcane twists and turns of the climate change talks, it may have sounded soothingly bold.[71]

In fact, in some cases, Bush's plan was even worse than the status quo.

Inspired by Bush's challenge, the electric power companies, who together emitted 40 percent of the United States' carbon dioxide, pledged to reduce their greenhouse gas intensity by up to 5 percent—2 percentage points less than what the Department of Energy had predicted even without the benefit of the Bush plan.[72] While the signatories of the Kyoto Protocol would be cutting their emissions levels to 3 to 5 percent below 1990 levels by 2012, the Bush scheme would allow U.S. emissions to rise by up to 28 percent over the same period.[73]

CHAPTER NINE

Running on Empty

By the early 2000s, it seemed clear that escalating oil consumption would surpass available oil supplies before long. The ever-growing American SUVs, the cars taking over Beijing's bicycle paths and India's decrepit, cow-clogged roads, the growing hordes of global elites eager to mimic the high style of the petrolife were projected to send oil and gas demand marching forward by around 2 percent every year, zooming to nearly 120 million barrels a day by 2025, over 50 percent more than the amount the world consumed in 2001 and nearly six times the amount the world consumed in 1960.[1]

Providing enough oil to meet growing world demand, the president of London's Institute of Petroleum, Dr. Pierre Jungels, told industry officials in 2003, would require $1 trillion in capital investment, plus "the work of some 350,000 engineers and scientists and advances in technology at least as great as those of the last 30 years." It seemed to Jungels practically insurmountable. "The industry faces huge challenges to find and produce the hydrocarbons required over a twenty-year horizon," he said. "Even if technical, financial, human resource and political issues can be resolved, there is no escaping the fact that the industry needs to . . . manage the transition . . . when the hydrocarbon inventory is depleting fast whilst demand keeps on growing."[2]

Faced with such doom-and-gloom scenarios, many looked to oil giant Saudi Arabia for relief, believing that Saudi's mighty wells would easily pour forth extra crude from its bountiful reserves. All one had to do was to twist the taps. But signs appeared indicating that even Saudi Arabia's much vaunted "surplus capacity" could be more mythical than real. Saudi Arabia's Ghawar oilfield, providing

60 percent of the country's total oil output had started to spurt increasing volumes of water. By 2003, Ghawar was producing 1 million barrels of water along with its nearly 4.5 million barrels of oil, analysts noted.[3] According to Department of Energy insiders, all of Saudi Arabia's oilfields were pumping large amounts of water.[4] Small amounts of water generally infuse the oil that wells unearth, but the wells are dug so that they can siphon the oil beneath the buoyant water floating on top. When large amounts of water come flowing out of an oil well, it generally means that the oil is nearly gone.

The modest discoveries of new oil would be of little help. The top five oil companies, ExxonMobil, BP, Shell, TotalFinaElf and ChevronTexaco, had spent $110 billion looking for new oil between 1999 and 2001, but for all that money only pumped out 500,000 more barrels of oil or oil equivalent every day. "These are extraordinary sums merely to keep production flat," energy investment banker Matt Simmons wrote.[5] New oil finds in places like Angola and Gabon added just under 4 billion barrels to the planet's known reserves of oil. Although gargantuan for the lucky oil companies that happened upon them, the world's oil-hungry machines could burn through that much in less than three months. Industry analysts estimated that production from oil and gas fields would continue to decline at an average rate of 3 to 5 percent every year.[6]

The dreaded peak in the world's production of oil, that point when about half of the reserves are gone, approaches.

Former Shell geologist Kenneth Deffeyes retired from teaching at Princeton in 1998 with plans to buy a small oil well. He figured that world oil production would be peaking in a few years, so the investment would be well worthwhile. "But nobody believed it! People who were well informed, had money to invest, they were spectacularly uninterested," he recalls. Shocked at their complacency, Deffeyes spent six months applying Hubbert's calculations to world

oil production. When he reached his result, he knew better than to confine the news to industry insiders. In 2001, he released *Hubbert's Peak: The Impending World Oil Shortage*, defiantly stating that the world's oil production would peak within a few years. "An unprecedented crisis is just over the horizon," he warned. "There will be chaos in the oil industry, in governments, and in national economies. Even if governments and industries were to recognize the problem, it is too late to reverse the trend. Oil production is going to shrink."[7]

Never mind the oil spills, the various asthma epidemics, the perils of blasting carbon into the air—here was a threat that could actually arrest the march of Big Oil.

As demand outstrips declining supplies, the oil market could enter a sustained period of volatile oil prices. Cautious consumers, especially in industries, would reasonably be expected to start shopping around for energy sources with prices around which they could shape their budgets. Prudent ones would logically shun oil-burning machines, opting instead for more expensive electric ones, for instance, so as to avoid enslavement to the unpredictable costs of oil. Oil companies themselves would likely be less willing to invest in expensive projects, lacking any ability to predict what their future, oil-price-dependent income might be. Already, by 2003, energy consultants had noticed some of the biggest companies' cold feet when it came to pricey new investments. The fear alone of wildly fluctuating prices froze them stock-still.[8]

At the same time, investments in new oil, found in ever deeper, ever more hostile climes, are increasingly risky in and of themselves. New oil today requires billions of dollars and years of planning, making each investment increasingly precious, and even garden-variety sabotage ever more deadly. A mere two-year delay fighting with environmentalists, fending off lawsuits, or negotiating with upset locals could send a project tumbling into the red.[9]

