The Fossil Fuels War :: Monthly Review

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The Rise of the Unconventionals

Only a few years ago governments, corporations, and energy analysts were fixated on the problem of "the end of cheap oil" or "peak oil," pointing to growing shortages of conventional crude oil due to the depletion of known reserves. The International Energy Agency's 2010 report devoted a whole section to peak oil.1 Some climate scientists saw the peaking of conventional crude oil as a silver-lining opportunity to stabilize the climate—provided that countries did not turn to dirtier forms of energy such as coal and "unconventional fossil fuels."2

Today all of this has changed radically with the advent of what some are calling a new energy revolution based on the production of unconventional fossil fuels.3 The emergence in North America—but increasingly elsewhere as well—of what is now termed the "Unconventionals Era" has meant that suddenly the world is awash in new and prospective fossil-fuel supplies.4 As journalist and climate activist Bill McKibben warns,

Right now the fossil-fuel industry is mostly winning. In the past few years, they've proved "peak-oil" theorists wrong—as the price rose for hydrocarbons, companies found a lot of new sources, though mostly by scraping the bottom of the barrel, spending even more money to get even-cruddier energy. They've learned to frack (in essence, explode a pipe bomb a few thousand feet beneath the surface, fracturing the surrounding rock). They've figured out how to take the sludgy tar sands and heat them with natural gas till the oil flows. They've managed to drill miles beneath the ocean's surface.5

The new phase of environmental struggle that the Unconventionals Era has engendered is symbolized above all today by the proposed Keystone XL Pipeline, extending from the Alberta tar sands to refineries on the U.S. Gulf Coast, designed to deliver up to 830,000 barrels of tar-sands oil (diluted bitumen or dilbit) a day. The proposed pipeline has two legs. The northern leg, which has not yet been approved in Washington, is to be 1,179 miles long and will cross the border from Canada to the United States. The southern leg runs 484 miles from Oklahoma to the Gulf Coast, and is already largely completed.6 Tar-sands-oil production and processing generates roughly 14 percent more emissions than the average oil consumed in the United States, and leaves large pools of polluted water.7 Failure to halt the burning of tar-sands oil would mean "game over" with respect to climate change, in the words of James Hansen, director of NASA's Goddard Institute for Space Studies, and the most renowned U.S. climatologist.8

The Alberta tar sands, which underlie an area roughly the size of Florida, are already generating 1.8 million barrels of oil a day and the current push is to expand this further. The Achilles heel of tar-sands production, however, is transportation. At present there is a "bitumen bubble" as tar-sands oil is more readily produced than transported. The inability to get the tar-sands oil to ports means that it remains dependent on the U.S. market and is unable to command world prices. Tar-sands oil (known on the oil markets as Western Canadian Select) traded at times in 2012 at $35 a barrel less than the price it would have received had transcontinental oil transport been readily available. This represented a loss of about a third of its value when compared to West Texas Intermediate.9 Hence, the tar-sands industry is desperate to secure adequate transcontinental transport to support its current as well as expanded oil production. The big push is for pipelines. Yet, there are serious environmental concerns that diluted bitumen may be more dangerous to transport in pipelines than

conventional crude oil, because of increased likelihood of pipeline corrosion, and the resulting leakages. The Keystone XL Pipeline would go right over the Ogallala aquifer, the largest drinking-water aquifer in the United States, which supplies eight states.10

The United States witnessed its biggest climate demonstrations yet in February 2013, with upward of 40,000 people protesting in front of the White House and more than a thousand arrested in opposition to the Keystone XL Pipeline.11 In Canada, meanwhile, the indigenous-led Idle No More has utilized a variety of strategies and tactics in fighting tar-sands production, such as: a hunger strike by Attawapiskat Chief Theresa Spence; rail blockades; flashmobs in malls; a giant circle dance in a large intersection in Winnipeg; and the legal defense of First Nations sovereignty rights with respect to land, water, and resources. Idle No More protests have targeted oil transport by both rail and pipeline, with the latter including opposition to Keystone XL and to the planned Enbridge Northern Gateway Pipelines Project—designed to extend around 730 miles from the Alberta tar sands to a marine terminal in Kitimat, British Columbia.12

