

Peak Oil and Energy Imperialism

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The rise in overt militarism and imperialism at the outset of the twenty-first century can plausibly be attributed largely to attempts by the dominant interests of the world economy to gain control over diminishing world oil supplies.¹ Beginning in 1998 a series of strategic energy initiatives were launched in national security circles in the United States in response to: (1) the crossing of the 50 per cent threshold in U.S. importation of foreign oil; (2) the disappearance of spare world oil production capacity; (3) concentration of an increasing percentage of all remaining conventional oil resources in the Persian Gulf; and (4) looming fears of peak oil.

The response of the vested interests to this world oil supply crisis was to construct what Michael Klare in *Blood and Oil* has called a global “strategy of maximum extraction.”² This required that the United States as the hegemonic power, with the backing of the other leading capitalist states, seek to extend its control over world oil reserves with the object of boosting production. Seen in this light, the invasion and occupation of Afghanistan (the geopolitical doorway to Western access to Caspian Sea Basin oil and natural gas) following the 9/11 attacks, the 2003 invasion of Iraq, the rapid expansion of U.S. military activities in the Gulf of Guinea in Africa (where Washington sees itself as in competition with Beijing), and the increased threats now directed at Iran and Venezuela—all signal the rise of a dangerous new era of energy imperialism.

The geopolitics of oil

In April 1998 the United States for the first time imported the majority of the petroleum it consumed. The crossing of this threshold pointed to a very rapid growth in U.S. foreign oil dependency. At the same time fears that the world would soon reach peak oil production became increasingly prominent, assuming a high profile behind the scenes in establishment discussions. A key event was the publication in *Scientific American* in March 1998 of “The End of Cheap Oil” by retired oil industry geologists Colin J. Campbell and Jean H. Laherrère. “The End of Cheap Oil” predicted that world oil production would peak “probably within 10 years.” The Campbell and Laherrère article and the question of peak oil immediately drew the attention of the International Energy Agency (IEA), the OECD’s energy organisation, in its *World Energy Outlook* of 1998. The IEA claimed that even adopting the pessimists’ assumptions on the real extent of world oil reserves and the existence of a bell-shaped production curve (but without the sharp oil price hike suggested by

Campbell), its own long-term supply model “would not peak until around 2008–2009.” Employing the IEA’s own assumptions on reserves, moreover, would push the peak back around a decade further.³ This, however, was still far from distant. The peaking of United Kingdom North Sea oil production in 1999 (Norwegian production peaked two years later) added a still greater sense of urgency.

Matthew Simmons, CEO of the Houston-based energy investment banking firm Simmons and Company International and a member of the National Petroleum Council and the Council on Foreign Relations, published an article in *Middle East Insight* in 1999 in which he emphasised the “far faster” depletion of major oil fields arising from high-extraction technology. Rather than extending the life of oil fields as previously supposed, the introduction of this technology most likely accelerated their depletion. Referring to oil fields “brought into production since 1970,” Simmons noted that “almost all of these new fields have already reached peak production and are now experiencing rapid rates of decline...And when the stable base of old, but giant, fields also starts to deplete,” he asked, “what will this do to the world’s average depletion rate?”⁴

In 2000 Simmons’s concerns regarding diminishing oil supply led to his becoming an energy advisor for George W. Bush’s presidential campaign. As he recounted it in a February 2008 interview, he had “pulled aside” Bush’s “first cousin” in early March 2000 to tell him of an earlier conversation he had had with an assistant to Secretary of Energy Bill Richardson, who had been sent to examine the spare oil production capacity of the OPEC countries. As Simmons reported to Bush’s cousin:

I said, “When you have someone who is the head of U.S. oil policy call you and [say ‘shit!’] about five times in 20 seconds, this is so much worse than what they’ve warned us about.” I said, “Between now and the election, if this all breaks out and Bush is misinformed, he can mispronounce every head of state in the world, but this, this will sink you.” And that dragged me into helping create the comprehensive energy plan put forth by Bush when he was running.⁵

Simmons was a member of the Bush-Cheney Energy Transition Advisory Committee, advising on the growing oil constraints. His 2005 book, *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy*, arguing that the Saudi oil production peak was imminent, has become one of the most influential works propounding the peak oil notion.⁶

The Energy Information Administration (EIA) of the U.S. Department of Energy conducted a full assessment of the peak oil issue as early as July 2000, considering a number of scenarios. As opposed to those who saw the peak occurring “as early as 2004” the EIA concluded that “world conventional oil production may increase two decades or more before it begins to decline.” The analysis itself, however, was not

altogether reassuring to the vested interests, since it suggested that a world oil peak could be reached as early as 2021.⁷

These concerns with regard to world oil supply that began to penetrate the corridors of power in the 1998–2001 period led to a wide-ranging debate within the inner circles in the United States about the nature of the oil extraction problem and the strategic means with which to alleviate it. This was increasingly integrated with wider issues on the expansion of the U.S. empire raised by groups such as the Project for a New American Century.⁸

In July 1998 the Center for Strategic and International Studies (CSIS) launched its “Strategic Energy Initiative,” at the urging of former chairman of the Senate Armed Services Committee Sam Nunn and former secretary of defense (and former secretary of energy) James R. Schlesinger. In November 2000, the Strategic Energy Initiative issued a three volume report, *The Geopolitics of Energy into the 21st Century*, with Nunn and Schlesinger as coauthors. It stressed that the Persian Gulf would have to expand its energy production “by almost 80 per cent during 2000–2020” in the face of rising demand and declining oil production elsewhere in the world in order to meet world energy needs.

The question of a world oil peak in the decade 2000–10 was also examined, focusing on the arguments of Campbell and Laherrère and Simmons. The CSIS Strategic Energy Initiative officially rejected the notion that the world oil peak would be reached as early as 2010. Nevertheless, its report took the peak oil issue extremely seriously. As the “only superpower” the United States, it declared, had “special responsibilities for preserving worldwide energy supply” and “open access” to the world’s oil. Underscored throughout the report was the necessity of finding ways to increase oil exports from Iraq and Iran both then under U.S. economic sanctions.⁹

In 2001 the James Baker III Institute for Public Policy of Rice University and the Council on Foreign Relations cosponsored a study of *Strategic Energy Policy Challenges for the 21st Century*, chaired by energy analyst Edward L. Morse. Task force members included both oil optimists, such as Morse and Daniel Yergin of Cambridge Energy Research Associates, and oil pessimists such as peak oil proponent Simmons. The Baker Institute/Council on Foreign Relations report emphasised the adequacy of world oil reserves for decades to come but argued that world oil was facing “tight supply” due to “underinvestment” in new production capacity and “volatile states.” Excess capacity had been “wiped out,” falling to “negligible” amounts, partly due to oil producing countries devoting oil revenues to social projects rather than to investment in new production capacity.