In 1999, Goldman Sachs summed up the situation. The oil business, they said, is a "dying industry."[10]

The realities of depletion are dawning on the world's biggest oil companies; one by one the major companies have readjusted their outlooks for the future, dumping their "growth" strategies in favor of "capital discipline" and the "delivery of superior financial returns," according to analysts from *International Petroleum Finance*.[11] As Susan Cunningham, a senior vice president of an independent oil company explained, "the reservoirs are getting smaller and smaller and it is more difficult to find that smaller reservoir."[12] In 2003, BP, Shell, and ChevronTexaco announced they planned to abandon their annual ritual of forecasting the next year's oil production. They had missed growth targets for 2002 and apparently decided that the future was too uncertain to even attempt to predict.

"Their actions speak a lot more than their words," comments petroleum geologist Colin Campbell, who has written extensively about world oil production. "If they had this great faith in growing production for years to come, why do they not invest in new refineries? There are very few new refineries being built. Why do they merge? They merge because there is not room for them all. It's a contracting business."[13] The industry hasn't built a new refinery in its biggest market, the United States, since 1976. Even when oil prices surge, companies aren't pushing up their drilling activity; there just isn't enough left to find so they aren't bothering, as Cunningham admitted in an industry trade journal:

> The price is high and rig costs are pretty reasonable for the price so we should be drilling. It comes down to the shareholder because what is missing is the volume we are getting from the drill bit. . . . You can't just keep on drilling for smaller things at higher costs. You are getting less per well because you have less pressure to support it. You do have to replace your reserves, but you can't replace them at any cost and some companies have been doing that.[14]

Cunningham's candor is rare, even rarer outside the clubby industry world in which she moved. She was careful, nonetheless, not to use the "D" word, as "depletion" is known in the industry. To do so would be to break one of the industry's cardinal rules.

Of course, the oil industry is under no obligation to sate global desires for crude. As long as consumers don't cotton on to the fact that the oil supply they depend upon is in permanent decline and prudently decide to wean themselves of it, the crossover between supply and demand could trigger many lucrative years of high oil prices. After all, just because the initial fountain of blood from the oily beast had been spent didn't mean the blood wouldn't keep dripping lazily for a good long while. Some within the industry perhaps genuinely believe the economists, who argue that higher prices will always lead to more resources and so resource depletion can never be a genuine problem. Others, however, must have realized that their future livelihoods depend on the obscurity of the coming peak. If the industry wanted to stay in business for another century and beyond, it would do well not to let on that the world's favorite fuel is anything less than perpetually abundant.

It isn't difficult for companies to keep up the appearance of abundant oil. After all, nobody really knows how much oil is down in the rocky reservoirs until every last drop has been drained and the wells run dry. Whatever anyone says about the size of a reservoir of oil before that point is essentially just a guess.

The size of oil reserves is generally calculated by reservoir engineers employed by oil companies. It is an exercise equal parts hope and manipulation. After pinpointing a reserve, companies drill several "appraisal wells," chasms opened up into the reserve to judge how rich and thick those oily rocks really are. Steel arms dive into the deep holes to pluck bits of rock for the geologists to mull over in the lab. Yet even with the most sensitive statistical tests and the most advanced petrochemistry, what the oily samples on the lab table reveal about the formations under the ground is limited. "The geology, which controls the amount of oil in the reservoir, is liable to change between our information points, our wells," admitted Robert Stoneley, a Royal School of Mines petroleum geologist. "Until we have actually produced all of the oil that we ever shall, we are involved with a greater or less degree of uncertainty."[15]

Essentially, the size of the reservoir is estimated using a formula that multiplies several different factors together, each of which is itself an educated guess. Different estimates for the variables render "wildly different answers" on the size of the reserve, according to Stoneley. To make statistical sense of it all, each factor used in estimating a reserve can be given a range of figures and the formula crunched through in all of the various combinations fifty to one hundred times. The result is a range of possible answers for the size of the reserve, within which, it is hoped the truthful one hides. This range, again, can be evaluated statistically, rendering a series of guesses, each with its own statistical probability of being true (their "P" factor) attached like a price tag. The reservoir engineer then chooses one, gracing it with a banner emblazoned "proven." But which one?

Deffeyes put it this way:

> Shell was interviewing three potential employees: a geologist, a geophysicist, and a petroleum reservoir-estimation engineer. The test question asked was "What is two times two?" The geologist mumbles for a while and announces that it is probably more than three, maybe less than five. The geophysicist punches it into his calculator and announces 3.999. When the reservoir engineer is asked, he jumps up, locks the door, closes the shades, unplugs the phone, and whispers, "What do you want it to be?"[16]

To complicate matters further, industry's estimates on the size of their oil assets change over time. For financial and regulatory reasons, oil companies sometimes prefer to low-ball their public estimate of reserves when they first find a new oil deposit.[17] Then, the numbers are slowly refined as it becomes clearer just how much oil is really buried underfoot. The proclaimed size of the reserve depends, also, on how much money industry is willing to spend on extracting the oil.