Other unconventionals are also altering the terrain of the struggle. The last few years have witnessed dramatic, new technological developments with respect to hydraulic fracturing coupled with horizontal drilling or "fracking." Sand, water, and chemicals are injected at high pressures in order to blast open shale rock, releasing the trapped gas inside. After the well has reached a certain depth the drilling occurs horizontally.13 Fracking has led to the rapid exploitation of vast, hitherto inaccessible, reserves of shale gas and tight oil in states across the country from Pennsylvania and Ohio to North Dakota and California, unexpectedly catapulting the United States once again into the position of a major fossil-fuel power. It has already led to substantial increases in natural-gas production, replacing dirtier and more carbon-emitting coal in generating electricity. Together the economic slowdown and the shift from coal to natural gas due to fracking have resulted in a 12 percent drop in U.S. (direct) carbon dioxide emissions between 2005 and 2012, reaching their lowest level since 1994.14

Nevertheless, the negative environmental and health effects of fracking falling on communities throughout the United States are enormous, if still not fully assessed. Toxic pollution from fracking is contaminating water supplies and affecting wastewater treatment not designed to cope with such hazards. Methane leakages from fracking, in the case of shale gas, are threatening to accelerate climate change. If such leakages cannot be contained, fracked natural-gas production could prove more dangerous to the climate than coal.15 Fracking has also engendered earthquakes in the extractive areas.16 In response to such developments, a whole new environmental resistance to fracking has arisen in communities throughout North America, Australia, and elsewhere.

A train pulling seventy-two tank cars laden with oil from fracking in North Dakota derailed and exploded in Lac-Mégantic, Quebec on July 6, 2013, killing fifty people. Such accidents are themselves a product of the boom in unconventionals, coupled with "pipeline on rails" methods of shipping the oil (as well as the decrease of labor used in rail transport). In 2009, corporations shipped a mere 500 tank cars of oil by rail in Canada; in 2013 this is projected to be as much as 140,000 tank cars.17 North Dakota tight oil is also shipped by rail to Albany, New York, where it is loaded onto barges for shipment to East Coast refineries.

Only three years ago, on April 20, 2010, an explosion in BP's Deepwater Horizon oil platform killed eleven workers and generated a huge underwater oil gusher, which dumped a total of 170 million gallons of crude oil into the Gulf of Mexico.18 The Deepwater Horizon disaster has come to stand for the new, environmentally perilous era of ultra-deepwater oil wells—offshore oil drilled at depths of more than a mile as a result of the development of more sophisticated technologies. (Deepwater oil drilling more generally involves drilling at depths of more than a thousand feet.)

Deepwater oil drilling is most advanced in the Gulf of Mexico, but is spreading in other places, such as Canada's Atlantic Coast, Brazil's offshore zone, the Gulf of Guinea, and the South China Sea. Still more ominous from an environmental standpoint is the drive by oil companies and the five Arctic powers (the United

States, Canada, Russia, Norway, and Denmark) to drill deepwater wells in the Arctic—made increasingly accessible due to global warming. Meanwhile, pressure is mounting to open up the outer continental shelf off the U.S. Atlantic and Pacific coasts to offshore oil drilling.19

In the face of the rush by capital to extract unconventional fossil fuels in ever-greater amounts, climate activists are seeking new means of resistance. The "Do the Math" strategy of 350.org is focused on the necessary divestment in fossil fuels, to be replaced by clean energy sources. Some financial analysts have been sounding the alarm with respect to the carbon budget imposed by the red line of a 2°C increase in global average temperature—referred to as a planetary tipping point or "point of no return" with respect to climate change. Climate scientists fear that once this point is reached processes will be set in motion that will make climate change irreversible and out of human control.20 It will no longer be possible to stop the progression to an ice-free world. Staying within the global carbon budget means that further carbon emissions are limited to considerably less than 500 billion metric tons (of actual carbon), according to Oxford climatologist Myles Allen and scientists associated with trillionthtonne.org. This means that most of the world's current proven fossil-fuel reserves cannot be exploited without initiating extremely dangerous—even irreversible—levels of climate change. And this limitation in turn threatens trillions of dollars of potential financial losses in what are now accounted as fossil-fuel assets—a phenomenon known as the "carbon bubble."21

