CHAPTER SIX

Cheap Energy

> Here would be a good site for a town or fort, by reason of the good port, good water, good land and an abundance of fuel.
>
> Journal of Christopher Columbus, Tuesday, November 27, 1492

Before Columbus reached the New World, the sugar industry that had schooled him burned Madeira. The trees of Madeira (Portuguese for "wood") were transformed from shipbuilding material to fuel to ashes. This wood became a source of energy not just through some innate property but through specific human relations. Just as the graphite in a pencil might instead become stuff for a hearth or peat transforms from a fertilizer to a combustible for the fireplace or cow dung moves from being a soil amendment to being a cooking fuel, wood was transformed by the relations around it. The configuration of capitalism's ecology has shaped humans' interaction with trees.

Fire has been part of the earth ever since there were things on dry land to burn.[1] Before humans, fire had its rhythms, feeding on several seasons of accumulated kindling and fanned by propitious climate oscillations. Humans have, in their turn, set

fire to a wide range of things. It's through cooking that *Homo erectus* became *Homo sapiens*.[2] Grasses were the first fuel, but buffalo dung endures as a rich source of heat. Herodotus observed that fatted animal bones were a fuel in Scythia.[3] Charred mammoth bones suggest the long history of humans' relationship with flames. The Maori colonization of Aotearoa (New Zealand) led to the loss of half its forest.[4] But humans have also recognized the need to stint. *Stint* is usually translated as "forgo"—to perform an act of sacrifice against present consumption—but it's more accurate to understand it as an indelible part of present consumption. You can find such a decision in the Chow dynasty (1122–256 BCE), which engaged in early attempts at forest management, including the establishment of a Police of Forest Foothills.[5] The empire stinted to maintain an energy source.[6]

Capitalism's ecology has a distinctive pyrogeography, one that is part of the fossil record. Indigenous People had thoroughly modified New World landscapes through fire. In eastern North America, they coproduced the "mosaic quality" of forest, savannah, and meadow that Europeans took for pristine nature.[7] Between Columbus's arrival and around 1650, disease and colonial violence reduced Indigenous populations in the Americas by 95 percent. With fewer humans burning and cutting them down, forests recovered so vigorously that the New World became a planetary carbon sink. Forest growth cooled the planet so much that the Indigenous holocaust contributed to the Little Ice Age's severity.[8] By the middle of the seventeenth century, some of the early modern era's worst winters were being recorded across Eurasia and the Americas. Not coincidentally, it was an era of bitter war and political unrest, from Beijing to Paris.[9] To reprise an idea from the introduction, it would be wrong to characterize this episode of genocide and reforestation

as anthropogenic. The colonial exterminations of Indigenous Peoples were the work not of all humans, but of conquerors and capitalists. *Capitalogenic* would be more appropriate. And if we are tempted to conflate capitalism with the Industrial Revolution, these transformations ought to serve notice that early capitalism's destruction was so profound that it changed planetary climate four centuries ago.[10]

For many commoners in Europe and beyond, forests and woodlands were—and remain—as essential to survival as food. The destruction of the commons involved more than the creation of hunger. It also removed common rights to gather wood, imposing a poverty of fuel and construction material. In feudal Europe, demographic and settlement expansion in the eleventh and twelfth centuries led to conflict not just over farmland but also over access to forests, which had become lucrative income sources for nobles and kings.[11] When England's King John was forced to sign the Magna Carta in 1215, it's significant that he was also compelled to sign a second document at the same time: the Charter of the Forest. Where the Magna Carta turns on legal and political rights, the Charter of the Forest was about "economic survival": securing for peasants something called estovers, a broad category of subsistence wood products.[12] The Forest Charter was an assurance of English commoners' access to fuel, food, and building materials.

In Germany, as Peter Linebaugh notes, "the first great proletarian revolt of modern history, the Peasants' Revolt of Germany in 1525, demanded the restoration of customary forest rights."[13] These included rights to use "'windfall wood, rootfall trees, and inbowes,' where these latter were defined 'also only to so much thereof as the bees do light on, and the honey that shall be found in the tree, but not to cut any main bough or tree itself

by color thereof.'"[14] People have been fighting for centuries over the fuel and construction material that wood can become. It's worth mentioning all this because it's too often forgotten that capitalism's energy revolution began not with coal but with wood—and with the privatization that forest enclosure implies.