In this situation, the Baker Institute/Council on Foreign Relations report pointed out that Iraq had emerged as a key “swing producer” of oil, operating well below capacity, and in the previous year “turning its taps on and off when it has felt such action was in its strategic interests to do so.” This presented a growing danger to the world capitalist economy, which included the “possibility that Saddam Hussein may remove Iraqi oil from the market for an extended period.” Indeed, “Iraqi reserves,” the *Strategic Energy Policy* report emphasised, “represent a major asset that can quickly add capacity to world oil markets and inject a more competitive tenor to oil trade.” Investment in the enhancement of Iraqi oil production capacity was essential. The problem was what to do about Saddam Hussein.

Overall, the Baker Institute/Council on Foreign Relations report emphasised, the stakes were exceedingly high, since there was a danger that oil price increases and supply shortages would make “the United States appear more similar to a poor developing country.”

The answer was for the Western powers led by the United States to play a more direct role in the development of world oil resources. This would be coupled with replacement of the current political economy of oil dominated by national oil companies, which had arisen with the growth of “resource nationalism” in the third world, with one in which the multinational oil corporations centered in the advanced capitalist economies once again took charge of reserves and investments.¹⁰

These reports by national security analysts on strategic energy policy were followed in May 2001 by the White House release of its *National Energy Policy*, issued under the direction of Vice President Dick Cheney. It too emphasised the need for U.S. petroleum security, noting that total U.S. oil production had fallen 39 per cent below its 1970 peak and that U.S. reliance on foreign oil imports could increase to almost two-thirds of its total gasoline and heating oil consumption by 2020. President Bush warned in May 2001 that dependence on foreign crude oil put U.S. “national energy security” in the hands of “foreign nations, some of whom do not share our interests.”

In terms of the long-term world oil supply outlook, the U.S. Department of Energy’s *International Energy Outlook* in 2001 projected the need for a doubling of Persian Gulf oil production over 1999 levels by 2020 in order to meet expected world demand. This optimistic forecast could not possibly be fulfilled, however, without massive investment in an expansion of capacity in the Persian Gulf of a kind that key states, such as Iraq and Iran, and even Saudi Arabia, seemed unlikely to undertake. Iraqi crude oil production in 2001 was 31 per cent less than in 1979, while Iran’s had fallen by about 37 per cent since 1976. Both nations were viewed as underproducing

due to underinvestment and the effects of sanctions. The IEA estimated that Persian Gulf states would have to invest over half a trillion dollars on new equipment and technology for oil production capacity expansion by 2030 in order to meet projected oil production levels.¹¹

U.S. national security and energy analysts as well as energy corporations and the Bush administration had thus arrived at the conclusion by spring 2001 that, while substantial oil reserves still existed, capacity was extremely tight, presaging a series of oil price shocks. Only a vast increase of oil production in the Persian Gulf as a whole could prevent an enormous gap emerging between oil production and demand over the next two decades. Behind all of this lay the specter of peak oil production.

Rather than try to solve the problem on the demand side by lessening consumption, the Bush administration turned, as had all other administrations before it, to the military as the ultimate guarantor. As Michael Klare wrote in his *Blood and Oil*:

In the months before and after 9/11, the Bush administration fashioned a comprehensive strategy for American domination of the Persian Gulf and the procurement of ever-increasing quantities of petroleum. It is unlikely that this strategy was ever formalised in a single, all-encompassing White House document. Rather, the administration adopted a series of policies that together formed a blueprint for political, economic, and military action in the Gulf. This approach—I call it the strategy of maximum extraction—was aimed primarily at boosting the oil output of the major Gulf producers. But since the sought-after increases could be doomed by instability and conflict in the region, the strategy also entailed increased military intervention.¹²

Militarily the issue was one of shoring up Saudi Arabia in the face of growing signs of instability, carrying out regime change in Iraq, and exerting maximum pressure on Iran. Key figures in the Bush administration such as Donald Rumsfeld and Paul Wolfowitz had been pushing for an invasion of Iraq even before the election. Once the September 2001 attacks occurred, the “War on Terrorism” led to the invasion first of Afghanistan, giving the United States a geopolitical doorway (and pipeline route) to Central Asia and the Caspian Sea Basin, followed by the invasion in 2003 of Iraq. From the standpoint of the geopolitics of oil, Saddam Hussein’s removal and the occupation of Iraq was seen as enhancing the security of Middle East oil, presenting the possibility of a big boost in Iraqi oil production, and providing a staging ground for increased U.S. military, political, and economic dominance of the Gulf. U.S. strategic control of the Middle East and its oil was viewed as the key to establishing the basis of a “new American century.”

As former Federal Reserve Board Chairman Alan Greenspan, the top U.S.

economic official throughout this period, stated in his book *The Age of Turbulence* in 2007: “I am saddened that it is politically inconvenient to acknowledge what everyone knows: that the Iraq war is largely about oil.” The U.S. invasion of Iraq, Greenspan claimed, needed to be seen against the background of previous Western military interventions aimed at securing the oil of the region, for example: “the reaction, to and reversal of, Mossadeq’s nationalisation of Anglo-Iranian oil in 1951 [resulting in the CIA’s overthrow of Iranian Prime Minister Mossadeq and the installation of the Shah in 1953] and the aborted effort by Britain and France to reverse Nasser’s takeover of the key Suez Canal link for oil flows to Europe in 1956.” The U.S. intervention in Iraq and its increased military role in the Middle East was, for Greenspan—the leading spokesperson for financial capital in the 1990s and early 2000s—justified by the fact that “world growth over the next quarter century at rates commensurate with the past quarter century will require between one-fourth and two-fifths more oil than we use today.” And this vast increase in oil production needed to come largely from the Persian Gulf, where two-thirds of the world’s reserves and hence most of its capacity for increased extraction was located.¹³

Although the Bush administration criticised Greenspan’s statement, the centrality of oil in the occupation of Iraq was not something that it could easily deny. In a September 13, 2007, prime time television speech, Bush declared that if the United States were to pull out of Iraq “extremists could control a key part of the global energy supply.”¹⁴

Peak oil: A global turning point?