And so, every year, the industry releases new, ever-larger estimates of their reserves, providing an illusion of growth. The bigger numbers do not result from discoveries of new oil, but from the fact that oilfields already found actually hold a bit more oil than the company had initially reported. Between 1946 and 1989, for example, the estimated number of barrels of oil in U.S. oilfields kept climbing, but it wasn't because more oil was being found. Up to 80 percent of all of those added barrels came from improved estimates of old oilfields.[18]

"Companies and countries are often deliberately vague about the likelihood of the reserves they report," notes Campbell, "preferring instead to publicize whichever figure . . . best suits them." There is no standard, no audit by independent outsiders to temper whatever political or financial incentives companies may have in presenting a more or less optimistic spin on their numbers.

In the United States, the Securities and Exchange Commission requires that companies bestow their estimates with the moniker "proven" only when such numbers have at least a 90 percent chance of being true. But conservative estimates are not so common elsewhere. The former Soviet Union, for example, for years promoted "wildly

optimistic figures" (those with less than a 20 percent chance of being true) as "proven" estimates of reserves, Campbell says.

When, in the late 1980s six OPEC countries reported that their oil reserves, even while being drained, had abruptly ballooned by 287 billion barrels, it was only the worst example of statistics-bending. In 1997, fifty-nine countries claimed that their oil reserves, despite being continually siphoned off, hadn't changed in size one iota from the previous year. They were sucking as fast as they could but the glass stayed full.[19] Iraq's reported reserves magically remained an even 100 billion barrels for over a decade. Even Shell joined the game, announcing in early 2004 that they had overestimated the size of their oil and gas reserves by a shocking 3.9 billion barrels.[20] As Deffeyes puts it, "'reserves' exist in the eye of the beholder."[21]

Nevertheless, these flawed reserves estimates are collected by trade journals such as *Oil & Gas Journal,* which publish them uncritically, passing them down to government agencies such as the Department of Energy and the International Energy Agency for their widely disseminated reports on the state of the oil market.[22] With the imprimatur of government and international agencies behind them, the unadulterated oil-industry numbers float down into journals, newspapers, and books and the soft politicized estimates harden into brittle facts.

By this time, the probability figures, the "P" numbers, are long gone, even though it wouldn't be particularly difficult to standardize their use. As Stoneley points out, even weather forecasters specify whether there's a 10 or 50 percent chance of rain in the afternoon.

It isn't just the corporate reservoir engineers and OPEC oil ministers who play the reserves number game. Even the esteemed U.S. Geological Survey (USGS) participates.

In 2000, the USGS released a 32,000-page report on the world's petroleum assets,[23] methodically assessing the "undiscovered potential" for the world's petroleum basins. The intrepid USGS scientists assessed each basin for the range of volumes of "undiscovered" oil it might hold. The usual way to affix a number to this intrinsically unknowable amount is to consider how probable the formation of an oil trap was in a given area. Several conditions had to be met and each can be assigned a likelihood, all of which can be multiplied together to give an overall probability of a certain amount of oil patiently waiting to be discovered. "This figure is extremely imprecise and may be not much more than a guess,"[24] Stoneley points out, but the USGS pushed forward, ranking its results in terms of probability. The average of the not-very-probable amounts (those with a 5 percent chance of being accurate) and the quite-probable amounts (those with a 95 percent chance of being accurate) render a mean value, the average probability of finding a certain amount of oil. These amounts of undiscovered oil, each having an average probability of existing, were then added together.

The USGS's presentation was authoritative but the numbers were at least as speculative as those of Shell's managers and Iraqi oil ministers. In the case of Greenland, for instance, the government geologists had determined there was a 95 percent chance of finding just a single barrel of oil. Given the lack of industry interest in the region, such a tepid assessment could be considered a fair reflection of conventional wisdom. But, ever-optimistic, the USGS noted that there was, indeed, in the farthest reaches of probability, a 5 percent chance of finding vast amounts of oil. The precise amount they predicted could be discovered was no less than 111.8 billion barrels, just 2 million barrels short of Iraq's 112 billion barrels of proven reserves.[25]

"You might as well say that there is a 5 percent chance that I am a frog," Campbell retorted.[26] Yet the USGS used their fanciful 5 percent figure, averaged with the 95 percent figure, to suggest that 47.1 billion barrels of oil could be found in Greenland. "Can we really give much credence to the suggestion that this remote place, that has so far failed to attract the interest of the industry, holds almost

as much, or more, than the North Sea, the largest new province to be found since the Second World War?" Campbell asked. "Could this be pseudo-science at its best?"[27]

Worse, Greenland's chimerical 47 billion barrels were summed together with other such whimsical figures to render a startling conclusion. The USGS had pinpointed 649 billion barrels of undiscovered oil,[28] 20 percent more than their previous estimate for non-U.S. reserves. USGS representatives were ordered off to international conferences to spread the word.[29] It made an impression. Never mind the skyrocketing rate of consumption of oil and the increasingly fruitless search for new oilfields. The world was awash in oil. Reviewing the USGS report, *Scientific American* concluded: "There's gobs of oil out there."[30]