While capital in the last few years has been triumphantly celebrating its increased ability to tap fossil fuels for decades to come, climate change has continued to accelerate—symbolized by the melting of Arctic sea ice to its lowest level ever recorded in summer 2012, with the total ice area receding to less than half the average level of the 1970s. The vanishing Arctic ice, which is melting far faster than scientists had predicted, suggests that the sensitivity of the earth system to small increases in global average temperatures is greater than was previously thought. The ice loss is of particular concern since it represents a positive feedback loop to climate change, accelerating the rate of global warming as the reflectivity of the earth declines—due to the replacement of white ice with dark seawater. The melting of Arctic sea ice, and the resulting "arctic amplification" (temperature increases in the Arctic exceeding that of the earth as a whole) is generating extreme weather events in the Northern hemisphere and worldwide through the "jamming" and redirection of the jet stream. As Walt Meier, a research scientist at the U.S. National Snow and Ice Data Center put it, "the Arctic is the earth's air conditioner. We're losing that."22

The growing incidence of extreme weather events—a phenomenon sometimes referred to as "global weirding"—is symbolized by Superstorm Sandy, which in October 2012 wreaked havoc from the Caribbean to New York and New Jersey. Australia's "angry summer" of 2012–2013 saw 123 separate extreme weather records broken in a mere ninety days.23 Meanwhile a scientific report in November 2012 revealed that Greenland and west Antarctica had lost more than 4 trillion metric tons of ice over the last two decades, contributing to sea level rise.24

Under these circumstances the increased exploitation of unconventional fossil fuels, made possible by higher oil prices and technological developments, has catastrophic implications for the climate. No less remarkable technological developments, however, have arisen at the same time in relation to renewable energies, such as wind and solar, opening up the possibility of a more ecological path of development. Since 2009 solar (photovoltaic) module "prices have fallen off a cliff."25 Although still accounting for a tiny percentage of electric-generating capacity in the United States, wind and solar have grown to about 13 percent of total German electricity production in 2012, with total renewables (including hydroelectric and biomass) accounting for about 20 percent.26 As the energy return on energy investment (EROEI) of fossil fuels has declined due to the depletion of cheap crude-oil supplies, wind and solar have become more competitive—with EROEIs above that of tar-sands oil, and in the case of wind even above conventional oil. Wind and solar, however, represent intermittent, location-specific sources of power that cannot easily cover baseload-power needs.27 Worse still, a massive conversion of the world's energy infrastructure to renewables would take decades to accomplish when time is short.

The Carbon War

The result of all these historically converging forces, dangers, and opportunities is an emerging fossil-fuels war: between those who want to burn more fossil fuels and those who want to burn less. Jeremy Leggett, a leader in the carbon-divestment movement, concluded his 2001 book, *The Carbon War*, with the observation that the giant fossil-fuel corporations "may well enjoy minor victories along the way. But they have already lost the pivotal battle in the carbon war. The solar revolution is coming. It is now inevitable. The only question left unanswered is, will it come in time?"28

The main battle lines of the carbon war are clear. On the one side, there are the dominant capitalist interests that have sought to address the decline of conventional crude-oil reserves through the incessant expansion of fossil-fuel resources. This has led to actual wars in the oil-rich Middle East and surrounding regions in an effort to gain control over the world's chief remaining "cheap oil" supplies. A decade ago, in 2003, the United States invaded Iraq, leading to what can only be called a continuous military intervention in the oil-rich regions of the Middle East, Central Asia, and Africa by the United States and "global NATO."29 These military incursions have been primarily related to the geopolitics of oil, and only secondarily to terrorism, weapons of mass destruction, and so-called "humanitarian intervention"—the main rationales provided.

Nevertheless, the main response of the capitalist system to the peaking of conventional crude oil has not been geopolitical expansion but rather development of the unconventionals. Not stopping with deepwater drilling, fracking, and the exploitation of tar-sands oil, the fossil-fuel industry, backed by the state, is now looking toward development of oil shale and methane hydrates—offering, if these can be brought online, what seems to be truly unlimited supplies of carbon, coupled with the prospect of unthinkable, catastrophic disruptions to the earth system.30

Today's business-as-usual interests refuse to accept any limits to continued expansion of fossil-fuel production. Establishment energy policymakers—as witnessed by the Obama administration and Council on Foreign Relations' senior energy analyst Michael Levi—see shale gas from fracking as a "bridge fuel" that will allow a reduction in carbon emissions until carbon capture and sequestration technologies can be developed sufficiently to be feasible, opening the way to supposedly unlimited exploitation of coal and other fossil fuels with zero carbon emissions. The fact that "clean coal" is a fairy tale never seems to enter the analysis.31 Most establishment energy proponents also favor biofuels as an added option, and support large hydroelectric facilities and nuclear energy, discounting the enormous ecological problems represented by all three—particularly nuclear power. Wind, solar, and biomass, in contrast, are viewed by industry as minor supplements to fossil fuels. Empirical research by environmental sociologist Richard York, published in *Nature Climate Change* in 2012, has verified that the introduction of low-carbon energy has been used mainly to supplement rather than actually displace fossil fuels within the global economy.32