In the five years that have elapsed since the United States invaded Iraq the world oil supply problem has drastically worsened. Estimates of the potential for increased Iraqi oil production made prior to the war had suggested that Iraq free of sanctions could potentially increase its crude oil production within a decade from its previous 1979 high of 3.5 million barrels a day (mb/d) to 6 or even 10 mb/d.¹⁵ Instead, Iraq’s average annual oil production in 2007 had fallen to 13 per cent below its 2001 level, having declined from 2.4 to 2.1 mb/d. Oil production in the Persian Gulf as a whole increased by 2.4 mb/d on average between 2001 and 2005 and then dropped by 4 per cent in 2005–07, along with the stagnation of world oil production as a whole.¹⁶

At the time U.S. troops reached Baghdad peak oil was already a specter looming over the globe. Today it is present in all establishment discussions of the world oil issue. Peak oil is not the same as *running out* of oil. Rather it simply means the *peaking* and subsequent terminal decline of oil production, as determined primarily by geological and technological factors. The extraction of oil from any given oil well

typically takes the form of a symmetrical, bell-shaped curve with extraction steadily rising, e.g., by 2 per cent a year, until a peak is reached when about half of the accessible oil has been extracted. Since oil production for an entire country is simply a product of the aggregation of individual wells, national oil production can be expected to take the form of a bell-shaped curve as well. Geologists have become adept at estimating the point at which a peak in national production will occur. These methods were pioneered in the 1950s by oil geologist M. King Hubbert, who achieved fame for successfully predicting the U.S. oil peak in 1970. The eventual peak in oil production is therefore sometimes known as “Hubbert’s peak.”

Peak oil is generally viewed in terms of the peaking of conventional crude oil supplies on which the main estimates of oil reserves are based. There are also unconventional sources of oil that can be produced at much greater cost and with a much lower energy returned on energy invested (EROEI) ratio. These include heavy oil, petroleum derived from oil sand, and shale oil. As the price of oil rises some of these sources become more exploitable, but also at much greater cost—monetarily and to the environment. It is estimated that it takes an equivalent of two out of three barrels of oil produced to pay for the energy and other costs associated with extracting oil from the tar sands in Alberta. It requires one billion cubic feet of natural gas to generate one million barrels of synthetic oil from oil sands. Two tons of sand must be mined to get one barrel of oil. Oil sand mining also requires vast quantities of water, producing two and a half gallons of toxic liquid waste for every barrel of oil extracted. This liquid waste is stored in enormous and rapidly expanding “tailing ponds.” The economic and environmental costs are thus prohibitive. Peak oil therefore inevitably signals the end of cheap oil.¹⁷

A key part of the argument on peak oil is the fact that discoveries of oil fields worldwide peaked in the 1960s, while the average size of new discoveries has also declined over time. Those who argue that peak oil is imminent insist that estimates of proven reserves are commonly exaggerated for political reasons, and that actual retrievable reserves may be considerably less. The conventional notion that there are forty years of crude oil production remaining at current rates of output is seen as misleading, since it exaggerates the reserves in the ground and downplays the fact that the economy requires that oil demand and production levels increase. Peak oil analysts therefore focus on production levels rather than reserves.

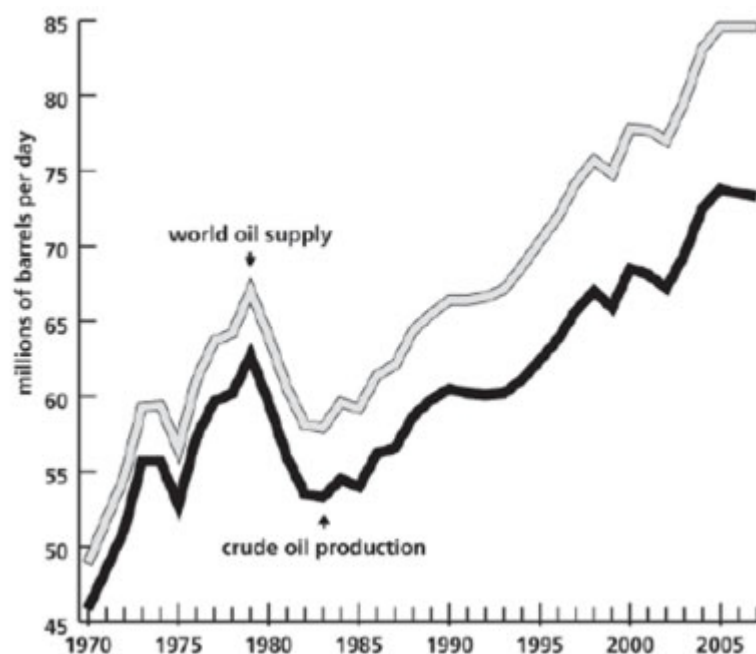
The peak oil crisis is more sharply defined than the more general crisis in energy, since not only is petroleum the most protean fuel, but it is also the preeminent liquid fuel in transportation, for which there is no easy substitute in the quantities needed. Therefore more than two-thirds of U.S. oil demand is in the form of gasoline and

petrodiesel consumption by cars and trucks. An imminent peak in conventional oil thus strikes at the lifeblood of the existing capitalist economy. It presents the possibility of a drastic economic dislocation and slowdown.¹⁸

The peak oil debate, which has often been fierce over the past decade, has now narrowed down to two basic positions. One of these is that of “early peakers” (usually seen as peak oil proponents proper). These analysts argue that peak oil will probably be reached by 2010–12, and may have already been reached in 2005–06. The alternative position, represented by “late peakers,” is that the world oil peak will not be reached until 2020 or 2030.¹⁹ Hence, there is a growing consensus that peak oil is or will soon be a reality. The chief question now is how soon, and whether it is already upon us.

An added consideration is whether world oil production will face a classic bell-shaped curve, culminating in a slender, rounded peak, to be followed quickly by a decline (within what can be viewed as a symmetrical curve)—or whether production will rise to a plateau and then stay there for a while, before declining. In fact, world oil supply appears already to have reached a plateau over the last three years at the level of 85 mb/d. This therefore has lent credence to the notion that this is the form the peak will initially take.

Chart 1: World oil production and supply



Source: Energy Information Administration, U.S. Department of Energy, *International Petroleum Monthly*, April 2008, <http://www.eia.doe.gov/ipm/supply.html>, tables 1.4d and 4.4.