When government agencies, such as the Energy Information Administration (EIA), the Department of Energy's number-crunching department, are tasked with making public predictions of future oil demand, they use the USGS report, along with the flawed numbers from the *Oil & Gas Journal* to blithely report that there will be plenty of oil to go around. In May 2003, for instance, the EIA explained that skyrocketing demand for oil would be easily met over the next decades. By 2025, the EIA reported, the oil industry would provide the necessary 118 million barrels a day—a big leap from 2001's oil flow of just 77 million barrels a day—as oil explorers were expected, by then, to find a whopping 730 billion barrels of new oil. The oil industry would find another 76 billion barrels in the United States alone, the EIA opined. In other words, the EIA was betting that an oil reserve the size of Venezuela's was hiding somewhere in the most explored country in the world. Ample graphs and charts, using the numbers from the USGS assessment and the *Oil & Gas Journal* estimates, provided a commanding illustration of just how.[31]

When confronted with such absurdities, Campbell professes

exasperation. "Really it is a huge job to track all of these moves and counter moves which would test the skills of Sherlock Holmes," he says.[32] "Probably the most rewarding tactic," Deffeyes suggested, "would be to locate the EIA's drug dealers. They seem to be selling some really potent stuff."[33]

The notion of abundant oil anchored many U.S. industries' medium-term financial health, it soothed the anxious public, and it masked the governments' ugly grabs for the increasingly limited resource. These were obviously policy objectives dear to the heart of any government. Yet without lead time to prepare, it would be the blissfully ignorant, oil-sated public that would suffer when their plush carpet of oil was rudely pulled out from underneath them.

That is not to say that more reliable information isn't available. Campbell had seen the real numbers. He spent three decades exploring for oil in Trinidad, Colombia, Papua, Ecuador, and Norway for major oil companies including Texaco, BP, and Amoco, and over a decade consulting for governments and major oil companies.

"The information could be provided without particular technical challenge," Campbell says.[34] Instead, inside information on the true size of the reserves is classified, proprietary data. "The 'technical' values . . . are confidential for most countries," noted oil-industry analyst Jean Laherrere, and there is a "huge discrepancy" between those internal numbers and the "'political' values of the reserves" that *Oil & Gas Journal* and other official outlets hawk.[35]

Private firms buy the "technical," more realistic data for their corporate and governmental clients. Petroconsultants, a private firm in Geneva that later merged into IHS Energy Group, is widely believed to own one of the largest, most accurate, private databases on the size of the world's oil reserves. They don't publish their figures in journals or databases, of course. Access comes at a prohibitive price, sold to intelligence agencies and industry insiders.[36]

Using Petroconsultants' and other technical data, industry insiders such as Campbell, Deffeyes, and other petroleum geologists have analyzed the rate at which we are eating into the global oil supply. According to their analyses, the oil industry will produce less than 80 million barrels a day in 2010, falling to 70 million barrels a day by 2020.[37] Deffeyes predicted the peak in world oil production had already passed, in the year 2000. Only time would tell whether he was correct. Campbell predicted the peak would come in 2010. Either way, they say, it is coming—not in twenty years or thirty years or more—but within the next decade.

It would be reasonable to expect that along with higher-ups at oil companies, savvy government leaders are conversant in the "technical" reserves data provided by outfits such as IHS Energy. After all, in the United States, many government leaders have deep roots in the oil industry. (According to a long-standing rumor, Deffeyes notes, the U.S. Central Intelligence Agency is IHS Energy's biggest customer.[38])

And yet, there's little evident attempt to rein in profligate fuel use, perhaps most notably in the U.S. Defense Department, that instrument of U.S. global might. The U.S. military consumes about 85 million barrels of oil a year, making it the biggest single consumer of fuel in the country and perhaps the world.[39] According to an interdisciplinary panel convened by the Defense Science Board (DSB), cheap oil has distorted the American military into a handful of super-killing steel monsters, with the majority of the forces devoted to the logistics of simply feeding and fueling them. The Army employed sixty thousand soldiers solely for the purpose of providing petroleum, oil, and lubricants to its war machines, which have themselves become increasingly fuel-heavy. The sixty-eight-ton Abrams tank, for instance, burns through a gallon of fuel for every

half mile. With its inefficient, 1960s-era engine, the Abrams tank burns twelve gallons of fuel an hour *just idling*.[40]

So much time and money is spent fueling the American fighting machines that, according to the head of the Army Materiel Command, a gallon of fuel delivered to the U.S. military in action can ultimately cost up to $400 a gallon. Indeed, 70 percent of the weight of all the soldiers, vehicles, and weapons of the entire U.S. Army is pure fuel.[41]

When given a choice between a gas-guzzling, high-maintenance machine and a lighter, more efficient one, the military generally chooses the former, analysts have found. The B-52 bomber is a good example. These fighter planes guzzle more than three thousand gallons of fuel an hour, using engines designed in the 1960s. New engine models could improve the B-52's fuel efficiency by 33 percent, propelling them so far that they wouldn't require expensive mid-air refueling, making possible the scrapping of fifty-five tanker platforms. Taking all that into account, the new engines could save the military over $1 billion. Yet the Air Force refuses to do it. According to its calculations, in which fuel costs less than a buck a gallon and delivery is free, the new engine isn't worth the investment.[42]

Evidently, the military's fuel-distended belly isn't something that the Defense Department considers a big problem. As of 2001, the computer program that today's high-tech, surgically striking military uses to calculate its fuel efficiency hadn't been updated since 1972. The computer language it is written in, FORTAN, is so old and seldom used it is practically extinct.[43]

As the DSB panel noted, there are two ways to satisfy the U.S. military's ravenous oil appetite: "to make platforms and systems more efficient so they require less logistics," they reported, "or acquire more logistics assets." If the military's wanton oil consumption and casual disregard for fuel efficiency is any indication, the top brass have decided to simply capture access to more oil.