ExxonMobil's CEO Rex Tillerson aptly summed up the overall outlook of today's fossil-fuel industry when he declared on March 7, 2013, that renewables such as "wind, solar, biofuels" would be supplying only 1 percent of total energy in 2040. He described the struggle against the Keystone XL Pipeline by "environmental groups…concerned about the burning of fossil fuels" as simply "obtuse," since they "misjudged Canada's resolve" (and no doubt that of the U.S. government) to exploit the tar sands—whatever the social and environmental cost. "My philosophy," Tillerson said, "is to make money."33

In the United States this addiction to fossil fuels is built into the Obama administration's "all of the above" energy strategy. The current Democratic administration is not only promoting the maximum extraction/production of unconventional fossil fuels in the United States and Canada, it is also actively encouraging other countries, such as China, Poland, the Ukraine, Jordan, Colombia, Chile, and Mexico to develop unconventionals as rapidly as possible. Meanwhile, Washington has used its influence in Iraq to get it to boost its crude oil production.34

The Obama administration has strongly underscored its support for coal, and has given a boost to nuclear power. It is also promoting the production of fracked natural gas globally as a "transition fuel." In the face of all of this, the administration's very limited support for the development of renewable energies—mainly via the Defense Department and federal-land-use policies—constitutes little more than governmental greenwashing, hardly discernible from the approach of the leading multinational oil companies themselves.35

To be sure, Obama has declared climate change a serious concern, and has supported modest, phased-in new fuel-economy standards for automobiles to come into effect by 2025. Recently, he has extended such fuel-economy standards to heavy-duty trucks, buses, and vans. He has also directed the Environmental Protection Agency to consider carbon-pollution limits for power plants.36

Such positions, however, have not prevented his administration from attempting to accelerate the production of the dirtiest fossil fuels. The administration's meager proposal to reduce U.S. carbon dioxide emissions by a mere 17 percent below 2005 levels by 2020 strongly belies any claims that it has to addressing the climate problem on the scale required. Congress's record in this area is even worse. Washington thus remains little more than a water carrier for the oil corporations and capital in general where climate policy is concerned, reflecting what Curtis White has called capitalism's "barbaric heart."37

On the other side is the burgeoning climate movement, propelled into massive direct action by the new threats from the unconventionals. Hansen's dire warning that it is "game over" if the Alberta tar-sands oil is exploited fully—with the tar sands themselves generating potentially enough carbon dioxide emissions to break the world's carbon budget, while also symbolizing the pressing need to draw a line in the sand in relation to unconventional fossil fuels—has had an electrifying effect on the movement on the ground. Over 50,000 people have pledged to put their bodies on the line to block Keystone XL Pipeline construction, thereby facing arrest if the Obama administration gives the northern leg of the pipeline a green light.38 Idle No More is fighting oil pipelines in Canada extending south, west, and east. This on-the-ground mobilization is combined with the growing fossil-fuels-divestment movement. Organized resistance to fracking meanwhile has been mounting as well. The main thrust of the climate movement has therefore shifted from demand-side initiatives aimed at reducing consumer-market demand for carbon fuels to supply-side strategies aimed at corporations and designed to keep the fossil fuels in the ground.

The shift to a supply-side struggle targeting corporations represents a maturing of the movement and a growing radicalization. Still, the more elite-technocratic and pro-capitalist elements, which appear to be in the driver's seat within the climate movement in the United States, remain wedded to the continuation of today's capitalist commodity society. The prevailing strategic outlook of the U.S. climate movement is largely predicated on the technologically optimistic assumption that there are currently available concrete alternatives to fossil fuels, particularly wind and solar, which, when combined with other renewable sources such as biomass, biofuels, and limited-scale hydroelectric power, will allow society to substitute renewable energies for fossil fuels in the near term *without altering society's social relations*. The solar revolution, it is often declared, is here.39