Chart 1 shows world oil production/supply from 1970 to 2007. “Oil” according to the IEA (and the EIA, which has adopted an almost identical approach) is defined to include “all liquid fuels and is accounted at the product level. Sources include natural gas liquids and condensates, refinery processing gains, and the production of conventional and unconventional oil.” Conventional or crude oil is readily processed oil “produced from underground hydrocarbon reservoirs by means of production wells.” Unconventional oil is derived from other processes, such as liquefied natural gas, oil sands, oil shales, coal-to-liquid, biofuels, “and/or [other fuel that] . . . needs additional processing to produce synthetic crude.”²⁰ The lower line in chart 1, labeled “crude oil production,” refers simply to production of conventional oil. The higher line, labeled “world oil supply,” also includes unconventional sources plus net refinery processing gains (losses). The “crude oil production” line shows a very slight dip in 2005–07, reflecting the fact that crude oil production fell from an average of 73.8 mb/d in 2005 to 73.3 mb/d in 2007. The “world oil supply” line, however, remains level at about 85 mb/d due to a compensating rise in unconventional sources over the same period, resulting in what appears to be a more definite plateau.

Explaining that a plateau is the most likely initial outcome at the world level, Richard Heinberg, a leading peak oil proponent, writes:

Why the plateau? Oil production is constrained by economic conditions (in an economic downturn, demand for oil falls off), as well as by political events such as war and revolutions. In addition, the shape of the production curve is modified by the increasing availability of unconventional petroleum sources (including heavy oil, natural gas plant liquids, and tar sands), as well as new extraction technologies. The combined effect of all of these factors is to cushion the peak and lengthen the decline curve.²¹

The notion that a partly geological-technical, partly political-economic, plateau is emerging has now become the dominant view in the industry. In November 2007 the *Wall Street Journal* reported

a growing number of oil-industry chieftains are endorsing an idea long deemed fringe: The world is approaching a practical limit to the number of barrels of crude oil that can be pumped every day . . . The near adherents [to the peak oil view]—who range from senior Western oil-company executives to current and former officials of the major world exporting countries—don’t believe that the global oil tank is at the half-empty point. But they share the belief that a global production ceiling is coming for other reasons: restricted access to oil fields, spiraling costs and increasingly complex oil-field geology. This will create a production plateau, not a peak, they contend, with oil output remaining relatively constant rather than rising or falling.

The *Wall Street Journal* article referred to the estimates of Cambridge Energy Research Associates, asserting that the peak will not be reached until 2030 and that it will manifest itself at first as an “undulating plateau.” But the *Journal* article also took seriously the views of Simmons, who pointed out that, due to declining production in old fields, an increased average daily oil production equivalent to ten times current Alaskan production was needed “just to stay even.” Indeed, “at the furthest out,” he suggested, the crisis associated with the world peak in conventional oil production would be reached “in 2008 to 2012.” Echoing many of the same worries, some oil executives have raised the specter of an oil supply ceiling of 100 million barrels (conventional and unconventional), with petroleum supply likely falling short of expected demand within a decade or less.²²

Given the appearance of a world oil production plateau at present, and with oil supply seemingly stuck at the 85 mb/d level, it is not surprising that some analysts believe that peak oil has already been reached. Thus Simmons and Texas oil billionaire T. Boone Pickens have both raised the question of whether the peak was reached in 2005. While the Energy Watch Group in Germany, which includes both scientists and members of the German parliament, contends that “world oil production . . . peaked in 2006.”²³

Publicly of course the peak oil problem has often been characterised by establishment sources and the media as a “fringe issue.” Yet over the past decade the question has been pursued systematically with increasing concern within the highest echelons of capitalist society: within both states and corporations.²⁴ In February 2005 the U.S. Department of Energy released a major report that it had commissioned entitled *Peaking of World Oil Production: Impacts, Mitigation, and Risk Management*. The project leader was Robert L. Hirsch of Science Applications International Corporation. Hirsch had formerly occupied executive positions in the U.S. Atomic Energy Commission, Exxon, and ARCO. The Hirsch report concluded that peak oil was a little over two decades away or nearer. “Even the most optimistic forecasts,” it stated, “suggest that world oil peaking will occur in less than 25 years.” The main emphasis of the Hirsch report commissioned by the Department of Energy, however, was on the issue of the massive transformations that would be needed in the economy, and particularly transportation, in order to mitigate the harmful effects of the end of cheap oil. The enormous problem of converting virtually the entire stock of U.S. cars, trucks, and aircraft in just a quarter-century (at most) was viewed as presenting intractable difficulties.²⁵

In October 2005, Hirsch wrote an analysis for *Bulletin of the Atlantic Council of the United States* on “The Inevitable Peaking of World Oil Production.” He declared there

that, “previous energy transitions (wood to coal, coal to oil, etc.) were gradual and evolutionary; oil peaking will be abrupt and revolutionary. The world has never faced a problem like this. Without massive mitigation at least a decade before the fact, the problem will be pervasive and long lasting.”²⁶

Similarly, the U.S. Army released a major report of its own in September 2005 stating:

The doubling of oil prices from 2003–2005 is not an anomaly, but a picture of the future. Oil production is approaching its peak; low growth in availability can be expected for the next 5 to 10 years. As worldwide petroleum production peaks, geopolitics and market economics will cause even more significant price increases and security risks. One can only speculate at the outcome from this scenario as world petroleum production declines.²⁷

Indeed, by 2005 there was little doubt in ruling circles about the likelihood of serious oil shortages and that peak oil was on its way soon or sooner. In its 2005 *World Energy Outlook* the IEA raised the issue of Simmons’s claims in *Twilight in the Desert* that Saudi Arabia’s super-giant Ghawar oil field, the largest in the world, “could,” in the IEA’s words, “be close to reaching its peak if it has not already done so.” Likewise the U.S. Department of Energy, which had initially rejected Simmons’s assessment, backtracked between 2004 and 2006, degrading its projection of Saudi oil production in 2025 by 33 per cent.²⁸

In February 2007 the U.S. Government Accountability Office (GAO) released a seventy-five-page report on *Crude Oil* pointedly subtitled: *Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production*. It argued that almost all studies had shown that a world oil peak would occur sometime before 2040 and that U.S. federal agencies had not yet begun to address the issue of the national preparedness necessary to face this impending emergency. For the GAO the threat of a major oil shortfall was worsened by the political risks primarily associated with four countries, accounting for almost one-third of world (conventional) reserves: Iran, Iraq, Nigeria, and Venezuela. The fact that Venezuela contained “almost 90 per cent of the world’s proven extra-heavy oil reserves” made it all the more noteworthy that it constituted a significant “political risk” from Washington’s standpoint.²⁹

In April 2008, Jeroen van der Ver, CEO of Royal Dutch Shell, pronounced that “we wouldn’t be surprised if this [easy] oil would peak somewhere in the next ten years.” Due to a combination of factors including production shortfalls and a declining dollar, oil in May 2008 reached over \$135 a barrel (it averaged \$66 in 2006 and \$72 in 2007). The same month Goldman Sachs shocked world capital markets by coming out with an assessment that oil prices could rise to as much as \$200 a barrel in the

next two years. Western oil interests were particularly distressed that the first production from Kazakhstan's Kashagan oil field (considered the largest oil deposit in the world outside the Middle East) was eight years behind schedule due in part to waters frozen half the year. By May 2008 the IEA, according to analysts for the *New York Times*, was preparing to reduce its forecast of world oil production for 2030 from its earlier forecasts of 116 mb/d to no more than 100 mb/d.³⁰

