# James Hansen and the Climate-Change Exit Strategy

John Bellamy Foster, *Monthly Review*, 2013

Humanity is not a bunch of lemmings marching unstoppably toward a cliff. There is such a thing as free will.... People please wake up! For the sake of young people, future generations, and other life on our planet, don't settle for what some "experts" say is the best we can do. —James Hansen[1]

## The Climate Cliff

The world at present is fast approaching a climate cliff. Science tells us that an increase in global average temperature of 2°C (3.6° F) constitutes the planetary tipping point with respect to climate change, leading to irreversible changes beyond human control. A 2°C rise is sufficient to melt a significant portion of the world's ice due to feedbacks that will hasten the melting. It will thus set the course to an ice-free world. Sea level will rise. Numerous islands will be threatened along with coastal regions throughout the globe. Extreme weather events (droughts, storms, floods) will be far more common. The paleoclimatic record shows that an increase in global average temperature of several degrees means that 50 percent or more of all species—plants and animals—will be driven to extinction. Global food crops will be negatively affected. For example, a 2011 report of the National Resource Council indicates that the U.S. corn (maize) crop, which accounts for 40 percent of the world's total, will experience a 25 percent decline in average yield with a 2°C rise in temperature.[2]

A 2°C increase in global average temperature is associated with the emission of about one trillion metric tons of cumulative carbon emissions since the Industrial Revolution.[3] A total of 566 billion metric tons of carbon have already been added to the atmosphere due to fossil fuel combustion, cement production, and land cover change since 1750. This sets up a carbon budget—the remaining tons of carbon that can be released without reaching the trillion metric ton mark—of less than 500 billion metric tons. Based on the record of emission rates over the last two decades it is estimated by climate scientists at Oxford University (associated with the website trillionthtonne.org) that we will emit the one-trillionth metric ton in twenty-eight years (this reflects a recent recalibration of the methodology resulting in a two-year reduction in the estimated timeline). We could, it is calculated, avoid emitting the trillionth ton if we were to decrease carbon emissions from this point on by about 2.4 percent a year. A truly safe response would require a drop in carbon emissions at more than twice that rate. The longer we wait the steeper the reductions will need to be.[4]

Today's climate science tells us that even aiming at keeping the rise in global temperature below 2°C is extremely risky, since approaching anywhere near 2°C is inviting irreversible change—i.e., a point of no return with the climate-change process spiraling out of human control. According to the National Resource Council, "Climate changes that occur because of carbon dioxide increases are expected to persist for thousands of years."[5] Kevin Anderson and Alice Bows, at the Tyndall Centre for Climate Change Research at the University of Manchester, argue that 2°C no longer constitutes the threshold of "dangerous" climate change, as was originally thought by the Intergovernmental Panel on Climate Change (IPCC), but rather—in the face of indications of increased climate sensitivity such as a much faster melting of Arctic sea ice than predicted—now stands for the threshold of "extremely dangerous" climate change.[6]

In response to this planetary emergency, 140 nations have agreed, at least in principle, to a goal of staying below the 2°C threshold.[7] So far, however, all attempts to reduce carbon dioxide emissions, including the Kyoto Protocol and subsequent climate negotiations, have been a dismal failure. Carbon emissions continue to rise in every part of the world, and notably in those countries that have been most responsible historically for carbon releases: the developed countries. Current climate agreements—mere promises usually based on cap and trade or the creation of a carbon market—have proven ineffective and, would, even if lived up to, take the world well beyond the 2°C boundary. So bankrupt is this general approach, in fact, that James Hansen, director of the NASA Goddard Institute for Space Studies and the world's foremost climate scientist, has said that these climate

agreements are not worth the paper that they are written on, since they will guarantee a disastrous outcome.8

Given that it is cumulative carbon emissions that matter, the goal has to be to keep fossil fuels in the ground, not simply to slow their use as in most current strategies. A complete transition away from fossil fuels is necessary within a few decades. The question is how to construct an exit strategy that will accomplish this.

Hansen's Exit Strategy

It is Hansen who has provided the starting point for a realistic climate-change exit strategy aimed at keeping the increase in global average temperatures well below 2°C. He proposes the creation of a "fee-and-dividend" system whereby fossil-fuel companies would be charged an easily implemented carbon fee imposed at the well head, mine shaft, or point of entry, with 100 percent of the revenue collected being distributed monthly to the population on a per capita basis as dividends, with up to two half shares for children per family. Dividends would be sent directly via electronic transfers to bank accounts or debit cards. The carbon fee would be a single, uniform number in the form of dollars per ton of carbon dioxide that would be emitted from the fuel. The carbon fee would then gradually and predictably be ramped up so as to achieve the necessary carbon reductions. Accompanying this would be the elimination of the current subsidies to the fossil-fuel industry.

In testimony to Congress in 2009, Hansen estimated that, based on 2007 data, the adoption in the United States of a fossil-fuel carbon fee of $115 for every ton of carbon dioxide emitted from fossil fuel (equivalent to a $1 increase per gallon of gasoline, or about 8 cents per kilowatt hour in electricity charges) would generate $670 billion in dividends. Each adult "legal resident" would receive one share equal to $3,000 a year. A family with two children would receive around $9,000 a year, with $750 a month deposited into its bank account. Attempts by energy companies to raise the prices of fossil fuels for end users in response would decrease demand for fossil fuels while encouraging innovation in alternative energies. Some 60 percent of the population would receive net economic benefits, i.e., the dividends they received back would exceed the increased prices paid.9 These net benefits would of course increase if they were to reduce their carbon footprints further.

"Economic modeling for the U.S.," Hansen has stated, "shows that [even] a mere $10/tonCO2 fee, rising $10 each year, would reduce emissions 30 percent after a decade—more than a factor of 10 greater than the oil carried by the proposed Keystone XL pipeline, rendering that pipeline superfluous."10 All of those with less than average carbon footprints, including the vast majority of the population, and particularly the poorer sectors of the population, would experience net monetary gains. Since this is a fee imposed on fossil-fuels companies, themselves among the biggest users of fossil fuels, it would give them the maximum incentive to develop alternative energy sources and keep the fossil fuels in the ground.