This is not to privilege a European and North American history of energy over the histories of deforestation in, say, China. Notwithstanding the moderating effects of the forest police, China's great deforestation one thousand years ago had consequences that persist today: at ten cubic meters (353 cubic feet), the country's per capita forest reserves are an eighth of the world average.[15] But China's world-ecology wasn't committed to global conquest. Europe's was.

The reason to look at energy in Europe lies in the different use of fuel—a kind of cheap nature—as an intrinsic part of capitalism's ecology. Cheap energy is a way of amplifying—and in some cases substituting for—cheap work and care. If cheap food is capitalism's major way of reducing the wage bill, cheap energy is the crucial lever to advance labor productivity. The two can function as a logical sequence, even if the actual history is more complex. First, peasants must be ejected from the commons. These new workers must find wage work in some form. Second, the workshops and factories that employ these workers have to compete with one another. And while there's a long history of bosses' overworking their employees, the competitive struggle between capitalists is ultimately decided by labor productivity. We normally think of labor productivity—that is, the production of more commodities per average hour of work—as something determined by machines. But capitalist machines function because they draw on the work of extrahuman natures, and these have to be cheap, because the demand is limitless. For this

reason, the enclosure of terrestrial commons coincided with the enclosure of the subterranean world. At the very moment when peasant life was turned upside down in sixteenth-century England, the country's great coal mines were pumping out coal by the thousands of tons. Here a new layer of cheapness emerges in our picture of the world: capitalism's global factory requires not just a global farm and a global family, but a global *mine* as well.

In this chapter we explore how energy became one of capitalism's cheap things through energy revolutions in Europe and the Americas, and what cheap energy means for the twenty-first century's global ecology. Energy qualifies as a "thing" insofar as it is transformed from part of the web of life into a commodity to be bought and sold. Fossilized life becomes stuff for a fire and an engine's fuel tank only through capitalism's ecology. But capitalism's energy system does several tasks at once. It makes both energy and inputs cheaper: cheap coal makes cheap steel; cheap peat makes for cheap(er) bricks. This reduces the costs of doing business and enhances profitability.[16] Cheap energy also helps keep labor costs down, by controlling one of the largest costs (after food) in a family budget. While enclosure made energy more expensive for most peasants by removing their access to the commons—where, in many parts of the world, collecting resources had fallen to women—it also pulled workers into the cash economy, where they had to pay for their building materials and fuel.[17] Controlling energy costs was another way to manage and sustain cheap work. Energy has always been an indispensable part of life, but to show how it is an indispensable part of capitalism's ecology, we need to begin with a place sitting on top of energy reserves so prodigious that this country scooped itself out of the earth: the Netherlands.[18]

THE DUTCH DISEASE

Let's begin with the words of Peter Voser, who in 2012 was the CEO of Royal Dutch Shell:

> In the United States, for example, the American Petroleum Institute estimates that the industry supports more than nine million jobs directly and indirectly, which is over 5% of the country's total employment. In 2009 the energy industry supported a total value added to the national economy of more than US$ 1 trillion, representing 7.7% of US GDP.
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> Beyond its direct contributions to the economy, energy is also deeply linked to other sectors in ways that are not immediately obvious. For example, each calorie of food we consume requires an average input of five calories of fossil fuel, and for high-end products like beef this rises to an average of 80 calories. The energy sector is also the biggest industrial user of fresh water, accounting for 40% of all freshwater withdrawals in the United States. . . .
>
> Powerful actors need to make the role of the energy sector and the benefits of our work clear, while demonstrating that we can be trusted to work together across boundaries to face the challenges ahead. In return, society at large will grant a license to operate that is too often missing today.[19]

It was part of Voser's job to engineer the triumph of the fossil fuel industry, over the protests of those such as the Ogoni Ken Saro-Wiwa, who was put to death in 1995, his life rendered cheap by Royal Dutch and Nigeria because he organized against them.[20] As the official history of the company—which was founded to develop oil fields in what is now Indonesia—puts it, "The rise of the Royal Dutch was rendered possible only by the victory in the field of colonial policy of those liberal principles according to which the interests of Asiatic Dominions are best served by the free competition of Western capital and Western labour in the development of the resources of these tropical

regions."[21] As the boom, deforestation, and bust of Madeira over seventy years show, capitalism's insatiability for fuel is part of its ecology. Royal Dutch is just the latest player in a long history of cheap energy.