It was alarm about gasoline prices and national energy security (and no doubt the specter of a world oil peak) that induced the Bush administration in 2006 to take a more aggressive stance in promoting corn-based ethanol production as a fuel substitute. In 2007, 20 per cent of U.S. corn production was devoted to ethanol to fuel automobiles. The price of grain spiked worldwide partly as a result. As environmentalist Lester R. Brown wrote in his *Plan B 3.0*: "Suddenly the world is facing a moral and political issue that has no precedent: Should we use grain to fuel cars or to feed people? . . . The market says, Let's fuel the cars."³¹

The new energy imperialism

The response in U.S. national security circles to the apparent oil production plateau, the disappearance of surplus oil production capacity, and growing fears of peak oil was swift. In October 2005 the CSIS issued another report, this time on *Changing Risks in Global Oil Supply and Demand*, written by Anthony Cordesman (long-time national security analyst for the U.S. Department of Defense, now holder of Arleigh A. Burke Chair in Strategy at CSIS) and Khalid R. al-Rodhan (a strategic analyst specialising in Gulf issues). Cordesman and al-Rodhan quoted the IEA's prediction in its 2004 *World Energy Outlook* that global oil production would not "peak before 2030 if the necessary investments are made." Rather the immediate problem was "lagging investment" in the Middle East. Still, peak oil issues were not to be entirely discounted. Thus Cordesman and al-Rodhan noted that, "Some analysts have questioned the [Saudi] Kingdom's ability to meet sudden surges in demand because of its lack of spare production capacity, and others—like Matthew Simmons—have estimated that Saudi production may be moving towards a period of sustained decline."

"Stability in petroleum exporting regions," Cordesman and al-Rodhan added, "is tenuous at best. Algeria, Iran, and Iraq all present immediate security problems, but recent experience has shown that exporting countries in Africa, the Caspian Sea, and South America are no more stable than the Gulf. There has been pipeline sabotage in Nigeria, labor strikes in Venezuela, alleged corruption in Russia, and civil unrest in Uzbekistan and other FSU [Former Soviet Union] states."³²

Even more central than the CSIS study was a 2006 Council on Foreign Relations report, chaired by former CIA Director John Deutch and Schlesinger, entitled, *National Security Consequences of U.S. Oil Dependency*. The Deutch and Schlesinger report zeroed in on inadequate oil production capacity, with OPEC no longer having the surplus capacity with which to keep prices under control. Production from existing conventional oil fields throughout the world was “declining, on average, about 5 per cent per year (roughly 4.3 million barrels per day), and thus even sustaining current levels of consumption” would be enormously difficult. Moreover, “the depletion of conventional sources, especially those close to the major markets in the United States, Western Europe, and Asia, means that the production and transport of oil will become even more dependent on an infrastructure that is already vulnerable.” Major energy suppliers like Russia, Iran, and Venezuela were using oil to pursue domestic and geopolitical goals, rather than reinvesting the oil proceeds. Saudi Arabia, Iraq, Iran, and West Africa were all centers of instability. China was trying to “lock up” oil supplies in Africa, the Caspian Sea, and elsewhere.

Although the Deutch and Schlesinger report discussed some demand-side measures to reduce U.S. consumption and oil dependency, it stressed expanding the role of the U.S. military in securing oil supplies. Thus the report declared that “the United States should expect and support a strong military posture [in the Persian Gulf in particular] that permits suitably rapid deployment to the region, if required...Any nation (or subnational group) that contemplates violence on any scale must take into account the possibility of U.S. preemption, intervention, or retaliation.”³³

No less significant was an April 2007 “policy report” issued by the James A. Baker III Institute for Public Policy on “The Changing Role of National Oil Companies in International Energy Markets.” Emphasising that national oil companies now controlled 77 per cent of the world’s total reserves, whereas Western multinational oil companies controlled a mere 10 per cent, it contended that this was the key issue in managing the current world oil supply problem. “If the United States were able to wish into existence a world that would favor its terms of trade and superpower status,” the Baker Institute went so far as to declare,

all NOCs [national oil corporations] would be privatised, foreign investors would be treated the same as local companies and OPEC would be disbanded, allowing free trade and competitive markets to deliver energy that is needed worldwide at prices determined solely by the market. But it is hard to imagine why major oil producing countries would agree to that . . . In light of this reality, the United States will have to accept the existence of NOCs as a fact of life but should encourage steps to make their activities more businesslike, transparent and—to the extent possible—free of

onerous government interference.

Above all the U.S. imperial objective should be to “break up” wherever possible “the monopoly power of oil producers” and their use of their oil resources to pursue national goals other than purely commercial ones. The chief example of such state interference in oil production, the Baker Institute report stated, was Venezuela under the leadership of Hugo Chávez. Not only had the Bolivarian Revolution prioritised “the government’s national development policy” and “social and cultural investment” over “commercial development strategy,” it had also used oil as an instrument of “foreign policy activism.” This could be seen in its geopolitically motivated agreements with Bolivia, Ecuador, Nicaragua, and the Caribbean nations. Another case of the geostrategic wielding of oil power was Iran, which had threatened that it “could block the vital oil transitway, the Strait of Hormuz,” if faced with a U.S. military attack. One critical danger that the United States needed to guard against was a “hostile” alliance between major oil producing/consuming states, such as Russia, China, Iran, and the Central Asian states. Another key consideration in the geopolitics of tough oil, the Baker Institute underscored, was the continuing political instability in Iraq. Despite Washington’s attempts to stabilise that country, political unrest and war continued, preventing the oil exploration of Iraq’s Western desert.³⁴

The tightening oil situation has prompted the rapid on the ground growth of U.S. energy imperialism, beyond the continuing Iraq and Afghan wars. The security of Saudi Arabia remains an overriding focus. Washington’s plans for a massive expansion of investment and production in Saudi Arabia, which according to the U.S. Department of Energy needs to double its oil output by 2030, depends on the feudal kingdom remaining in place. Meanwhile, there is rising social tension, emanating from the vastly unequal distribution of the country’s oil revenues. Ninety per cent of private sector jobs go to foreigners. The sexes are entirely segregated. The repressive structure of the society conceals massive popular resentment. Any destabilisation of the society would likely prompt U.S. military intervention. As James Howard Kunstler has written in *The Long Emergency*, “a desperate superpower might feel it has no choice except to attempt to control the largest remaining oil fields on the planet at any cost”—particularly if faced by growing rivalry from other states.³⁵

The United States has sought to counter the possibility of an energy alliance between Russia, China, Iran, and Central Asian oil states by expanding its military bases in Afghanistan and Central Asia, notably its Manas air base in Kyrgyzstan on the border of oil-rich Kazakhstan.