This outlook has allowed the movement to narrow its opposition to the fossil-fuel industry alone, confining its demands to keeping fossil fuels in the ground, blocking the transport of fossil fuels, and divesting in fossil-fuels corporations. As McKibben has stated, "movements need enemies" and the strategy has been to focus not on capitalism but on the fossil-fuel industry as a "rogue industry.... Public Enemy Number One."40 This has been highly successful in sparking the growth of the movement. Yet, there are serious questions with regard to where all of this is headed. Will the current struggle metamorphose into the necessary full-scale revolt against capitalist environmental destruction? Or will it be confined to very limited, short-term gains of the kind compatible with the system? Will the movement radicalize, leading to the full mobilization of its popular base? Or will the more elite-technocratic and pro-capitalist elements within the movement leadership in the United States ultimately determine its direction, betraying the grassroots resistance?

These are questions for which there are no answers at present. In the current historical moment the struggle against the fossil-fuel industry is paramount—the basis of today's ecological popular front. Yet, a realistic outlook indicates that nothing short of a full-scale ecological and social revolution will suffice to create a sustainable society out of the planetary rift generated by the present-day capitalist order. The break with the relentless logic of the system cannot be long delayed.

The Revolution Against the System

A realistic historical assessment tells us that there is no purely technological path to a sustainable society. Although a rapid shift to renewables is a crucial component of any conceivable path to a carbon-free, ecological world, the technical obstacles to such a transition are much greater than is usually assumed. The biggest barrier is the up-front cost of building an entirely new energy infrastructure geared to renewables rather than relying on the existing fossil-fuel infrastructure. Construction of a new energy infrastructure requires vast amounts of energy consumption, and would lead—if current consumption and economic growth were not to be reduced—to further demands on existing fossil-fuel resources. This would mean, as ecological economist Eric Zencey has explained, "an aggressive expansion of the economy's footprint in paradoxical service to the goal of achieving sustainability." Assuming the average EROEI of fossil fuels keeps falling, the difficulty only becomes worse. Ecological economists and peak-oil theorists have dubbed this the "energy trap." In Zencey's words, "The problem is rooted in the sunken energy costs of the petroleum infrastructure (which makes the continued use of petroleum energetically cheap)" even when the EROEI of such fossil fuels in the case of unconventionals is lower than wind and solar.[41] It follows that building an alternative energy infrastructure—without breaking the carbon budget—would require a tectonic shift in the direction of energy conservation and energy efficiency.

Kevin Anderson, a leading British climate scientist and the deputy director of the Tyndall Institute for Climate Research, explained in a 2012 interview with *Transition Culture* that while it is imperative that we drastically cut fossil fuel use,

> we cannot deliver [this] reduction by switching to a low carbon energy supply, we simply cannot get the supply in place quickly enough. Therefore, in the short to medium term the only major change that we can make is by consuming less. Now, that would be fine, we could become more efficient in what we consume by probably [a] 2–3% per annum reduction. But bear in mind, if our economy was growing at 2% per annum, and we were trying to get a 3% per annum reduction in our emissions, that's a 5% improvement in the efficiency of what we're doing each year, year on year.
>
> Our analysis [at the Tyndall Institute] for 2°C suggests we need a 10% absolute reduction per annum [in carbon dioxide emissions in the rich countries], and there is no analysis out there that suggests that this is in any way compatible with economic growth. If you consider the *Stern Report* [*on Climate Change*], Stern was quite clear that there was no evidence that any more than a 1% per annum reduction in emissions had ever been associated with anything other than "economic recession or upheaval," I think was the exact quote.[42]

In Anderson's view, the only hope is to shift rapidly from a capitalist-growth economy to a steady-state economy—or, at the very least, to place a moratorium on economic growth for several decades while society's surplus resources are devoted to the transformation of the energy infrastructure. This would require, he says, "the community approach, the bottom-up approach," with the population mobilizing on its own behalf and that of future generations to create a new "emergent" reality. Such a social and ecological transformation would necessitate a move towards social conservation, even short-term rationing. Ecological planning of production and consumption, and energy use, would be essential.[43] In the words of the Royal Society of London, one of the world's oldest scientific bodies, it is now necessary to "develop socio-economic systems and institutions that are not dependent on continued material consumption growth."[44]