This company was made possible by revenues, and finance, based on a fuel crisis in the fifteenth-century Netherlands, several centuries before its founding. Dutch soil was once filled with black gold: not oil but peat, an energy source still used today for heating and even for generating electricity.[22] It's the youngest of the fossil fuels and offers about two-thirds the energy of coal by weight.[23] Peat is coal's precursor. After enough time and pressure, the former becomes the latter, and peat—and thus coal—was once wetland vegetation. As this vegetation decayed in northern and central Europe, it formed pillow-shaped layers more than a mile (1.6 kilometers) in diameter, which accumulated into raised bogs. By the early Middle Ages, these reached around fifteen feet (4.6 meters) above sea level. Beginning in the eleventh century, however, peasants gathered peat for heating, salt processing, and sale. Mining this topsoil made the Low Countries even lower—and vulnerable to climate change. Indeed, as northern Europe's climate turned colder, wetter, and more turbulent at the end of the thirteenth century, flooding increased across Europe, especially in the North Sea region, where land was sinking. Soggy soils didn't make for fertile land. We know this because taxes on grain cultivation plummeted by 1400 as an agroecological crisis deepened.[24] Surrounding the cities of Amsterdam, Rotterdam, and Utrecht were landscapes that resembled "Swiss cheese, with dozens of water-filled, exhausted peat bogs often separated from each other by nothing more than narrow, vulnerable strips of land on which were scattered the structures of what once had

been farms."[25] Climate change and the removal of peatlands coproduced a truly disastrous situation: by 1500, "the North Sea threatened to drown Dutch society."[26] At that point, grain farming had virtually disappeared from the coastal regions.[27]

This had consequences for the Dutch economy. In England, workers were made by the enclosure of land.[28] In the Netherlands, they were made by sinking peat bogs and were dug out by the needs of an expanding dairy and cattle industry.[29] Peat also hooked the country on cheap energy. During the seventeenth century, one and a half million tons of peat were dug out and shipped to the republic's growing cities every year; more than eight thousand boatloads arrived in Amsterdam in 1636 alone.[30] By 1650, the Dutch Republic's per capita energy consumption was higher than India's in 2000.[31]

While the Dutch peasantry was having an increasingly hard time, Dutch capitalism was thriving. Indeed, the latter thrived *because* the former were becoming workers in cities.[32] Central to this process was cheap food. The Dutch began the long sixteenth century with the highest grain prices in western Europe and ended it with some of the lowest.[33] As we mentioned in the previous chapter, this grain came from a frontier in Poland, a country with fertile soils along the Vistula and landlords who were ready to fall into "international debt peonage."[34] Inventive financial arrangements sent Andean silver swiftly out of Amsterdam and Antwerp to Poland in exchange for wheat and rye. The trade deficit formed part of a strategy to keep cheap food flowing to the growing Dutch cities. Just as in Madeira, the Polish rye and wheat boom lasted fifty to seventy-five years. By the 1660s, soil erosion had nearly halved yields, and capitalism's ecology had deepened and expanded beyond Poland's thinned land.[35]

The Dutch owed their superpower status to both an agricultural and an energy revolution. These comprised not just large-scale peat extraction but also the pioneering application—and technological development—of wind power to a wide range of industrial pursuits.[36] From the mid-sixteenth century, windmills of every kind punctuated the Dutch landscape. Along the river Zaan, just to the north of Amsterdam, there were six hundred industrial windmills by the 1730s, one every hundred meters (328 feet).[37]