Generally speaking, the U.S. market, by its sheer size, can count on crushing any competitors for oil should it become scarce. Americans demanded over 20 million barrels a day in 2003; Japan and China, the next two largest consumers, have markets just one-quarter the size: in 2003, Japan required just 5.43 million barrels a day and China just 5.46 million barrels a day.[44] By 2025, the U.S. market will still be three times bigger than its nearest rival, but there'll be significantly less oil to go around. Its nearest rival will be much closer in terms of market size and is an unfriendly, historically hostile country: China. China depleted the majority of its own oil by 1993 and was even having trouble keeping its coal fires burning by the early twenty-first century.[45]

China's prodigious coal production (involving some 5 million coal miners toiling in about 75,000 coal mines[46]) provides about 70 percent of the country's energy.[47] But the massive reserves are dwindling. The looming coal shortage is "one of the greatest hidden dangers in China's future," a Chinese coal industry spokesperson warned China's parliament in 2003. Chinese officials decreed that Xilutian, the country's largest strip coal mine, after nearly a century of operation rendering over 250 million tons of coal, would be closed down in 2007. The three giant mountains of slag that had been dug out of the mine would somehow be turned into a "forest park."[48]

With coal-deprived Chinese on the prowl for scarce energy supplies, the already tight market will get even tighter in coming years. Big oil companies are already lining up to feed China's engines, primarily with new oil developments in Russia. The Russian government plans to pipe oil from the windswept island of Sakhalin, floating in the Bering Sea between Russia and Alaska, direct to thirsty oil consumers in China. ExxonMobil, Shell, BP, and others have descended upon the former Czarist penal colony to help them do it.[49] Shell is likewise building "a formidable presence" in north Asia, according to *Petroleum Economist*. The company's expanding assets in China are

"gravitating towards the centre of its investment strategy."[50] In March 2002, BP committed up to $20 billion in oil assets in Russia, making it the third largest company operating there, in order to service China's major emerging market.[51] By 2004, oil-hungry Chinese leaders would set off on whirlwind tours of oil hotspots such as Algeria and Gabon, staking their claim to the world's crude.

China's rising roar for oil echoes in the halls of the White House. In May 2001, not long after George W. Bush ascended from the Texan oilfields to the White House, the administration issued an energy policy report, underlining the U.S. need to corral the world's remaining oil supplies for itself.[52] The Bush administration, as was *de rigeur* since the 1970s, called its mission "energy security." But for former oilmen like Bush and Vice President Dick Cheney, the equation of "energy" with "oil" couldn't have been more transparent. The United States must "explore for energy," Cheney asserted. Clearly, the former CEO of Halliburton was not suggesting his colleagues go hunting for sunlight to shine on solar PV panels.[53]

After the devastating attacks on New York and Washington on September 11, 2001, it appeared that in the public mind, the government could do no wrong. "I really think this period is analogous to 1945–1947 in that the events started shifting the tectonic plates in international politics," said former Chevron board member and national security advisor Condoleezza Rice. The oil tanker that Chevron had named after Rice had been renamed after she moved to Washington, DC, in 2000, but the strength of her commitment to the petrolife remains clear. "It's important to try to seize on that and position American interests and institutions before they harden again," she said.[54]

Early in his first term, President George Bush met with the Canadian prime minister to hash out Canada's role in supplying Americans with oil and gas. After September 11, 2001, the two governments,

suitably enjoined to finally solve the West's Middle Eastern problem, fingered what they deemed a "secure and strategic source of hydrocarbons": the oil sands of Alberta, Canada.

Across the bleak landscape of northeastern Alberta, over millions of years, a giant oilfield had risen from its grave. Freed from its rocky tomb, the oilfield's light molecules of oil and gas evaporated, leaving behind a thick, tarry sludge to bask in the thin northern sun. The sludge gummed up with the Albertan sand.

If the oil lingering in these sands, called "tar sands" or "oil sands," could be recovered, Alberta could provide 300 billion barrels of oil, more than the proven reserves of Saudi Arabia, awed industry groups said. Beyond those 300 billion potentially recoverable barrels lie a whopping 2.5 trillion more. Alberta, in other words, held more oil in its tar sands than the entire world endowment of conventional oil.[55] It isn't the only such deposit, either. Another giant deposit of tar sands sits in the Orinoco belt in Venezuela, buried deep underground.[56]

In the 1980s, the cost of extracting oil from tar sands ran to around $30 a barrel,[57] obviously a losing proposition with each barrel of oil fetching between $20 and $25 in the marketplace. Saudi Arabian oil, in contrast, costs just $2 a barrel to extract.[58] The tar sands lay fallow for years until the Canadian government started to aggressively subsidize their development. In 1995, the Canadian federal government announced that whichever oil companies braved the Albertan winter to rescue the stranded oil sands could write off 100 percent of their expenses,[59] the government forgoing the lion's share of its royalty until the industry started to earn a profit.[60]

A few years later, an armada of oil companies muscled in to Alberta's tar sands, selling off their assets in other parts of Canada to focus on the sludgy bitumen in the north.[61] Shell and Chevron committed to a mine, pipeline, and new refinery to process the tar sands into crude, at a cost of over $2.6 billion.[62] It was Shell Canada's biggest investment in a single project ever.[63] A host of smaller companies as well as outfits from Japan, China, Israel, and Korea buzzed around the suddenly sweeter tar sands play.