If we go beyond the climate change issue and examine the entire global ecological crisis the logic behind such

reasoning is inescapable. In 2009 leading earth-system scientists led by Johan Rockström of the Stockholm Resilience Center introduced what is known as the "planetary boundaries" approach to determining the "safe operating space" for human beings on the planet, using as their baseline the biophysical conditions associated with the Holocene geological epoch in earth history—the last 10,000–12,000 years which nurtured the rise of civilization. The global ecological crisis can thus be defined as a sharp and potentially irreversible departure from Holocene conditions.45

This analysis of a "safe operating space" for humanity established a system of natural metrics in the form of nine planetary boundaries. In the case of three of these—climate change, biodiversity loss, and the nitrogen cycle (part of a boundary together with the phosphorus cycle)—the planetary boundaries have already been crossed. While in the case of a number of other planetary boundaries—the phosphorus cycle, ocean acidification, global freshwater use, and change in land use—alarming trends suggest that these boundaries will soon be crossed as well. Climate change is therefore only one part of a much larger ecological crisis facing humanity, traceable to the exponential growth of an increasingly destructive economic order within a finite planetary system.

These considerations all point to the limitations of what appears to be the governing outlook of the climate movement, promoted by its elite-technocratic elements. The current ecological popular front has its basis in its singular opposition to fossil fuels and the fossil-fuel industry, and is largely premised on the notion the solar revolution will provide the solution to the climate problem, allowing for the continuation of the current socioeconomic order with relatively few adjustments. However, stopping climate change and the destruction of the environment in general requires not just a new, more sustainable technology, greater efficiency, and the opening of channels for green investment and green jobs; it requires an ecological revolution that will alter our entire system of production and consumption, and create new systems geared to substantive equality, and ecological sustainability—a "revolutionary reconstitution of society at large."46 It means comprehending, as Marx presciently did in the nineteenth century, the metabolic relation between society and nature based in production itself—and the dangers associated with capitalism's growing metabolic rift. For Marx, the very destruction of "that metabolism" in the human relation to nature "compels its systematic restoration as a regulative law of social production, in a form adequate to the full development of the human race."47

The materialist conception of history has often been interpreted in ways—contrary to Marx—that systematically excluded ecological conditions from the analysis. Yet an argument can be made that the working class during its most class-conscious and revolutionary periods has been just as concerned with overall living conditions—including urban and rural community and the interaction with the natural environment—as with working conditions (in the narrow sense). A clear indication of this, reflecting the times in which it was written, is provided by Engels's 1844 *Condition of the Working Class in England*, where environmental conditions were presented as of even greater importance to the overall material conditions of the working class than factory conditions—although the root cause resided in the class basis of production.48 In today's world, the undermining of the lifeworld of the great majority of the population is occurring in relation to both economy and environment. We can therefore expect the most radical movements to emerge precisely where economic and ecological crises converge on the lives of the underlying population. Given the nature of capitalism and imperialism and the exigencies of the global environmental crisis, a new, revolutionary environmental proletariat is likely to arise most powerfully and most decisively in the global South. Yet, such developments, it is now clear, will not be confined to any one part of the planet.49

The "bottom line" in an accounting ledger is one of capitalism's most enduring metaphors. We are now facing an ecological bottom line—a planetary carbon budget together with planetary boundaries in general—that represents a more fundamental accounting. Without a thoroughgoing transformation of production and consumption, and also social consciousness and cultural forms, the world economy will continue to emit carbon dioxide on a business-as-usual basis, pushing us all the way to the redline of 2°C and beyond—to a world in which climate change is increasingly beyond our control. In Hansen's words: "It is not an exaggeration

to suggest, based on [the] best available scientific evidence, that burning all fossil fuels could result in the planet being not only ice-free but human-free."50

Under these conditions what is needed is a decades-long ecological revolution, in which an emergent humanity will once again, as it has innumerable times before, reinvent itself, transforming its existing relations of production and the entire realm of social existence, in order to generate a restored metabolism with nature and a whole new world of substantive equality as the key to sustainable human development. This is the peculiar "challenge and burden of our historical time."51