Hansen's plan crucially insists that all of the revenue from the carbon fee go straight to the public instead of governmental agencies, which he considers "virtual arms of the fossil fuel industry." The relatively minor costs of administering the plan could presumably be paid for out of the federal government's general fund—as is the case, for example, with the entirety of military spending. He therefore advocates the population adopt the rallying cry "100% or fight!" This is to ensure that the redistributive nature of the proposal remains intact, guaranteeing popular support for the change.11

The class aspect of Hansen's proposal is crucial. Under fee and dividend, he declares, "Low-income people can gain by limiting their emissions. People with multiple houses, or who fly around the world a lot, will pay more in increased prices than they obtain in the dividend.... If the funds are distributed 100% to the public, the public will allow the fee to rise to high levels, in contrast to the relatively ineffectual carbon price characterizing cap-and-trade or a pure carbon tax."12 The Congressional Budget Office estimated in 2007 that the carbon footprint of the top quintile of the U.S. economy was more than three times that of the bottom quintile. Likewise the Carbon Tax Center reports that in 2005 the top quintile accounted for 32 percent of total gasoline consumption in the United States,

while the bottom quintile account for 9 percent. Hence, the carbon dividends distributed on a per capita basis to the population would mean in effect a redistribution of income from the top quintiles with above average carbon footprints to the bottom quintiles with below average carbon footprints.13

The advantage of Hansen's fee and dividend from a climate-change standpoint is that it is directly aimed at making the fossil-fuel companies—those who take the fossil fuels out of the ground—pay, while increasing the price of carbon to decrease consumption in every nook and cranny of the economy. It also makes it possible to raise carbon prices to the extent required for a rapid phase out of fossil fuels, while garnering the necessary mass support. "The public will only allow an adequate rising price on carbon," he contends, "if the system is simple and transparent with the proceeds distributed to the public."14

Writing for the *Nation* in 2010, economist Charles Komanoff of the Carbon Tax Center argued that the strength of the fee-and-dividend approach was twofold. First, it "would turn the proceeds of these higher energy costs over to the American public to spend as they wish, rather than to corporate emitters to fatten their bottom lines or to Washington lawmakers to lavish on pet projects. Under fee-and-dividend, each and every American would receive a monthly check, which for most people would offset the higher energy prices caused by the fee." Second, it would be far superior to the murky carbon price produced by cap and trade, which is set by "a vast trading market and determined by fluctuating factors like the economic growth rate, consumer and producer price elasticities and hedge bets by speculators"—and then further undermined by offsets. The conservative corporate-connected and corporate-funded big environmental groups, such as the Environmental Defense Fund, the Natural Resources Defense Council, and the Pews Charitable Trust, Komanoff points out, prefer cap and trade because of its corporate-friendly character, while fee and dividend appears more popular with grassroots environmental groups. The differences between cap and trade and fee and dividend in terms of simplicity and transparency were dramatized by the bills being considered in Washington in 2009–2010. The carbon-fee bill presented to Congress by Connecticut Democrat John Larson was a mere twenty-one pages long, as opposed to the main cap-and-trade bill being considered by Congress which ran to over 1,500 pages. Yet, emissions reductions under the carbon-fee bill would have been two or three times as great.15

An increased carbon tax through the fee-and-dividend plan is the chief element in Hansen's climate-change exit strategy, but the overall strategy that he proposes is much wider than this would suggest. Crucial to this approach is the notion that crude oil production (conventional oil based on reserves as estimated variously by the IPCC and the U.S. Energy Information Administration) will peak before mid-century. Based on such assumptions, Hansen and his coauthor Pushker A. Kharecha demonstrated in a 2008 article in *Global Biogeochemical Cycles* that the burning of the remaining conventional oil and gas is consistent with climate stabilization at or below 2°C (450 ppm atmospheric CO2). But this is true only if accompanied by a phase out of coal-fired plants without carbon capture and sequestration technology (a technology which is not yet feasible), and provided there is no recourse to unconventional fossil fuels—such as tar sands oil, shale oil and gas, and methane hydrates. Hansen considers coal and unconventional fossil fuels as "death trains," not only because these are the dirtiest of fuels, but also because their use will break the carbon budget. Canada's tar sands, he says, contain 240 gigatons of carbon while U.S. shale contains a further 300 gigatons. If we burn it all on top of conventional fuels there is no hope of avoiding the planetary tipping point.16

The Hansen strategy hopes for a massive transformation of energy infrastructure. He supports Al Gore's call, issued in 2008, for the building of a carbon-free energy infrastructure in the United States. Nevertheless, Hansen recognizes that a massive shift in infrastructure would take decades. In the meantime, therefore, direct carbon conservation—the limiting of consumption through conservation techniques of reducing, reusing, recycling, and rationing (putting this ahead of immediate economic considerations)—becomes even more important.17

Another key element in the Hansen climate-change exit strategy is to carry out a global transition in "farming and forestry practices" in order to "enhance carbon retention and storage in the soil and biosphere," including global reforestation. This could generate an "anthropogenic drawdown of atmospheric CO2." Power plants can move toward burning biofuels if they use carbon capture and sequestration technologies and provided it is not at the expense of food crops and tropical forests, relying instead on "agricultural waste, natural grasses, and other cellulosic materials."18 (However, it should be added that there are legitimate concerns—overlooked by Hansen—about burning agriculture "waste" which in most cases should be returned to the soil to cycle nutrients and help maintain its fertility. It also makes more ecological and energy sense to use natural grasses to feed cattle and other ruminants, instead of corn and soybeans.)