But the Dutch road to capitalism faced three serious constraints to expansion after 1650. One was that the country had no forests to speak of. This was overcome through the power of ready cash—a resource that it had in abundance. Dutch merchants reached across the North Sea and into the Baltic for cheap timber and a wide range of forest products, necessary not only for shipbuilding but also for bleaching textiles. A second problem was less tractable. Peat was abundant but never particularly cheap. Its cost rose 50 percent faster than the price index in Antwerp between 1480 and 1530.[38] Even with innovations after 1530 that allowed peat extraction below the waterline, prices continued their upward trend, tripling in the northern Netherlands in the century after 1560.[39] Coal was imported, from nearby Liège (now in Belgium) but especially from England, in growing volumes—some sixty-five thousand tons a year by the 1650s.[40] That represented a lot of energy, and the leading energy-intensive industries shifted to coal when possible. Sugar refiners—whose giant five-story buildings were the closest thing to a modern factory you'd see in the seventeenth century—burned so much coal that Amsterdam's city council banned the practice in 1614. But as the city's refineries multiplied—there were a

hundred by century's end—so too did demand for cheap, or at least cheaper, energy. Despite the earlier bans that had registered the "insufferably great sorry" that coal burning inflicted on Amsterdam's citizens, year-round coal burning was legalized in 1674.[41] Peat was cleaner but coal cheaper.

These steps could not solve the Netherlands' third problem: the high cost of labor. Dutch success was premised on an agrarian crisis that produced "an elastic supply of labour of proto-proletarians."[42] That elasticity was gone by 1580, and Dutch wages remained the highest in Europe until the middle of the eighteenth century.[43] By 1650—and probably earlier—Dutch capitalists had the highest wage bill in Europe, one that moved still higher after 1680. Between 1590 and 1730, Dutch wages were never less than a third higher than those in the England, and frequently twice that.[44] But, due in no small part to their far more territorial forms of colonialism, the English were soon to catch up.

The transitions to large-scale peat digging in the Netherlands and coal mining in England occurred simultaneously, in the 1530s and 1540s.[45] Our imaginary of the Industrial Revolution tells us that fossil fuels were invented in the eighteenth century—but in fact they, like so much else, were a product of the long sixteenth century. The first great industrialization occurred in the century or so after 1450, unfolding in the great sugar-planting and silver-mining frontiers, as we've seen, but also in shipbuilding, brewing, glassmaking, printing, textiles, and iron and copper smelting.[46] All, in one way or another, consumed prodigious amounts of energy.

In modest amounts, coal had been mined and burned for a very long time; for the Romans, it was the "best stone in Britain."[47] In the century after 1530, England's coal output climbed dramatically, growing eightfold.[48] In Newcastle alone, where coal was king, production grew nearly twentyfold between the 1560s

and 1660s, accounting for perhaps a third of all English coal.[49] Coal may have been king in Newcastle, but on a per capita basis, the production of Dutch thermal energy equaled—and mechanical energy exceeded—England's in the seventeenth century.[50] But Dutch energy just wasn't *cheap* enough. England was hardly a low-wage economy at the time, and real wages were also rising fast, despite the success of enclosure and dispossession. Starting at a lower point than those of the Dutch, English wages increased much faster, nearly doubling in the century after 1625.[51] With coal, the English economic advantage was decisive: "The burden of high wages in England, however, was offset by cheap energy."[52]

The high cost of workers and the availability of abundant cheap energy in England drove a series of the eighteenth century's technological breakthroughs: the use of a coal derivative, coke, to make iron, and of the Newcomen steam engine to drain coal mines, whose increasing depths meant constant flooding.[53] Coke had been known since the seventeenth century, but it took a long series of innovations between 1709 and 1755—usually credited to Thomas Darby—to make it profitable for iron production.[54] This liberated England from dependence on charcoal. Coke-fired iron, just 7 percent of English iron output in 1750, accounted for 90 percent in 1784.[55] The cost of producing a ton of iron collapsed, falling 60 percent in the eighteenth century. Cheap energy made cheap iron made cheap tools and machines. So long as abundant energy could be extracted, labor and capital costs were saved, and raw materials became cheaper.[56]