Notes

1. ↩ See John Bellamy Foster, *The Ecological Revolution* (New York: Monthly Review Press, 2009), 85–105; International Energy Agency, *World Energy Outlook 2010* (OECD/IEA, 2010), 125–26; Ramez Naam, *The Infinite Resource* (Lebanon, NH: University Press of New England, 2013), 47.
2. ↩ Pushker A. Kharecha and James E. Hansen, "Implications of 'Peak Oil' for Atmosphere CO2 and Climate," *Global Biogeochemical Cycles* 22 (2008): 1–10. The term "unconventional fossil fuels" is commonly used to refer to: fossil-fuel feedstocks that have not been intensively exploited up to the present, usually because they are of inferior grade and/or require additional technology and added costs for extraction and processing, such as heavy oils, oil sands, shale gas, tight oil, tight gas, oil shale, methane hydrates, and oil from deepwater drilling. "Unconventional Fossil Fuels," *Juice: Alternative Fuels World*, http://alternatefuelsworld.com, accessed July 15, 2013; International Energy Agency, "Glossary of Terms" ("Unconventional Gas" and "Unconventional Oil"), http://iea.org, accessed July 15, 2013.
3. ↩ Charles C. Mann, "What If We Never Run Out of Oil," *Atlantic* 311, no. 4, May 2013, 54, 63.
4. ↩ Michael T. Klare, *The Race for What's Left* (New York: Henry Holt, 2012), 106.
5. ↩ Bill McKibben, "The Fossil Fuel Resistance," *Rolling Stone*, April 25, 2013, 42.
6. ↩ The Keystone XL Pipeline is actually part of the larger Keystone pipeline system. The first two phases of this are already completed and the third phase, the southern leg, will soon be finished. When this is done Alberta tar-sand oil will begin to flow to the Gulf. But the completion of the critical northern line (phase 4) will provide a more direct route and will carry about twice the oil. As Candice Bernd has written: "James Hansen called the [Keystone XL] project 'the fuse to the largest carbon bomb on the planet.' … The northern, cross-border expansion of the project would make that fuse burn faster, doubling the Keystone pipeline system's carrying capacity to more than 800,000 barrels a day." Candice Bernd, "Tar Sands Will Be Piped to the Gulf Coast, With or Without the Northern Segment of Keystone XL," *Truthout*, April 29, 2013, http://truth-out.org.
7. ↩ David Biello, "How Much Will Tar Sands Oil Add to Global Warming?," *Scientific American*, January 23, 2013, http://scientificamerican.com.
8. ↩ James Hansen, "Game Over for the Climate," *New York Times*, May 9, 2012, http://nytimes.com, and "Keystone XL: The Pipeline to Disaster," *Los Angeles Times*, April 4, 2013, http://articles.latimes.com.
9. ↩ Glenn Gilchrist, "Transportation—Alberta Achilles Heel," April 5, 2013, http://world.350.org; Reid McKay, "Canada Losing Massive Wealth on Oil Price Differential," *CEO.CA*, February 13, 2013, http://ceo.ca; David Biello, "Greenhouse Goo," *Scientific American* 309, no. 1 (July 2013): 61.
10. ↩ David Sassoon, "Crude, Dirty and Dangerous," *New York Times*, August 20, 2012, http://nytimes.com; David Biello, "Does Tar Sand Oil Increase the Risk of Pipeline Spills?," *Scientific American*, April 4, 2013, http://scientificamerican.com.
11. ↩ McKibben, "The Fossil Fuel Resistance," 40; Michael Levi, *The Power Surge* (New York: Oxford, 2013), 81; "What's Next in the Ongoing Keystone XL Saga," *U.S. News & World Report*, April 5, 2013, http://usnews.com.

12. ↩ See Jacob Devaney, "Idle No More: Hints of a Global Super-Movement," *Common Dreams*, January 3, 2013, http://commondreams.org; "First Nations Group Calls for B.C. to Reject Northern Gateway Pipeline Work Permits," *Vancouver Sun*, June 27, 2013, http://vancouversun.com; Brooke Jarvis, "Idle No More: Native-Led Protest Movement Takes on Canadian Government," *Rolling Stone*, February 4, 2013, http://rollingstone.com.

13. ↩ Ohio Environmental Council, "What is Fracking?," http://theoec.org, accessed July 29, 2013; "Baffled About Fracking? You're Not Alone," *New York Times*, May 13, 2011, http://nytimes.com; Levi, *The Power Surge*, 41–49.