The trouble is, Alberta's tar sands are nothing like conventional crude oil, which is why trade magazines and government agencies historically haven't taken tar sands into account when tallying up the world's reserves of crude. Thick and tarry, tar sands oil can't be conveniently bundled off down a pipeline to the refinery. It must be treated first, with natural gas and other petroleum products, in order to flow. Not just with a little bit either; the tar sands require over five times more of these precious petroleum products than regular heavy crude.

Even when begrudgingly flowing, the oil is heavier than most refineries can handle. New refineries must be built or revamped in order to process it, and all they may be able to turn out is road asphalt or boiler fuel. Alternatively, yet more fuel can be burned to heat tar-sands oil into a synthetic crude oil.[64]

For each barrel of tar-sands oil, no less than two tons of sand and clay must be mined, using the widely reviled methods pioneered by the coal industry: forest-killing open-pit mining. With all the eviscerating procedures and additional treatment the tar sands require, extracting oil from the sands sucks up two-thirds of the energy they ultimately render,[65] poisoning the atmosphere with carbon in the process. Producing a single barrel of oil from tar sands emits no less than six times more carbon dioxide than producing a barrel of conventional oil.[66]

By 2002, over $10 billion had been invested in Alberta's oil sands, and the industry planned to squeeze out more than 3 million barrels a day by 2012.[67] By then, a handful of companies that had been mining the tar sands, using the world's biggest shovels and trucks, had depleted most of the shallow deposits. Companies turned to the deeper deposits, more than six hundred feet down. Open-pit mining wouldn't do, but they could drill holes and shoot steam down, to push the oily sands out.[68] The new technique, "steam assisted gravity drainage," sent the price of producing a barrel of tar sands plummeting down to around $5 to $7 a barrel.[69] It also required vast amounts of precious fresh water, which after

being contaminated with chemicals is pumped into giant festering lakes of waste water.[70]

The oil-sands industry gorges on a quarter of Alberta's scarce fresh water—each barrel of oil needing six barrels of water to flush it out[71]—and burns up to a fifth of the entire nation's natural gas supply.[72] According to a leaked report from a Canadian environmental agency, the pollutants from the expanding tar-sands operations will result in enough acid rain to destroy much of the region's majestic forests as well.[73]

Most oil-sands projects have gone over budget by 15 to 20 percent and worse,[74] suffering sporadic sabotage from livid locals.[75] But it doesn't matter, analysts say. Government subsidies have drained the projects of financial risk. "Even if this project goes 20 percent or 30 percent over budget," a big oil company like Shell "will still have effectively zero debt on its balance sheet," an energy analyst told *Petroleum Economist*.[76]

In 2003, to the glee of the Canadian oil and gas industry, the U.S. Energy Information Administration added some 180 billion barrels of oil from the Alberta tar sands to its tally of "conventional" oil reserves, catapulting Canada's reserves above those of Iraq's and second only to Saudi Arabia's.[77] Provided they could stave off the shivering farmers and their thirsty livestock, the North American governments remained supportive, and with the price of oil high, the oil industry could potentially stay in business extracting oil from tar sands for centuries.

Alberta's oil, being politically safe, might relieve some of the pressure of the United States' dependence on Middle Eastern oil, but greater quantities of crude would be required for Bush and Cheney's sought-after energy independence.

One such flow of oil could have been from the Caspian Sea. But in 2002, disappointing news started to emerge from the ancient

oil territories around Baku, precipitating even more aggressive stampedes for oil.

During the mid-1990s, seismic data had revealed a giant geological structure under the northern Caspian Sea, a monolith stretching two hundred miles long and fifty miles wide. If it were full of oil, it could be the largest oilfield in the world.[78] "The Caspian may well be the Persian Gulf of the twenty-first century," *Offshore* magazine reported in March 1996.[79]

Over in the State Department, ears were pricked. In 1997, the State Department had informed Congress that the Caspian held almost 200 billion barrels of oil.[80] The message was not lost on the senators. "You can picture back in the think tanks of America, and the foreign service departments and the military planners, all of these people seeing this great gem sitting out there in the Caspian, and their interest shifted to how to get the damn stuff out," recalls Campbell. "Since they are obviously not geologists, it was sort of taken as an assumption that it was there, and the problem would be to export it and bring it onto world markets."

State leaders in the impoverished region jockeyed for position. The Caspian Sea was landlocked, bordered by a gallery of countries and peoples who nursed age-old feuds with each other: Russia, Iran, Kazakhstan, Turkmenistan, and Azerbaijan.

Struggles emerged over the sea itself. Was it a lake or was it a sea? Before 1991, only two countries bordered the Caspian: Iran and the Soviet Union. Under international law, resources in lakes are generally shared between bordering countries. This suited the Soviet Union and Iran, as all they wanted to get out of the Caspian were its wandering sturgeon and caviar. Calling the Caspian a lake and divvying up the roving delicacies was easier than hoping that the fish swam and laid their eggs on one side of the Caspian rather than the other.