We're not presenting this as a pure English technological miracle. Some explanations would have us think that there would be no real capitalism without English coal. Indeed, coal's significance is easily overstated: the major innovations in textile manufacturing, such as the mechanical loom and the spinning

jenny, preceded rather than followed steam's widespread introduction, and as late as 1868, 92 percent of Britain's merchant fleet was powered by wind, not coal.[57] We know enough to realize that capitalism's frontier is nothing if not inventive. It is possible to imagine an English history without coal, with more energy imported and discovered, and to imagine a nineteenth century even more prone to social revolt and revolution than it was. While we suggest that such social turmoil will be the fate of a twenty-first century without frontiers of cheap nature, it's important to understand how cheap energy has intersected with food, care, money, and work in order to see the social order produced through them. We thus present three key twentieth-century moments involving international conflicts around energy.

TWENTIETH-CENTURY FOOD

The first, and arguably the most important, instance in which cheap energy matters today is the Haber-Bosch process, industrialized in the Rhineland-Palatinate laboratories of Badische Anilin- und Soda-Fabrik (BASF) and patented on October 13, 1908. Fritz Haber, a researcher at the University of Karlsruhe, demonstrated a method of using high-temperature and high-pressure industrial chemistry to react hydrogen (H_2) with atmospheric nitrogen (N_2) to produce ammonia (NH_3). Carl Bosch, a BASF engineer, solved substantial mechanical problems involving an operating environment of more than one hundred atmospheres (1,470 pounds per square inch, or 103 kilograms per square centimeter) to commercialize this reaction.[58] There were strategic imperatives behind their research. Guano, an important source of ammonia, had been mined prodigiously and been replaced by Peruvian saltpeter (sodium nitrate, $NaNO_3$) from

the Atacama Desert.[59] This "white gold" was vital to the production of gunpowder and to soil fertility, and the British controlled its trade.[60] The Haber-Bosch process delivered a substitute—one so significant that Haber won a Nobel Prize in 1918 and Bosch got his in 1931. As it happens, Alfred Nobel had made his fortune in explosives, and Haber's and Bosch's work provided Germany with key inputs for TNT and gelignite, which Nobel had patented. Their knowledge decoupled the manufacture of gunpowder from the extraction of resources from specific sites and allowed the production of weapons through the use of nothing but energy and air. More than one hundred million deaths in armed conflict can be linked to the widespread availability of ammonia produced by the Haber-Bosch process.[61]

But ammonia is also the stuff of life. Justus von Liebig, who inspired Marx's thinking on metabolism, declared in 1840 that the struggle of agriculture is to reliably produce digestible nitrogen.[62] Normally, the largely inert nitrogen in the air becomes bioavailable through either interaction with lightning or being fixed in soils by microorganisms. It is a prerequisite and, in the right amounts, a stimulant for plant growth. When nitrogen is made bioavailable through the Haber-Bosch process, there's a high energetic cost. The reaction requires hydrogen, which in turn requires cheap fuel. Today the hydrogen for fertilizer production comes primarily from natural gas, although coal and naphtha also work. This makes fertilizer production the largest energy input into US industrial agriculture.[63]

In transmuting air and fossil fuel into a fertilizer, the Haber-Bosch process has reduced the costs of food, work, and care.[64] On arrival, cheap inorganic fertilizer returned higher yields to landowning farmers and lower wages to field workers and sent waves of commodity food and displaced peasants to the cities.[65] This

made possible the growth of cereal mountains that found their way into the stomachs of livestock, whose flesh was then devoured by humans in the Global North and soon worldwide. With the end of World War II, ammonia was redirected from ammunition and now blasted into the soil. Two-thirds of the resulting cereal boom in the United States and Europe was used as animal feed. Haber-Bosch allowed the meatification—as Tony Weis puts it—of the global diet.[66] With meat increasingly marketed as an essential component of the modern meal, demand for feed soared. To meet it, farmers in Brazil cleared land to grow soy for livestock, a process that is alone responsible for 2 percent of all capitalogenic greenhouse gases each year.[67] Another example of the fertilizer-food nexus lies in this fact: fertilizer price manipulation contributed to the fall into poverty of forty-four million people during the last food price crisis, in 2007–8.[68] All of this, part of the project to destroy peasant agriculture and Indigenous foodways and replace them with a regime of industrial monocultures, would be unthinkable without energy made into a soil amendment.[69] Or, as Marx put it, "All progress increasing the fertility of the soil for a given time is a progress towards ruining the more long-lasting sources of that fertility. The more a country proceeds from large-scale industry as a background of its development . . . , the more rapid is this process of destruction. Capitalist production, therefore, only develops the techniques and the degree of combination of the social process of production by simultaneously undermining the original sources of all wealth—the soil and the worker."[70]