In addition to recommending various forms of alternative energy as replacements to fossil fuels, Hansen also advocates a potential fourth generation of nuclear power—provided that the dangers of this form of energy can be substantially reduced. Faced with a dire choice between certain planetary catastrophe without a shift from fossil fuels, and a shift to nuclear power with its attendant dangers, Hansen has cautiously insisted on the need to pursue technological possibilities that may emerge with respect to the latter. In the future, nuclear power could be, he writes, "one viable alternative option, if strict provisions are followed for public safety, waste disposal, and elimination of potential weapons-grade by-products." However, since fourth generation nuclear power is not developed yet, and since it takes seven-to-ten years to build a nuclear power plant, this does not loom overlarge in his strategy.19 He has, however, rejected geoengineering solutions, such as sustained stratospheric sulfate aerosol injection, as involving "long-term risks to climate and ocean/stratospheric chemistry."20 Finally, Hansen insists on the need to work intensively at reducing non-CO2 atmospheric forcings, such as those related to methane, tropospheric ozone, and black carbon.21

Hansen is not only the world's foremost climate scientist, but also a leading climate activist. He has been arrested in an attempt to block coal-fired plants and in a protest over the Keystone XL pipeline designed to bring Alberta tar sands oil to the Gulf of Mexico. His activism, and willingness to be arrested in relation to these issues, shows what he considers to be essential. With peak crude oil approaching, the world's proven conventional oil and natural gas reserves could all be burned while conceivably keeping global average temperatures below 2°C. Nevertheless, if we go too far into coal supplies and encourage tar sands production, the "game," Hansen contends, will be "over." The goal therefore must be to stabilize emissions around peak conventional oil and natural gas production, before major inroads are made into the use of the remaining coal reserves and unconventional fossil fuels. The greatest failures of the Obama administration so far, in his view, are its continued support of coal-fired plants, its backing of Canadian tar sands production, its likely approval (delayed so far only by environmental protests and the 2012 elections) of the Keystone XL pipeline, and its refusal to push for carbon fee and dividend—in that order. For Hansen blocking the burning of coal and unconventional fossil fuels is essential if any chance of climate stabilization is to remain possible, and thus he calls for mass mobilization and citizen action. There is no other way given the power of the fossil-fuel industry.22 A mere increase in the carbon price is insufficient where coal and unconventional fossil fuels are concerned, and actual bans are necessary.

Hansen has lobbied governments throughout the world to introduce a fee and dividend system. Given that Washington and other capitals of the G-8 are governed by the fossil-fuel industry and "big money," Hansen doubts that the core economies of the world capitalist system will move first in adopting such a system. In fact, Canada, the United States, and Norway are all involved in the expansion of tar sands production. With the United States unwilling to act, world leadership in this area increasingly falls on China which, he believes, represents "the best hope." China is now the world leader in non-carbon energy investments, such as "nuclear, wind, and solar power." Yet "these carbon-free energies," Hansen writes, "will supplant fossil fuels, in China and the world, only when a rising carbon fee forces fossil fuels to pay their costs to society. No nation will impose an internal fee that seriously disadvantages itself in international commerce. But an internal fee-and-dividend

system, with a modest initial carbon price, will be a boon to the nation that leads, and provide a framework for international discussion." Current World Trade Organization rules allow a nation that imposes a carbon fee to levy duties on products from other nations that do not have a carbon equivalent fee or tax, making it relatively easy to generate a global carbon fee/tax system.

Hansen insists China does not have the same moral responsibility to take the lead on climate change, as do the United States, Russia, Germany, and the United Kingdom—the countries with the largest cumulative carbon emissions. The United States is responsible for 27 percent of the cumulative, historical carbon dioxide emissions, while China, with three times the population, is responsible to date for only about 10 percent.23

China and other emerging economies are growing in large part due to the global labor arbitrage (and to some extent environmental arbitrage) whereby the rich capitalist countries are via multinational corporations increasingly transferring their production and their environmental costs to poor and emerging economies.24 A major issue in today's carbon debate thus has to do with embodied carbon in international-trade goods and the locus of global consumption of these goods. One effect of the global shift in production is to transfer the carbon emissions associated with goods consumed in the global North to the global South.

A 2008 study by Jiang Kejun, director of the Energy Research Institute of China's National Development and Reform Commission, its main macroeconomic planning agency, indicates that the balance of emissions embodied in trade—or, BEET, defined as "embodied carbon emissions in exports less embodied carbon emissions in imports"—expressed as a percentage of total domestic-production-based emissions, is almost invariably negative within the global North. Thus the balance of carbon emissions as a percentage of total domestic carbon emissions is: Switzerland -123 percent; United Kingdom -17; Germany -16; Japan -15; and the United States -7—indicating that these countries are net carbon importers and that their domestic carbon emissions understate their carbon footprints. While the inverse naturally holds for major emerging economies, where the corresponding figures are: South Africa, 38 percent; Indonesia, 19; China, 18; India 7; and Brazil 1—indicating that these nations are net carbon exporters and that their domestic carbon production overstates their carbon footprints.25 Although there is naturally considerable debate in different studies about the percentages applicable to each country, there is no doubt that the shift of manufacturing toward the semi-periphery and periphery of the world economy, coupled with the continued concentration of manufactured-goods consumption in the center, has meant that the richest economies have to a considerable extent succeeded in externalizing their carbon emissions to poor and emerging economies, which are then left holding the tab where emissions reductions are concerned.26

This, too, lessens the direct moral responsibility of China and other large emerging economies to cut their emissions, relative to the economies at the center of the system. Given centuries of unequal exchange, and the fact that half the population of the world contributes virtually nothing to global emissions, primary responsibility still lies with the countries at the center of the system—which, as the richest countries, are in the best position to act.27

Nevertheless, China is today the leading carbon emitter and is also especially vulnerable to the effects of climate change. "Carbon dioxide amounts of 400 ppm (parts per million), expected in 2016 with current emissions," Hansen states, "will cause an eventual sea level rise of about 25 meters. China's land area will shrink greatly, requiring about 250 million people to move inward." Unlike the rich capitalist economies of the West, China's government is less dominated, he contends, by fossil-fuel interests, which of course exist but "do not rule the roost." It is more capable of charting a rational course that adopts a "long view," and is able to "implement policy decisions rapidly." Clearly, its ability to plan and promote a strategic vision gives it capabilities that the fossil-fuel and finance-driven governments of the West lack. Referring to a high-level presentation that he attended in Beijing, Hansen noted that the Chinese approach was "epitomized by Dr. Jiang Kejun" at the Beijing Forum.