Threats of U.S. “preemptive” military intervention directed at Iran meanwhile have been continuous, based on its alleged attempts to acquire nuclear weapons

through the aggressive pursuit of nuclear energy, and its “interference” in Iraq. Iran’s pursuit of nuclear power, as a 2007 study published in the *Proceedings of the National Academy of Sciences* has confirmed, is due to an oil export decline rate of 10–12 per cent, arising from the growth of domestic energy demand plus a high rate of oil field depletion and a lack of investment growth in expanded capacity. This led to Iran’s recent inability to meet its OPEC oil export quota. The current trend points to the likelihood of Iranian petroleum exports falling to zero by 2014–15. From the standpoint of Western energy and national security analysts, Iran’s government and its national oil corporation have adopted the monopolistic policy of underinvesting in oil, deliberately slowing its production in expectation of continually rising prices, thereby holding back on the lifeblood of the world economy.³⁶

During the last few years the U.S. military has dramatically increased its bases and operations in Africa, particularly in the Gulf of Guinea. The United States expects to get 20 per cent of its oil imports from Africa by 2010, and 25 per cent by 2015. The U.S. military set up a separate Africa Command in 2007 to govern all U.S. military operations in Africa (outside Egypt). Washington sees itself as in direct competition with Beijing over African oil—a competition that it perceives not simply in economic but also military-strategic terms.³⁷

U.S. ruling interests also have increased their threats directed at Venezuela, Ecuador, Bolivia, and other Latin American states, accusing them of “resource nationalism” and presenting them as dangers to U.S. national security. Washington has made one attempt after another to unseat Venezuela’s democratically elected president Hugo Chávez and to overthrow Venezuela’s Bolivarian Revolution, with the clear object of regime change. This has included stepping up its massive military intervention in Colombia and backing the Colombian military and its intrusions into neighboring countries. In 2006 the U.S. Southern Command conducted an internal study, declaring that Venezuela, Bolivia, Ecuador, and conceivably even Mexico (which was then facing elections with a possible populist outcome) offered serious dangers to U.S. energy security. “Pending any favorable changes to the investment climate,” it declared, “the prospects for long-term energy production in Venezuela, Ecuador and Mexico are currently at risk.” The military threat was obvious.³⁸

All of this is in accord with the history of capitalism, and the response of declining hegemony to global forces largely outside their control. The new energy imperialism of the United States is already leading to expanding wars, which could become truly global, as Washington attempts to safeguard the existing capitalist economy and to stave off its own hegemonic decline. As Simmons has warned, “If we don’t create a solution to the enormous potential gap between our inherent demand for energy and

the availability of energy we will have the nastiest and last war we'll ever fight. I mean a literal war."³⁹

In January 2008 Carlos Pascual, vice president of the Brookings Institution and former director of the Bush administration's Office of Reconstruction and Stabilization, released an analysis of "The Geopolitics of Energy" that highlighted U.S. capitalism's de facto dependence on oil production in "Saudi Arabia, Russia, Iran, Iraq, Venezuela, Nigeria, and Kazakhstan"—all posing major security threats. "Due to commercial disputes, local instability, or ideology, Russia, Venezuela, Iran, Nigeria and Iraq are not investing in new long-term production capacity." This then was both an economic and a military problem for Washington.⁴⁰

Especially disturbing in this new phase of energy imperialism is the lack of resistance from populations within central capitalist countries themselves. Thus left-liberal publications in the wealthy nations often play on the prejudices of their readers (who are buffeted by rising gasoline prices), encouraging them to support oil imperialism designed to safeguard Western capitalism. David Litvin, writing on "Oil, Gas and Imperialism" in 2006 for the *Guardian* in London, claimed that "the inevitability of modern energy imperialism needs to be recognized." Threats from Russia, OPEC, Venezuela, and Bolivia were highlighted. The United States invaded Iraq, we were told, partly for "oil security." Clearly sympathising with that form of energy imperialism that "involves consumer states launching political or military" interventions "to secure supplies," Litvin concluded: "Energy imperialism is here to stay, and efforts should [therefore] focus on making it a more benign force."⁴¹

Likewise Joshua Kurlantzick, a contributing writer for *Mother Jones*, wrote a piece entitled "Put a Tyrant in Your Tank" for the May-June 2008 issue of that magazine which attributed oil supply problems to national oil companies, and argued—referring to the Baker Institute report on "The Changing Role of National Oil Companies"—that oil would be better safeguarded if placed in the hands of multinational oil companies as of old. The latter, readers were told, "may cozy up to nasty regimes . . . but they are at least obligated to respond to public criticism." Kurlantzick presented repeated criticisms of Hugo Chávez in Venezuela for his "resource nationalism," going so far as to compare Venezuela to Burma and Russia, as "authoritarian and corrupt," citing a study from the neoconservative, largely U.S. government-funded, Freedom House. The *Mother Jones* article also gave credence to the 2006 internal study conducted by the Pentagon's Southern Command, pinpointing the national security dangers to the United States of resource nationalism in Venezuela, Bolivia, and Ecuador. Other petrostates that were subjected to sharp criticism were Iran, Russia, Kazakhstan, Nigeria, and Libya. Chinese state oil corporations were targeted for their

aggressiveness in pursuing oil around the world and for their lack of environmental concerns. U.S. energy imperialism was thus seen as justified even by the putatively progressive *Mother Jones*—with hope and confidence being placed mainly in big oil and the Pentagon.⁴²

Planetary conflagration?

The supreme irony of the peak oil crisis of course is that the world is rapidly proceeding down the path of climate change from the burning of fossil fuels, threatening within a matter of decades human civilisation and life on the planet. Unless carbon dioxide emissions from the consumption of such fuels are drastically reduced, a global catastrophe awaits. For environmentalists peak oil is therefore not a tragedy in itself since the crucial challenge facing humanity at present is weaning the world from excessive dependence on fossil fuels. The breaking of the solar energy budget that hydrocarbons allowed has generated a biospheric rift, which if not rapidly addressed will close off the future.⁴³

Yet, heavy levels of fossil fuel, and particularly petroleum, consumption are built into the structure of the present world capitalist economy. The immediate response of the system to the end of easy oil has been therefore to turn to a new energy imperialism—a strategy of maximum extraction by any means possible: with the object of placating what Rachel Carson once called “the gods of profit and production.”⁴⁴ This, however, presents the threat of multiple global conflagrations: global warming, peak oil, rapidly rising world hunger (resulting in part from growing biofuel production), and nuclear war—all in order to secure a system geared to growing inequality.