14. ↩ "Rise in U.S. Gas Production Fuels an Unexpected Plunge in Emissions," *Wall Street Journal*, April 18, 2013, http://online.wsj.com. Such figures are of course misleading in terms of the overall climate problem, since the coal industry has responded to the increased competition of natural gas by increasing coal exports to China and elsewhere. Indeed, a study by John Broderick and Kevin Anderson of the Tyndall Climate Change Research Institute has indicated that "more than half of the emissions avoided in the U.S. power sector [in 2008–2011] may have been exported as coal." Thus they conclude that "without a meaningful cap on global carbon emissions, the exploitation of sale gas reserves is likely to increase total [global] emissions." John Broderick and Kevin Anderson, *Has US Shale Gas Reduced CO2 Emissions?*, Tyndall Manchester Climate Change Research, October 2012, http://tyndall.ac.uk, 2. U.S. coal exports help fuel Chinese industry, which then sells a larger part of their output back to the United States. It has been estimated that the United States imported 400 million tons of embedded carbon in Chinese goods in 2008 alone. Bill Chameides, "On U.S. Greenhouse Gas Emissions and Cognitive Dissonance," *The Green Grok*, November 14, 2012, http://blogs.nicholas.duke.edu.

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38. ↩ George Lakey, "I Pledge Allegiance, To Resist the Pipeline," *Waging Nonviolence*, March 12, 2013, http://wagingnonviolence.org. In his June 2013 remarks introducing his "climate action plan" Obama ambiguously stated that the Keystone XL Pipeline project would be disapproved if it was shown to "significantly exacerbate the problem of carbon pollution." The inclusion of the word "significantly" naturally allows the administration the maximum latitude to come down on the side of the fossil fuels industry if it so chooses.
39. ↩ See, for example, Jeremy Leggett, *The Solar Century* (London: GreenProfile, 2009). This technocratic approach is a product of Leggett's whole history, first as a geologist consulting for the oil industry, then as a Greenpeace leader, then as CEO for Britain's first solar power corporation, and finally as the

founder of Carbon Tracker.

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42. ↩ "An Interview with Kevin Anderson," Transition Culture, November 2, 2012, http://transitionculture.org; Nicholas Stern, The Economics of Climate Change: The Stern Review (Cambridge: Cambridge University Press, 2007), 232. A similar criticism (to that of Anderson) of the Stern Review's contention that carbon emission reductions of more than 1 percent per annum were detrimental to the capitalist economy and thus had to be off limits was made in John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift* (New York: Monthly Review Press, 2010), 154–56.

43. ↩ Kevin Anderson interview; Kevin Anderson and Alice Bows, "Beyond 'Dangerous Climate Change': Emission Scenarios for a New World," *Philosophical Transactions of the Royal Society* 369 (2011): 40–41. We might add that what would make a vast reduction in consumption possible while at the same time improving the conditions of most of the population is the massive amount of waste built into monopoly capitalist society, associated with the prodigious expansion of superfluous goods, and vast marketing expenses. Such socially unnecessary expenditures, as Thorstein Veblen explained at the outset of the twentieth century, are built into the production of commodities themselves. See John Bellamy Foster and Brett Clark, "The Planetary Emergency," *Monthly Review* 64, no. 7 (December 2012): 7–16; Thorstein Veblen, *Absentee Ownership and Business Enterprise in Recent Times* (New York: Augustus M. Kelley, 1964), 284–325.

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47. ↩ Karl Marx, *Capital*, vol. 1 (London: Penguin, 1976): 637–38.

48. ↩ Frederick Engels, *The Condition of the Working Class in England* (Chicago: Academy Chicago Publishers, 1984).

49. ↩ The notion of an environmental proletariat is advanced in Foster, Clark, and York, *The Ecological Rift*, 440. See also Fred Magdoff and John Bellamy Foster, *What Every Environmentalist Needs to Know About Capitalism* (New York: Monthly Review Press, 2011), 143–44. An example of the growth of a broad alliance of working people is the Idle No More movement in Canada, in which popular environmental groups, the National Farmers Union, and, increasingly, unionists are allying themselves with a movement led by First Nations, and organized around their treaty rights—in opposition the Canadian government's rapacious extractivist policies. Much of the struggle has centered on resistance to tar-sands oil extraction/production, focusing on native land and water rights. See Gene McGuckin, "Why Unionists Must Build the Climate Change Fight," *Climate & Capitalism*, May 2, 2013, http://climateandcapitalism.com; "Farmers Union: Why We Support Idle No More," *Climate & Capitalism*, April 3, 2013, http://climateandcapitalism.com.

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