Jiang Kejun laid out sector-by-sector projections of transitions to low-carbon and no-carbon energies and improved energy efficiency that would allow CO2 emission growth to be slowed and then reversed over the next few decades. Technology development is supported, and, when lower carbon technology becomes available, efficiency standards are promptly ratcheted…[so as to reduce CO2 emissions per unit of output]. Most encouragingly, there is recognition that this strategy requires a rising carbon price for most successful results. The Chinese authorities appear to grasp that rapid attainment of the tipping points at which clean energies quickly displace dirty energy requires an economic incentive.28

Hansen insists that given its low level of cumulative, historical emissions and its low per capita carbon emissions China (along with other emerging countries) will not accept a carbon cap system. However, a carbon tax is currently being considered in China, the implementation of which is anticipated before the end of the current five-year plan.29

The significance of Hansen's approach to climate change, beyond his grasp of climate science itself, derives largely from his class analysis, his populist frame, his internationalism, and his dire realism. This has led him to promote fee and dividend as the only feasible approach for getting carbon emissions down rapidly. Without a much higher carbon price that reflects the real cost of carbon dioxide (including its environmental costs), there is no hope of avoiding disaster given the nature of the prevailing social/economic system. And there is no possibility of instituting an effective carbon price without an approach that takes into account class and power inequalities, and basic issues of justice. Criticized for the fee-and-dividend plan's redistributive character, which would increase the buying power of the poor who would supposedly "waste the dividend," Hansen replied: "I come from a low income family, my father a tenant farmer educated to 8th grade, with seven children. We would not have wasted the money. Nor would most low income families." Subjected to criticisms of his plan from the *New York Times* and Paul Krugman, Hansen shot back, explaining that "the *Times* tends to favor mainstream environmentalist ideology." For him the block to effective political action in the United States and other moneyed-democracies ruled by "fossil fuel kingpins" is "the corrosive influence of money in politics…aided by corporate-dominated media." With respect to China, Hansen emphasizes over and over again that the West's "historical energy profligacy, versus China's energy penury," has given the former no moral basis with which to criticize China on this score. And since China and other developing countries will not accept a cap on emissions, the only global approach that will work, he argues, is a carbon fee or tax. In other words, a feasible strategy has to take into account not only the class but also the imperial legacy of the system.30

## Capitalism's Ecological Footprint: Beyond Hansen's Exit Strategy

Hansen's climate-change exit strategy represents what is clearly a calculated attempt to push through the maximum plan that the regime of capital could conceivably accept, and the minimum necessary to avoid complete disaster. It represents a heroic effort to promote the formation of political-economic conditions that will prevent the world from crossing a catastrophic climate tipping point. In fashioning his exit strategy Hansen says little or nothing about the world's other immense environmental challenges, despite the fact that he is the coauthor of major scientific publications on the crossing of multiple planetary boundaries—signaling a planetary environmental crisis that extends beyond global warming to other critical areas as well. In addition to climate change, the world has already crossed critical planetary boundaries (removing it from Holocene-epoch conditions) with respect to nitrogen use and species extinction, and is on the brink of crossing similar critical planetary boundaries for ocean acidification, freshwater shortages, and landcover change.31 Nor does Hansen's climate-change exit strategy address the question of capitalism and the accumulation imperative that drives such a system, which has obvious implications for any long-term strategy of climate or environmental stabilization.

The main goal at present, Hansen stresses, is simply to see if we can head off climate catastrophe before the die is cast, through the combination of a steadily rising carbon tax, conservation, new

technology and infrastructure, and global reforestation—together with the closing of coal-fired plants and preventing the use of non-conventional fossil fuels such as tar sands oil and shale oil and gas. Hansen has left it to others, such as Bill McKibben with his "Do the Math" tour movement (modeled after the disinvestment campaign against Apartheid), to go after the fossil-fuel industry directly, campaigning to disinvest in fossil fuels on the carbon-budget grounds that we cannot afford to burn more than 20 percent of the fossil fuels currently economically available.32

Hansen's climate-change exit strategy thus has definite limitations. Despite its progressive features it is mostly a top-down, elite-based strategy of implementing a carbon tax with the hope that this will spur the introduction of necessary technological changes by corporations. To be sure, Hansen stresses the democratic nature of the plan, and has argued that Obama could have mobilized the population around such a tax at the height of his popularity in his first term through a series of fireside chats.33 He also suggests that the 100 percent redistribution element in the fee-and-dividend strategy must be backed up by the threat of the wider public to "fight" if this is interfered with. And he has himself joined in mass mobilizations against coal and tar sands oil. Yet, his plan includes no call for a general ecological-cultural revolution against the U.S. power structure. Hansen is silent on the enormous resources directed at the military with its vast carbon footprint. He has not questioned the wars over oil; there is no mention of Iraq in his book. In general, direct conservation initiatives, which would require widespread mobilization, on the scale needed, are downplayed. Most of all, he avoids the question of whether climate stabilization, much less ecological stabilization, is compatible with a system of exponential capital accumulation *ad infinitum*—leaving the real task of carrying out the necessary social change to cope with the environmental problem as a whole unaddressed. If he hopes his strategy will unleash a wider, mass-based ecological and social revolution he refrains from making this explicit.

It is important to recognize that Hansen's reliance on a steadily increasing carbon price will only really work if it is universalized in the global economy. Any decrease in demand for fossil fuels that is based on purely locally generated price increases, e.g., through the imposition of a carbon tax, will lead—if the same amount of fossil fuel as before is supplied by oil producers—to a drop in global price. Under these conditions, far from decreasing global demand for fossil fuels, the result would simply be to stimulate fossil-fuel consumption elsewhere in the world economy.34 By the same token, an increase in global carbon price not big enough substantially to reduce demand and not to be followed by other predictable price increases could actually stimulate—as we have already seen—the production of dirtier fossil fuels, such as tar sands oil. All exclusively market-based strategies tend to backfire, since they rely principally on economic incentives. Hansen's fee and dividend is necessary under present conditions but is only a single wedge in what must be a much more comprehensive climate-change exit strategy.