TWENTIETH-CENTURY COAL AND WORK

Keeping energy cheap requires sustained state intervention. State support is also necessary to keep reproductive labor free

and paid labor cheap. When the state fails, we see resistance politics emerge, as in movements as diverse as the twenty-first-century Occupy Nigeria and UK fuel protests.[71] The second twentieth-century connection to cheap fuel links modern protests to the 1525 Peasants' War. Remember that as part of the right to common in the forest, peasants wanted access to wood as fuel and construction material. The politics of resistance in the twentieth century is also linked to both housing and energy.

Workers need roofs over their heads—and roofs are not free. Houses in Colorado at the end of the nineteenth century were made with brick—lumber was far too expensive, while brick could be manufactured with locally available clay and coal. This manufacture made energy vital to housing. Mining technology lowered the price of coal, but labor remained 60–80 percent of its cost. Two ways to keep that cost down were to pay immigrant workers very little and to settle them in company towns, which compelled them to hand back wages for housing and services such as schools, cut-price English lessons, and recreational facilities. With little control over their lives, workers felt the company town akin to refeudalization rather than benign capitalism. When the Rockefeller-owned Colorado Fuel and Iron Company squeezed their wages, coal miners organized.[72] Their strike, from spring 1913 to winter 1914, remains a signal moment in US labor history. On April 20, 1914, around twenty men, women, and children were killed at a striker's camp in Ludlow, Colorado. Subsequent outrage, particularly against the mine owner, John D. Rockefeller Jr., led to congressional investigation and, fueled by further union organization, restrictions on child labor and the introduction of the eight-hour working day.[73]

Timothy Mitchell points out that the labor politics of carbon had a profound impact on the twentieth century. Set aside the

discussion of whether a particular country is "cursed" by a resource like fossil fuel or minerals.[74] Look instead at how the extraction of those resources built a working class that was able to resist its exploitation and whose demands for equality could be met through the energy its labor made profitable.[75] All of a sudden, national destinies could be dreamed far bigger than before—precisely because such national dreams were underwritten by cheap energy.

TWENTIETH-CENTURY OIL AND MONEY

The third story of cheap energy in the twentieth century comes from the transformation of energy into money and "the American way of life."[76] The United States was the preeminent oil power of the twentieth century. Although Russia had the pole position as the century opened, with the discovery of oil in Pennsylvania, Texas, and California, the United States quickly took the lead. By 1945, two of every three barrels of oil were produced in the United States.[77] Only in the 1970s did the Soviet Union and then Saudi Arabia displace America as the world's leading oil producer.[78] Global oil production grew prodigiously after World War II, outstripping the era's extraordinary economic growth by almost 60 percent.[79]

When the United States abandoned the gold standard in August 1971,[80] international capital sought refuge from this "Nixon shock" in commodity purchases. At the same time, the Soviet Union—following poor harvests—traded its oil for wheat, driving up the price of bread. Fourteen months later, the Organization of the Petroleum Exporting Countries (OPEC), nominally responding to the Yom Kippur War between Israel and Egypt, announced a 70 percent rise in the oil production

tax.[81] World oil prices leaped from three to twelve dollars per barrel. The OPEC countries were responding to the US export of dollar-denominated inflation. As the shah of Iran put it, the United States had "increased the price of wheat you sell us by 300 percent, and the same for sugar and cement."[82] The world paid the higher oil price, and the OPEC countries found themselves sitting on substantial income, reserves of what became known as petrodollars. These reserves needed a return, so they were cycled back to oil-importing countries as low-interest loans. Think of this as money backed not with silver but with oil—a "de facto oil standard."[83] The so-called Volcker shock of 1979 tripled the real interest rates on these petroloans over the next two years.[84] To avoid default, indebted countries, predominantly in the Global South, turned to the only lenders who'd consider them: the International Monetary Fund and the World Bank, institutions that could administer austerity programs, small governments, and free markets through their own shock doctrines.[85] Petrodollars thus made possible the sorry history of neoliberal governance.