In the face of the immense perils now facing life on the planet, the world desperately needs to take a new direction; toward communal well-being and global justice: a socialism for the planet. The immense danger now facing the human species, it should be understood, is not due principally to the constraints of the natural environment, whether geological or climatic, but arises from a deranged social system wheeling out of control, and more specifically, U.S. imperialism. This is the challenge of our time.

May 25, 2005

Notes

1. Influential mainstream political analyst (and former Nixon White House strategist) Kevin Phillips has recently argued that oil in the Middle East and elsewhere has emerged as perhaps the single most important strategic (non-monetary) factor in

“the Global Crisis of American Capitalism,” and is closely tied up with the world’s need to shift to a “new energy regime.” See Phillips, *Bad Money: Reckless Finance, Failed Politics, and the Global Crisis of American Capitalism* (New York: Viking, 2008), 124–27. Indeed, the struggle to control world oil can be seen as the centerpiece of the new geopolitics of U.S. empire, designed at the same time to combat the decline of U.S. hegemony. See John Bellamy Foster, “A Warning to Africa: The New U.S. Imperial Grand Strategy,” *Monthly Review* 58, no. 2 (June 2006): 1–12.

2. Michael T. Klare, *Blood and Oil* (New York: Henry Holt, 2004), 82.

3. Colin J. Campbell and Jean H. Laherrère, “The End of Cheap Oil,” *Scientific American* (March 1998): 78–83; International Energy Agency, *World Energy Outlook, 1998* (Paris: OECD, 1998), 94–103.

4. Matthew R. Simmons, “Has Technology Created \$10 Oil?,” *Middle East Insight* (May–June 1999), 37, 39.

5. Matthew R. Simmons, “[An Oil Man Reconsiders the Future of Black Gold](#),” *Good Magazine*, February 11, 2008. The insert in square brackets in the quote is in original.

6. Matthew R. Simmons, *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy* (Hoboken, New Jersey: John Wiley and Sons, 2005).

7. John Wood and Gary Long, “[Long Term World Oil Supply \(A Resource Base/Production Path Analysis\)](#),” Energy Information Administration, U.S. Department of Energy, July 28, 2000.

8. See Klare, *Blood and Oil*, 13–14.

9. Sam Nunn and James R. Schlesinger, cochairs, *The Geopolitics of Energy into the 21st Century*, 3 volumes (Washington, D.C.: Center for Strategic and International Studies, November 2000), vol. 1, xvi–xxiii; vol. 2, 30–31; vol. 3, 19.

10. Edward L. Morse, chair, [Strategic Energy Policy Challenges for the 21st Century](#), cosponsored by the James A. Baker III Institute for Public Policy of Rice University and the Council on Foreign Relations (Washington, D.C.: Council on Foreign Relations Press, April 2001), 3–17, 29, 43–47, 84–85, 98; see also Edward L. Morse, “A New Political Economy of Oil?,” *Journal of International Affairs* 53, no. 1 (Fall 1999), 1–29.

11. White House, *National Energy Policy* (Cheney report), May 2001, <http://www.whitehouse.gov/energy/National-Energy-Policy.pdf>, 1–13, 8–4.; Department of Energy, Energy Information Administration, *International Economic Outlook, 2001*, [http://www.eia.doe.gov/oiaf/archive/ieo01/pdf/0484\(2001\).pdf](http://www.eia.doe.gov/oiaf/archive/ieo01/pdf/0484(2001).pdf), 240; *International Petroleum Outlook*, April 2008, tables 4.1b and 4.1d; Klare, *Blood and Oil*, 15, 79–81.

12. Klare, *Blood and Oil*, 82–83.

13. Alan Greenspan, *The Age of Turbulence* (London: Penguin, 2007), 462–63.
14. James A. Baker Institute for Public Policy, “The Changing Role of National Oil Companies in International Markets,” *Baker Institute Policy Report*, no. 35 (April 2007), http://www.bakerinstitute.org/publications/BI_PolicyReport_35.pdf, 1, 10–12, 17–19.
15. Fareed Muhamedi and Raad Alkadiri, “Washington Makes It’s Case for War,” *Middle East Report*, no. 224 (Autumn 2002), 5; John Bellamy Foster, *Naked Imperialism* (New York: Monthly Review Press, 2006), 92.
16. U.S. Department of Energy, Energy Information Administration, *International Petroleum Monthly*, April 2008, tables 4.1b and 4.1d.
17. Richard Heinberg, *The Party’s Over* (Garbiola Island, B.C: New Society Publishers, 2005), 127–28; Michael Klare, *Rising Powers, Shrinking Planet* (New York: Henry Holt, 2008), 41; Greenpeace, “Stop the Tar Sands/Water Pollution,” <http://www.greenpeace.org/canada/en/campaigns/tarsands/threats/water-pollution>.
18. *Energy Watch Group, Crude Oil: [The Supply Outlook](#)*, October 2007, 33–34.
19. The distinction between “early” and “late” peakers is to be found in Richard Heinberg, *The Oil Depletion Protocol* (Garbiola Island, B.C: New Society Publishers, 2006), 17–23. For some representative works from the “early peaker” perspective see Kenneth S. Deffeyes, *Hubbert’s Peak* (Princeton: Princeton University Press, 2001); David Goodstein, *Out of Gas* (New York: W. W. Norton, 2004); and Heinberg, *The Party’s Over*. Cambridge Energy Research Associates is the leading independent representative of the “late peaker” view. See <http://www.cera.com/asp/cda/public1/home/home.aspx>.
20. International Energy Agency, *World Energy Outlook, 1998*, 83–84. The increased prominence of unconventional oil has recently led to increasing references to “liquids” as opposed to “oil” as such in Department of Energy reports. See Michael T. Klare, “Beyond the Age of Petroleum,” *The Nation*, October 25, 2007.
21. Richard Heinberg, *Power Down* (Gabriola Island, B.C.: New Society Publishers, 2004), 35; James Howard Kunstler, *The Long Emergency* (New York: Atlantic Monthly Press, 2005), 67–68. In an important paper on the implications of peak oil for global warming, Pushker Kharecha and James Hansen of NASA’s Goddard Institute for Space Studies and the Columbia University Earth Institute provide a graph (in one scenario) of a plateau in oil-based CO₂ emissions, stretching from approximately 2016 to 2036. Pushker A. Kharecha and James E. Hansen, “[Implications of ‘Peak Oil’ for Atmospheric CO₂ and Climate](#),” *Global Biogeochemistry* (2008, in press), figure 3.
22. “Oil Officials See Limit Looming on Production,” *Wall Street Journal*, November 11, 2007; Klare, *Beyond the Age of Petroleum*.”