More important, Hansen's analysis relies on a degree of technological optimism that assumes a higher carbon price will stimulate new technologies, resulting in massive decarbonization of the economy—without fundamentally altering the nature of the economy itself, and without limits on economic growth. This technological optimism is particularly evident where the case of China is concerned, which he sees as "the best hope." There the high-stakes gamble is a hyper-technological one, coupled with very rapid growth of 7 percent or more—with a carbon tax hopefully nudging the economy onto a low carbon path. The high-growth rate itself makes it highly improbable that China will be able to reach its targeted peak emissions by 2025. China's great advantage, though, is that with its remaining centralized-planning apparatus it is theoretically still able to restructure its economy in a manner and on a scale that the plutocracies of the West are unable to accomplish—blocked as they are at every stage by corporate interests. Thus it is able to act forcefully on the supply-side as well as the demand-side. Yet, its primary goal of economic growth of 7 percent or above makes the environment simply an ancillary concern—despite China's mounting environmental problems in every area.

To be sure, Hansen, while a technological optimist, is critical of "extreme" energy optimists like Amory Lovins who think that a "soft energy path" based on alternative energies will automatically solve most problems—without large hydroelectric power, without nuclear power, and without a carbon tax.35 Moreover, in Hansen's climate-change exit strategy, as we have seen, it is necessary to exert mass political pressure to close down coal-fired plants and to block the use of unconventional fossil fuels. With those energy sources cut off the world would have to rely on soon-to-peak fossil fuels and alternative energies (including hydroelectric and nuclear).

All of this suggests, however, that the Hansen exit strategy for all of its strengths is itself insufficient. Its weakness is that it does not go far enough in addressing the social-systemic contradictions generated by the power structure of today's monopoly-finance capital. What is needed under present circumstances is an acceleration of history involving a reconstitution of society. The kinds of changes to be considered in the context of a planetary emergency cannot be confined within the narrow channels that the ruling class and its political power elite will accept. Rather an effective climate-change exit strategy must rely on the much larger social transformation that can only be unleashed by means of mass-democratic mobilization.

This requires a shift away from mere discussions of energy, efficiency, and technology, to the deeper questions of social needs and purposes, and the rational utilization of resources. During wartime societies have resorted to mass mobilization of the public in order to rationalize the use of resources and limit consumption so as to redirect the economy to wartime needs. A similar mobilization could take place with public backing in the present planetary emergency in order to carry out an ecological transition. Resources could be concentrated on rapid transformation of energy infrastructure, for example, and diverted from wasteful sectors of the economy—such as the trillion dollars spent annually on the U.S. military.36 During the Second World War the United States was able to convert its automobile industry in a mere six months from the production of cars and trucks for domestic use to the production of trucks, tanks, and planes for the war effort. Production of civilian cars and trucks was banned for the duration of the war, and rationing was the order of the day. A similar ecological conversion (this time perhaps involving conversion from the production of military goods) could conceivably be carried out in the context of the planetary emergency, aimed at rapid alteration of the nation's energy infrastructure.37

Today the actual use value of those goods and services that enter into what is labeled "economic growth" must be questioned. The commodity economy of capitalism, Elmar Altvater wrote in *The Future of the Market*, "is narcissistic: it sees only itself reflected in gold." In the ancient myth of King Midas, Midas, having been granted by the god Bacchus his wish of turning everything he touched into gold, soon discovered that literally everything he touched—the branch he grasped, the stream he stepped in, and the food he attempted to eat—was instantaneously transformed into gold, threatening his continued existence by cutting off his relation to nature. Midas therefore soon pleaded with Bacchus to be freed of this catastrophic "gift." Upon being changed back into his natural state, Midas devoted the remainder of his life to the worship of Pan, the god of nature.38

Nevertheless, today's capitalist society still fails to recognize—as Midas did in the end—its error in pursuing abstract, commodified wealth at the expense of both humanity and nature. As ecological economist Herman Daly has written: "Instead of asking, when will we be rich enough to afford the cost of protecting the environment? we might instead ask, does growth in GDP at the current margin and scale in the U.S. really make us richer? Might it not be increasing environmental and social costs faster than it increases production benefits, thereby making us poorer? It is clear that we need an aggregate limit on CO2 emissions to avoid this 'uneconomic growth.'"39

From a Marxist perspective Gross National Product or national income as it is currently measured in capitalist societies, can never be equated with economic (much less ecological) welfare. A distinction must always be made between "the real aspect and the value aspect in economic theorizing."40

Crime under capitalism, Marx ironically noted in *Theories of Surplus Value*, "brings with it the augmentation of national wealth" by calling into being "criminal justice, constables, judges, hangmen, juries," as well as mechanical instruments for torture, locks and locksmiths, the law professor's compendia, etc. "Thus the criminal comes in as one of those natural 'counterweights' which bring about a correct balance [in accumulation] and open up a whole perspective of 'useful' occupations."41 Marx's qualification of "useful" in this context was important. His analytical purpose, despite the irony, was clear: to demonstrate that not all labor designated as augmenting national wealth under capitalism was in fact useful labor from a wider social standpoint. Capitalist competition and the race for profits, Marx stated, promoted "the deterioration in the quality of goods, adulteration, spurious production."42

Still, the critique of the use-value structure of the economy played only a minor role in Marx's critique of political economy in the mid-nineteenth century—prior to the rise of monopoly capital and modern marketing. Yet already by the time of the great English artist and socialist William Morris—who first read Marx's *Capital* in 1883 (the year of Marx's death) and devoted the last decade of his life to the cause of socialism—nascent monopoly capitalism had made the *qualitative-value critique* of capitalist production more important.43 "Wealth," Morris wrote,

is what Nature gives us and what a reasonable man can make out of the gifts of Nature for his reasonable use. The sunlight, the fresh air, the unspoiled face of the earth, food, raiment, and housing necessary and decent; the storing up of knowledge of all kinds, and the power of disseminating it; means of free communication between man and man; works of art; the beauty which man creates...all things which serve the pleasure of people, free, [hu]manly, and uncorrupted. This is wealth. Nor can I think of anything worth having which does not come under one or other of these heads. But think, I beseech you, of the product of England, the workshop of the world, and will you not be bewildered, as I am at the thought of the mass of things which no sane man could desire, but which our useless toil makes—and sells?....