The political economy of energy has, however, changed over the past two decades. During the 1980s and 1990s, the costs of bringing a new barrel of oil to the market grew by just under 1 percent a year. That shifted—dramatically—at the end of the century. Between 1999 and 2013, those costs climbed nearly 11 percent every year. In the most expensive oil fields—the top tenth of production, which often predicts future price trends—production costs increased tenfold between 1991 and 2007 and by another two-thirds since.[86] Cheap oil is coming to an end even as climate change is on its way to killing one hundred million people by 2030.[87] And that end is not only about future death; things are already dirtier and more violent than ever, as conflicts

stretching from Alberta to Ecuador replay a sixteenth-century battle between Indigenous Peoples and extractivists, once again with planetary implications.

Why is cheap oil so important? It's not that capitalism can't do without fossil fuels. After all, retailers and manufacturers don't care if their electricity comes from ancient fossils, windmills, or solar panels. Cheap oil is so important because today's capitalists don't wish to support the kinds of massive investment that would make a solar transition possible. Clearly, some businesses will cash in on various renewable energy initiatives. It is, however, hard to believe that all of the world's businesses will pitch in the forty-five trillion dollars necessary for a large-scale conversion to renewables by 2050.[88] If a solar transition is to happen under capitalism, it will only be because governments will pay for it.[89] Neoliberal practice has left governments with few policy prescriptions outside tax relief—and in countries like the United States, corporate taxation is already at historic lows, with self-styled "green" tech companies (Apple, Google) the greatest beneficiaries.[90] We will all end up paying to keep their share prices high.

We want to close with a discussion of the *cheap* in *cheap fuel*. The crisis of fuel isn't necessarily a crisis of scarcity or overproduction. The shift away from fossil fuels isn't the end of the regime of cheap energy. Indeed, the climate crisis has afforded an opportunity for finance to present itself as a mechanism of global salvation: it is through carbon credits, offsets, and permits to pollute the atmosphere that the atmosphere will be saved—or so we are told.[91] This is where commoning can finally be ended—through the full financial externalization of collective responsibility, turning what need to be collective decisions on the fate of the commons into a financial product in a global market.

Yet we cannot end a discussion of energy without observing that the International Energy Agency in 2016 announced that the capacity of renewable energy exceeds that of coal.[92] Does this render a discussion of cheap energy moot? Hardly. Look inside the batteries of the solar revolution, and you'll find blood minerals from the Democratic Republic of the Congo and Bolivia.[93] The lithium extraction complex in Bolivia looks like Potosí redux.[94] Damming rivers as a way of tackling climate change has been catastrophic—and part of a strategy to dispossess Indigenous Peoples.[95] Moving away from fossil fuel toward dams still leads to entirely predictable species extinction and may end up increasing greenhouse gas emissions with the decomposing ecology of human-made reservoirs.[96]

Above all, the strategy of cheap fuel doesn't depend on carbon. It has in the past but needn't in the future. Hydroelectric dams, for instance, reveal that the cheap energy strategy always depends on states. It requires the violence meted by public and private sectors, licensed by a world-ecology that stretches back to cheap nature and is possible only because of a collective understanding that cheap energy is part of the *national* bounty. Through collective ideas of communal nationhood, energy is secured in capitalism's ecology, from the subsidized petroleum in India through the oil revenues in Venezuela to the low gas prices in the United States that have substituted for real blue-collar wage growth. For the poor to bear the costs of energy projects, you need a governing set of ideas and institutions that can control and channel ideas of collective destiny in their name. To understand these covering ideas of collective destiny and violence, we move to our final cheap thing: lives.