23. Phillips, *Bad Money*, 130–31, 153; *Energy Watch Group, Crude Oil: The Supply Outlook*, October 2007, 71.

24. Phillips sees this discrepancy between the analysis at the top and public statements in Washington as due in large part to a desire to keep from the public the view that the U.S. system is itself peaking. See Phillips, *Bad Money*, 127.

25. Robert L. Hirsch, project leader, [*Peaking of World Oil Production: Impacts, Mitigation, and Risk Management*](#), U.S. Department of Energy, February 2005, 13, 23–25. A different and more official position was issued by the EIA in 2004–2005 in the form of a presentation on “When Will World Oil Production Peak” by EIA administrator Guy Caruso at the 10th Annual Oil and Gas Conference, Kuala Lumpur, Malaysia, June 13, 2005. The central scenario, however, estimated the world oil peak occurring in 2044, a figure too out of line with all other studies to be considered credible. See <http://www.eia.doe.gov/neic/speeches/Caruso061305.pdf>.

26. Robert L. Hirsch, “The Inevitable Peaking of World Oil Production,” *Bulletin of the Atlantic Council of the United States* 16, no. 2 (October 2005): 8.

27. Daniel F. Fournier and Eileen T. Westervelt, U.S. Army Engineer Research and Development Center, U.S. Army Corps of Engineers, [*Energy Trends and their Implications for U.S. Army Installations*](#), September 2005, vii.

28. International Energy Agency, *World Energy Outlook, 2005* (Paris: OECD, 2005), 510–12; Simmons, *Twilight in the Desert*, 170–79; Klare, *Rising Powers, Shrinking Planet*, 38.

29. United States Government Accountability Office, *Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production*, February 28, 2007, 4, 20–22, 35–38.

30. Bloomberg.com, “Goldman’s Murti Says Oil ‘Likely’ to Reach a \$150–\$200 (Update 5),” May 6, 2008; “The Cassandra of Oil Prices,” *New York Times*, May 21, 2008; ; Klare, *Rising Powers, Shrinking Planet*, 121–22; Joroen van der Veer (interview), “[Royal Dutch Shell CEO on the End of ‘Easy Oil’](#),” “Not Enough Oil is Lament of BP, Exxon on Spending (Update 1),” Bloomberg.com, May 19, 2008; Mike Nizz, “[Market Faces a Disturbing Oil Forecast](#),” *The Lede* (New York Times blog), May 22, 2008.

31. Lester R. Brown, *Plan B 3.0* (New York: W. W. Norton, 2008), 41; Fred Magdoff, “The World Food Crisis,” *Monthly Review* 60, no. 1 (May 2008): 1–15, and “The Political Economy and Ecology of Agrofuels,” in this issue.

32. Anthony H. Cordesman and Khalid R. al-Rodhan, *The Changing Risks in Global Oil Supply and Demand*, Center for Strategic and International Studies, October 3, 2005 (first working draft), 8, 13–19, 55–59, 79, 83.

33. John Deutsch and James R. Schlesinger, chairs, *National Security Consequences of U.S. Oil Dependence*, Council on Foreign Relations, 2006, <http://www.cfr.org/publication/11683/>, 3, 16–30, 48–56.
34. James A. Baker III Institute for Public Policy of Rice University, “The Changing Role of National Oil Companies in International Oil Markets,” *Baker Institute Policy Report*, no. 35 (April 2007), http://bakerinstitute.org/publications/BI_PolicyReport_35.pdf, 1, 10–12, 17–19.
35. Kunstler, *The Long Emergency*, 76–84; Baker Institute, “Changing Role of National Oil Companies,” 12.
36. Roger Stern, “The Iranian Petroleum Crisis and the United States National Security,” *Proceedings of the National Academy of Sciences* 104, no. 1 (January 2, 2007): 377–82.
37. Foster, “A Warning to Africa”; Michael Watts, “The Empire of Oil: Capitalist Dispossession and the New Scramble for Africa,” *Monthly Review* 58, no. 4 (September 2006), 1–17; Klare, *Rising Powers, Shrinking Planet*, 146–76.
38. “U.S. Military Sees Oil Nationalism Spectre,” *Financial Times*, June 26, 2006; Council on Foreign Relations, “[The Return of Resource Nationalism](#),” August 13, 2007; Eva Golinger, *Bush vs. Chávez* (New York: Monthly Review Press, 2008).
39. Simmons, “An Oil Man Reconsiders the Future of Black Gold.”
40. Carlos Pascual, “The Geopolitics of Energy,” *Brookings Institution*, January 2008, <http://www.cfr.org/publication/15342/brookings.html>, 3–4.
41. Daniel Litvin, *The Guardian* (UK), “Oil, Gas and Imperialism,” January 4, 2006.
42. Joshua Kurlantzick, “Put a Tyrant in Your Tank,” *Mother Jones* 33, no. 3 (May–June 2008), 38–42, 88–89.
43. See Richard Heinberg’s excellent chapter on “Bridging Peak Oil and Climate Change Activism” in his *Peak Everything* (Gabriola Island: New Society Publishers, 2008), 141–57. On the concept of a biospheric rift see Brett Clark and Richard York, “Carbon Metabolism: Global Capitalism, Climate Change, and the Biospheric Rift,” *Theory & Society* 34, no. 4 (2005): 391–428. In their paper on peak oil and global warming, Kharecha and Hansen present a baseline atmospheric carbon stabilisation scenario in which oil-based CO₂ emissions peak by 2016, due principally to the “peaking” of world oil production (mediated by economic and social as well as geological factors). If such a peak were to occur, they argue, it would facilitate the stabilization of atmospheric carbon at (or below) what scientists increasingly consider to be the maximum safe level of 450 parts per million (associated with a rise in global average temperature of around 2°C above pre-industrial). But stabilization of atmospheric CO₂ at this level would also require that CO₂ emissions from coal-fired

power plants peak by 2025 and that coal-fired plants without sequestration be phased out completely “before mid-century.” Pusher and Kharecha, “Implications of ‘Peak Oil’ for Atmospheric CO₂ and Climate.”

44. Rachel Carson, *Lost Woods* (Boston: Beacon Press, 1998), 210.