The workers must even lend a hand to the great industrial invention of the age—adulteration, and by its help produce for their own use shams and mockeries of the luxury of the rich; for the wage-earners must always live as the wage-payers bid them, and their very habits of life are *forced* on them by their masters.... Civilization therefore wastes its own resources, and will do so as long as the present system lasts.44

In today's regime of monopoly-finance capital, society is more and more removed from real wealth, as Morris described it, while the vast portion of production is geared to what John Ruskin called "illth."45 This is true even in the emerging countries, whose economies are heavily geared to the production of relative luxury goods to be consumed in the rich economies and that increasingly replicate within their own internal structure the forms of commodified consumption dictated by the latter.

Under the regime of monopoly-finance capital waste comes to dominate the economy in seven overlapping forms: (1) unproductive expenditures (the waste of social surplus) built into the productive structure of the economy; (2) its counterpart in the useless toil necessary to produce such useless articles; (3) waste associated with unutilized productive capacity and especially unemployed human beings—the wasting of human lives, often reduced to dire poverty; (4) mountains of solid waste which must be disposed of; (5) "non-commodity waste," the by-product of wasteful production, that has no place in the market, such as radioactive waste; (6) military waste or mere means of destruction; and (7) financial speculation, associated, in Marx's prescient statement, with the growth of "a new financial aristocracy, a new variety of parasites in the shape of promoters, speculators, and merely nominal directors: a whole system of swindling and cheating by means of corporate promotion, stock issuance, and stock speculation." All of this is connected to the incessant accumulation of capital, along with the no less incessant increase in environmental throughput—the growing ecological footprint of capital.46

Political economist Peter Custers has introduced the concept of "negative use value" to characterize this aspect of today's capitalism, rooting this in the theory of monopoly capital associated with the work of Paul Baran and Paul Sweezy. The bombs that destroyed Hiroshima and Nagasaki, for example, were negative use values from start to finish: mere mechanisms of human and environmental destruction.47 More generally monopoly capital theory has argued that capitalism in the monopoly stage has created "specifically capitalist use values"—use values that have no basis in genuine human needs but that are produced (and the demand created) in order to ensure the reproduction of capital itself, i.e., the realization of ever-greater profits.48 More and more emphasis in the system is placed on so-called positional goods, related to status. Insatiable, individualistic desires are promoted, through endless marketing, as opposed to the satisfaction of collective needs. Product obsolescence, production of goods "designed for the dump," is supplemented by psychological obsolescence, production of goods designed to be replaced due to changing fashions—a loss of desirability in the owner's mind, engineered by market forces.49

The result is a population that suffers from unemployment and underemployment, exploitative and dead-end jobs, psychological stress, wasted consumption, and impoverished lives. "The crippling of individuals," Albert Einstein wrote, "I consider the worst evil of capitalism."50

Capitalism in the phase of monopoly-finance capital is more prone to economic stagnation, and at the same time more intensively destructive of the planetary environment. For humanity today, facing both climate change and a more generalized planetary ecological catastrophe, due to the crossing of critical planetary boundaries, there is no choice left consistent with long-term survival but to leave capitalism's burning house. Hansen's climate-change exit plan represents the crucial first step that must be taken if irreversible climate change is to be avoided. But it is not by any means the last step. A real solution demands a radical alteration in social priorities—the kind of revolutionary transformation that could occur at unimagined speed if the population were once to reach its own social-environmental tipping point.

## The Making of an Environmental Working Class?

It is in the global South and not in the global North that we can expect the most rapid growth in awareness of the climate emergency, out of which there is the possibility of the emergence of an *environmental proletariat*, where environmental conditions and work conditions are equally parts of working-class struggle. As Hansen has indicated, around 250 million people in China, in highly urbanized and industrialized coastal areas, will be forced to move inland over time as a result of a sea level rise of twenty-five meters, which will eventually occur with an increase of atmospheric carbon concentration to 400 ppm—a point that is fast upon us. "The transition," if it takes place, "to the ice-free state will be chaotic and uncontrolled"—new coastlines will not stabilize for a considerable period. In China the low-lying delta of the Pearl River and the Guangdong industrial region from Shenzhen to Guangzhou overlap. Here the formation of an environmental proletariat in the above sense is more than possible. Moreover, the question of an environmental proletariat in China is merged in a complex way with the question of an ecological peasantry, due to the massive migrant labor system and the relation of this to land rights in the countryside. All of this is feeding ecological reconstruction movements in the rural areas alongside worker protests in the cities.51 The intermixing of class and environmental struggle is equally immediate, complex and dynamic in the deltas of the Ganges and Brahmaputra in Bengal, and elsewhere in East and South Asia. Yet, as we have shown above, only a global response can meet the planetary emergency.

Walter Benjamin once wrote: "The tradition of the oppressed teaches us that the 'state of emergency' in which we live is not the exception but the rule. We must attain to a conception of history that is in keeping with this insight."52 What is objectively revolutionary in Hansen's proposal is its root in a shared sense of emergency and crisis that can be readily communicated at the center of the system in the monopoly-finance capital economies themselves. The greatest potential of Hansen's steadily increasing carbon fee and dividend is that its results would reverberate in every aspect of the society

and economy. It would make clear as never before at the level of everyday life the class nature of carbon footprints and the increasing destruction of the planet as a place of human habitation. And it would soon be evident that the radical kinds of changes that would need to be introduced into the whole constellation of production, distribution, and consumption relations could not "be effected except by means of despotic inroads on the rights of property, and on the conditions of bourgeois production; by means of measures, therefore, which appear economically insufficient and untenable, but which, in the course of the movement, outstrip themselves, necessitate further inroads upon the old social order, and are unavoidable as a means of entirely revolutionizing the mode of production."53

Today we are faced with the alienation of the planet itself; a manifestation of the human estrangement inherent in capitalist accumulation. Once again, only this time on a planetary scale, we are confronted with the choice between "a revolutionary reconstitution of society at large…or the common ruin of the contending classes" (and countries).54 However, today that common ruin, if it were to occur, would prove irreversible. A revolutionary reconstitution of society is therefore our only alternative. We share with James Hansen the view that "humanity is not a bunch of lemmings marching unstoppably toward a cliff"; there is still time for corrective social action. But it must be clearly seen that we face a planetary crisis and emergency; no gradual exit is possible, time is too short.