Oil, however, is a much more stationary resource. After the Soviet Union broke up, Iran insisted on keeping the lake definition, but some of the new bristling countries bordering the Caspian wanted to

classify the water as a sea. It was salty, after all, and had been called a sea for ages. Also, if the Caspian were reclassified a sea, under 1980s-era UN conventions, it would be sliced like a pie, with each bordering country getting a single piece. Envisioning the slicing of the Caspian cake in their minds, the various countries vied for the tastiest morsels.[81]

More pressing questions followed. Which way would the biggest pipelines with their precious cargo run? Which countries would net the windfalls of transit fees, and which wouldn't? The problem of transport had already triggered violent conflict. When the Russians had decided to pump early Caspian oil through their leaky pipelines running through Grozny, the capital of Chechnya, they had set off six long years of bloody war and repression. The prize was even bigger now, and so was the brewing fight. Oil companies foresaw ferrying $21 million worth of crude oil and gas out of the Caspian Sea through pipelines every single day.[82]

The easiest cheapest route for a pipeline would be to pipe the oil through Russia or Georgia to the Black Sea, or through Iran to the Persian Gulf.[83] Western companies were unlikely to build pipelines through Iran, in as much as the country was still under U.S. sanctions.[84] The Russian route appeared most promising, and could make use of existing Soviet-era pipes. These were notoriously leaky, dripping oil into the frozen ground, which thawed into great standing lakes of oil (the biggest was eleven kilometers long and two meters deep) during the summers.[85]

But the United States objected. Never mind the leaky pipelines, the United States did not want any of this precious new oil to go through any potentially hostile territories like Russia. The cherished cargo, instead, should travel a longer and more expensive route, through Georgia and U.S. ally Turkey, government analysts insisted.

In the late 1990s, the United States started pouring money into the region to prepare the ground, feting the new leaders of the Caspian states at lavish White House diplomatic events.[86] The

pipeline the United States wanted would cost around $3 billion. BP said it couldn't be done without "free public money," signing on to build the line after the U.S., U.K., Japanese, and Turkish governments agreed to subsidize the project. President Clinton traveled to Istanbul in 1999 to sign a deal for the pipeline that would carry Caspian oil into Turkey, where it could be loaded onto tankers in the Mediterranean.[87] U.S. military bases sprouted across Central Asia, an iron embrace that tightened considerably with the 2001 invasion of Afghanistan, a violent and unsuccessful attempt to capture the wily Saudi terrorist Osama bin Ladin.

But then the other shoe fell. Something was going wrong in the oil patch. In 2001, BP and Statoil had gotten enough bad news. They pulled out. By late 2002, the oil industry had drilled three wells on the most promising Caspian oilfield, Kashagan, the hoped-for 200-billion-barrel savior. What they found was that "far from it being a single huge structure containing 200 billion barrels as they had hoped," recalls Campbell, "it is made up of different individual reefs, very deep, high sulfur, and the latest estimates are it's only got between 9 and 13 billion barrels!"[88] Of the dreamed-of 200 billion barrels, just one-twentieth might materialize. The Caspian would be no substitute for the Middle East.

The pipeline, however, proceeded apace. The people along the pipeline route, impoverished by war and years of neglect, their oil-rich land lacking even in the refineries that would provide them jobs, would most likely end up seeing their most lucrative resource pumped right out from under their noses with little to show for it. They braced themselves for an earthquake, as the sturgeon-rich Caspian was prone to them. Locals feared, too, greater contamination of the air with "sour gas," natural gas mixed with oil and deadly hydrogen sulfide, which was already being released by many fields in the region.[89]

One can only imagine how the news of the Caspian oil crash was greeted by the oilmen sitting in the Oval Office in the spring of 2002. It wasn't long afterward that Iraq, that treasure-chest of unexplored oil riches, fell under their gaze.

Only 17 of 80 discovered oilfields in Iraq have been developed; only 2,300 wells drilled, less than 1 percent of the number of wells drilled in Texas alone, according to the EIA. Iraq's vast Western Desert is virtually virgin territory; modern oil hunters had never subjected these oil lands to the reach and scrutiny of their directional drills and three-dimensional seismic surveys.[90]

Unlike the rest of his colleagues in OPEC who had been chastened by their fall from grace after the 1973 oil embargo, Iraqi President Saddam Hussein was still willing to use Iraqi oil as a weapon to punish his enemies, not least the United States. In September 2000, Hussein announced that Iraq would no longer accept U.S. dollars for its oil, only euros. In April 2002, from the seat of his starving country, weakened by years of sanctions, Hussein withheld all Iraqi oil from the market, in another attempt to punish Israel's allies.[91] It wasn't just the West that met with the leader's opprobrium. Hussein impetuously ripped up a deal with a Russian oil company after Russian president Vladimir Putin supported sanctions against Iraq.[92]

Hussein had bigger plans. In February 2003, he claimed Iraq would double its oil production to 6 million barrels a day by 2012, perhaps even 10 million barrels a day, if sanctions were lifted.[93] In anticipation, the Iraqis were planning to drill more than four hundred new wells, and had already inked some deals to get the job done. The rub was that the oilmen who would drill those wells would not be working for ExxonMobil or ChevronTexaco, but Russian, French, and Chinese companies.[94]

Then, seemingly out of nowhere, in the spring of 2003, the United States invaded Iraq on a flimsy pretext, purporting to rid the broken country of destructive weapons.