## Notes

1. ↩ James Hansen, "Storms of My Grandchildren's Opa," December 13, 2012, http://columbia.edu.

2. ↩ National Resource Council, *Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia* (Washington, DC: The National Academies Press, 2011), 39–40, 162–63; Mark Fischetti, "2-Degree Global Warming Limit is Called a 'Prescription for Disaster.'" *Scientific American* blog, December 6, 2011, http://blogs.scientificamerican.com; James Hansen, *Storms of My Grandchildren* (New York: Bloomsbury, 2009), 160–64, 171, and "The Sword of Damocles," February 15, 2009, http://columbia.edu.

3. ↩ "One gigaton of carbon is 1 billion tons of carbon, where 'carbon' refers literally to the mass of carbon, *not* the mass of a molecule as a whole (i.e., all the atoms), but just the mass of carbon atoms." A trillion metric tons of carbon is equal to 1,000 gigatons. National Resource Council, *Climate Stabilization Targets*, 18.

4. ↩ Myles Allen, et. al, "The Exit Strategy," *Nature Reports Climate Change*, April 30, 2009, 56–58, and "Warming Caused by Cumulative Carbon Emissions Towards the Trillionth Tonne," *Nature* 458 (April 20, 2009): 1163–66; Malte Meinshausen, et. al., "Greenhouse Gas Emissions Targets for Limiting Global Warming to 2°C," *Nature* 458 (April 30, 2009): 1158–62; National Resource Council, Climate Stabilization Targets, 5–6; Fischetti, "2-Degree Global Warming Limit is Called a 'Prescription for Disaster.'" Trillionthtonne.org, from which the timeline on when the trillionth metric ton of carbon will be emitted is taken, recently recalibrated their estimates to take into account land cover change and other factors. As a result they changed the year at which they estimated the trillionth ton would be reached from 2043 to 2041.

5. ↩ National Resource Council, *Climate Stabilization Targets*, 16.

6. ↩ Kevin Anderson and Alice Bows, "Beyond 'Dangerous' Climate Change," *Philosophical Transactions of the Royal Society*, no. 1934 (January 13, 2011): 20–44, http://rsta.royalsocietypublishing.org.

7. ↩ United Nations Environment Programme, *The Emissions Gap Report*, November 2010, http://unep.org, 8.

8. ↩ Hansen, "Storms of My Grandchildren's Opa."

9. ↩ James Hansen, "Carbon Tax and 100% Dividend vs. Tax and Trade," Testimony to Committee on Ways and Means, United States House of Representatives, February 25, 2009, http://columbia.edu.

10. ↩ Hansen, *Storms of My Grandchildren*, 209–22, and "Storms of My Grandchildren's Opa."

11. ↩ Hansen, "Carbon Tax and 100% Dividend vs. Tax and Trade," and "Storms of My Grandchildren's Opa."

12. ↩ Hansen, "Storms of My Grandchildren's Opa."

13. ↩ Carbon Tax Center, "Demographics," http://carbontax.org, accessed December 19, 2012; Congressional Budget Office, "Trade-Offs in Allocating Allowances for CO2 Emissions," April 25, 2007, http://cbo.gov.

14. ↩ Hansen, "Carbon Tax and 100% Dividend vs. Tax and Trade," *Storms of My Grandchildren*, 209–21, and "Storms of My Grandchildren's Opa."

15. ↩ Charles Komanoff, "Senate Climate Bill Dies—Does the Environment Win?" *The Nation*, July 28, 2010, http://thenation.com.

16. ↩ Pushker A. Kharecha and James E. Hansen, "Implications of 'Peak Oil' for Atmosphere CO2 and Climate," *Global Biogeochemical Cycles* 22 (2008): 1–10; James Hansen, "Game Over for the Climate," *New York Times*, May 9, 2012, http://nytimes.com, and "Coal-Fired Power Stations are Death Factories. Close Them," *Guardian*, February 14, 2009, http://guardian.co.uk.

17. ↩ Hansen, *Storms of My Grandchildren,* 191; Kharecha and Hansen, "Implications of 'Peak Oil'"; "Gore Calls for Carbon-Free Electric Power," *New York Times*, July 18, 2008, http://nytimes.com.

18. ↩ Kharecha and Hansen, "Implications of 'Peak Oil,'" 9.

19. ↩ See the exchange (pro and con) among scientists on Hansen's position on nuclear power as a means of countering the greater threat of climate change in "On Nuclear Power," *Monthly Review* 62, no. 9 (February 2011): 54–57. As the situation has become more desperate over the last few years Hansen has become more supportive of third-generation nuclear power as well. See James E. Hansen, "China and the Barbarians: Part I," November 24, 2010, http://columbia.edu.

20. ↩ Kharecha and Hansen, "Implications of 'Peak Oil,'" 8; Hansen, *Storms of My Grandchildren*, 194–204.

21. ↩ Kharecha and Hansen, "Implications of 'Peak Oil,'" 9.

22. ↩ Andrew Revkin, "Hansen of NASA Arrested in Coal Protest," *New York Times*, June 23, 2009, http://nytimes.com; "NASA's Hansen Arrested Outside White House at Pipeline Protest," *Bloomberg.com*, April 29, 2011, http://bloomberg.com; James Hansen, "Game Over for the Climate," *New York Times*, May 9, 2012, http://nytimes.com.

23. ↩ James Hansen, "The Price of Change," *South China Morning Post*, November 3, 2010; "Storms of My Grandchildren's Opa"; and "China and the Barbarians, Part I."