Operation Iraqi Liberation (OIL) had been quickly renamed Operation Iraqi Freedom, but the oily ramifications were clear

nevertheless. As American killing machines advanced in the Iraqi desert, long lines of five-thousand-gallon tanker trucks trailed behind, stopping to refuel at military bases aptly named after Shell and ExxonMobil. "The forward bases are normally refueling points," a Pentagon spokesperson said. "They're basically gas stations in the desert."[95] Hundreds of airborne oil tankers refueled the Air Force's fuel-hungry bombers, the newest ones pumping more than six hundred gallons a minute while hovering in mid-air. B-2 bombers flew nonstop from Missouri to Afghanistan and back, replenished a dozen times in mid-air by the flying oil tankers, many of which could themselves be refueled in mid-air.[96]

Burning over 2 million barrels of oil every week, the U.S. forces crushed the Hussein regime within weeks.[97]

Enraged Iraqis and others resisted the U.S. occupation that followed, felling more than five hundred U.S. soldiers between the fall of the Hussein regime and early 2004, torching pipelines and blowing up cars. Much ink was spilled detailing the U.S. concern for the Iraqi people, yet weeks after the war ended, many still lacked drinking water and electricity. They didn't even have gasoline. Lines at the local gas stations stretched for miles and took days to inch forward. Schoolchildren waited for buses that never came. The sick died waiting for gas to fuel the cars that might take them to the hospital.[98]

The flow of oil from Iraq's two giant, aging oilfields, Kirkuk in the north, discovered in 1927 and Rumaila in the south, discovered in 1953, comprised about two-thirds of Iraq's daily oil production before the invasion, but reservoir engineers who descended upon them after the smoke cleared found grave damage. Forced to produce oil while deprived of modern technologies, the reserves had been overpumped and flooded with water, outdated techniques frowned upon by the modern oil industry. Water seeped into Kirkuk's oil deposits, and hundreds of thousands of barrels of oil were being injected *into* Kirkuk's wells in order to maintain pressure. In the south, oil experts convened by the United Nations say, less than half of the hypothetically recoverable oil could ultimately be pumped out.

If the United States tried to pump more oil out of these damaged fields, they could be destroyed irrevocably, some experts said.[99]

Despite extreme provocation, the Iraqi regime declined to use the much-feared weapons of mass destruction that the United States had warned about, and indeed after the regime fell, none were ever found, casting doubts on whether they ever existed at all. Still, pesky Hussein was gone and the contracts that Iraq had negotiated with the Chinese and the Russians were unilaterally declared null and void.[100]

Immediately, the U.S. occupying forces instructed Iraq's oil ministers not to make a move without their permission,[101] installing former Shell CEO Phillip Carroll to help lead Iraqi oil development, despite an abundance of highly trained, efficient oil technocrats from Iraq itself.[102] Before new oil could be pinpointed and extracted, a massive investment to rebuild the country's oil infrastructure would have to be made, one that would net billions for Big Oil and its contractors. Halliburton alone would take home at least $3 billion in reconstruction contracts.[103] Oil companies demurely pointed out how expensive and time-consuming such contracts would be for them. But given the length of time and amount of money they'd spend elsewhere, for less oil in more hostile places, it was a bit of a stretch. To put it in perspective, ExxonMobil spent close to thirty years negotiating access to a mere billion barrels in war-torn Chad; the industry was spending almost $40 billion to develop oil in Kazakhstan, despite the trouble they'd face in piping it out.[104] In Iraq, the industry might have to spend several billion dollars to get the country's oil infrastructure stabilized, but in the end, the prize would be access to the second largest proven conventional oil reserves in the world.

The U.S. regime in Iraq promptly set about twisting the spigots off for their enemies and on for their friends. For a country that considered using oil as a weapon anathema, when given the opportunity it quickly jumped at it. U.S. soldiers cut off a pipeline carrying two hundred thousand barrels of Iraqi oil daily to Syria, in one fell swoop bleeding Syria of up to $1 billion a year.[105] Discussions on how to rebuild a pipeline to pump cheap Iraqi oil to U.S. ally Israel kicked off.[106]

President Bush meanwhile set off on a whirlwind tour of Africa, the first time a president had visited the continent in his first term. That summer of 2003, the administration toyed with the notion of sending troops to storm Liberia. "African oil has become of national strategic interest to us," explained one U.S. official. "The stability of West Africa"—home to the West's new *El Dorado*—"is important to U.S. interests," added national security advisor Condoleezza Rice.[107]

The Bush administration continued to promise the American public that sales of Iraqi oil, not their taxes, would pay for Iraq's $100 billion reconstruction.[108] But by November 2003, dogged by sabotage, United States-occupied Iraq was producing just 1.9 million barrels a day, well under the 3.5 million barrels the country proferred daily before 1990.[109] As the occupation of Iraq dragged on, the U.S. administration started to sow the ground for what they considered the next step for the world's last super-power: decades of unending war, Vice President Cheney told a crowd in Los Angeles in January 2004, under the guise of a generations-long "war on terrorism."[110]