24. ↩ On the global labor arbitrage see John Bellamy Foster and Robert W. McChesney, *The Endless Crisis* (New York: Monthly Review Press, 2012), 125–54.

25. ↩ Jiang Kejun, *Embodied Carbon in Traded Goods*, Trade and Climate Change Seminar, International Institute for Sustainable Development, Copenhagen, Denmark, June 18-20, 2008, http://iisd.org. Embodied carbon is defined in this report as "carbon dioxide emitted at all stages of a good's manufacturing process, from the mining of raw materials through the distribution process, to the final product provided to the consumer."

26. ↩ Misato Sato, "Embodied Carbon in Trade: A Survey of the Empirical Literature," Grantham Research Institute on Climate Change and the Environment, Working Paper, no. 77, April 2012, http://cccep.ac.uk.

27. ↩ On world income distribution and ecological footprints see Fred Magdoff, "Global Resource Depletion," *Monthly Review* 64, no. 8 (January 2013): 23–24. On unequal ecological exchange see Howard T. Odum, *Environment, Power, and Society* (New York: Columbia University Press, 2007), 303–5.

28. ↩ Hansen, "China and the Barbarians: Part I," and "The Price of Change"; Jiang Kejun, "Potential Secure, Low Carbon Growth Pathways for the Chinese Economy," Working Paper, January 2011, http://csis.org.

29. ↩ "China to Levy Carbon Tax Before 2015—Report," *Reuters*, January 5, 2012, http://reuters.com; Alvin Lin and Yang Fuqiang, "China's Carbon Tax Is Very Real," *Chinadialogue.net*, January 27, 2012, http://chinadialogue.net. Jiang Kejun explained that the current Chinese plan is to achieve peak emissions by 2025 or earlier—in line with the worldwide goal of staying below a 2°C increase in global average temperature. However, the Chinese plan is based on heroic assumptions of technological development and diffusion rather than on a carbon tax, conservation, and rechanneling/constraining growth. Its environmental goals are clearly secondary to its economic growth objective of doubling its GDP by 2020. Yan Yan, "China's Emissions May Peak as Soon as 2025," *Chemistry World,* December 12, 2012, http://rsc.org.

30. ↩ Hansen, "Storms of My Grandchildren's Opa," "The People vs. The Carbon Traders," January 12, 2010, and "Cowards in Our Democracies: Part 2," January 28, 2012, http://columbia.edu.

31. ↩ Johan Rockström, et. al., "A Safe Operating Space for Humanity," *Nature* 461, no. 24 (September 2009): 472–75, and "Planetary Boundaries," *Ecology and Society* 14, no. 2 (2009).

32. ↩ See http://math.350.org.

33. ↩ Hansen, "Storms of My Grandchildren's Opa."

34. ↩ Hans-Werner Sinn, *The Green Paradox: A Supply-Side Approach to Global Warming* (Cambridge, MA: MIT Press, 2012), 125–82.

35. ↩ Hansen, *Storms of My Grandchildren*, 21–22, 208.

36. ↩ Actual U.S. military expenditures (including all categories) are now over a trillion dollars but the acknowledged military spending associated with the Department of Defense is much less. For a full accounting based on 2007 data see John Bellamy Foster, Hannah Holleman, and Robert W. McChesney, "The U.S. Imperial Triangle and Military Spending," *Monthly Review* 60, no. 5 (October 2008): 1–19. Reductions in military spending would in itself provide a massive fund for ecological reconstruction. On some of the numerous concrete measures—both short term and long term—that could be taken in a general process of ecological revolution see Fred Magdoff and John Bellamy Foster, *What Every Environmentalist Needs to Know About Capitalism* (New York: Monthly Review Press, 2011), 124-44.

37. ↩ Jonathan Koomey, *Cold Cash, Cool Climate: Science-Based Advice for Ecological Entrepreneurs* (Burlington, CA: Analytics Press, 2012), 74; Dwight Jon Zimmerman, "Automobile Factories Switched to War Production as America Entered World War II," February 10, 2012, http://defensemedianetwork.com.

38. ↩ Elmar Altvater, *The Future of the Market* (London: Verso, 1993), 184; Ovid, *Metamorphoses* (trans. Charles Martin) (New York: W.W. Norton, 2004), 373–75.

39. ↩ Herman Daly, "Renowned Ecological Economist Herman Daly Says Climate Action Can't Wait," *Grist.org*, August 16, 2007, http://grist.org.

40. ↩ Shigeto Tsuru, "The Significance of Marxian Political Economy in the Present-Day World," in Ian Bradley and Michael Howard, eds., *Classical and Marxian Political Economy* (London: Macmillan, 1982), 276–90.

41. ↩ Karl Marx, *Theories of Surplus Value*, Part 1 (New York: International Publishers, 1969), 387–88.

42. ↩ Karl Marx, *Early Writings* (London: Penguin, 1975), 302.

43. ↩ On the qualitative value problem see Paul M. Sweezy, *The Theory of Capitalist Development* (New York: Monthly Review Press, 1942), 23–40.

44. ↩ William Morris, *News from Nowhere and Selected Writings and Designs* (London: Penguin, 1962), 121–22.

45. ↩ John Ruskin, *Unto This Last* (Lincoln: University of Nebraska Press, 1967), 73.

46. ↩ The basis of this analysis of economic/social waste is to be found Paul A. Baran and Paul M. Sweezy, *Monopoly Capital* (New York: Monthly Review Press, 1966), and "Some Theoretical Implications," *Monthly Review* 64, no. 3 (July–August 2012): 45–58. For Marx's statement on financial swindling see Karl Marx, *Capital*, vol. 3 (Chicago: Charles H. Kerr, 1909), 519 (chapter 27)—translation here in accord with Baran and Sweezy, *Monopoly Capital*, 141. On the concept of "non-commodity waste" see Peter Custers, *Questioning Globalized Militarism: Nuclear and Military Production and Critical Economic Theory* (London: Merlin Press, 2006), 52–53.

47. ↩ Custers, *Questioning Globalized Militarism*, 11–12, 36–38.

48. ↩ On the concept of "specifically capitalist use values" see John Bellamy Foster, *The Theory of Monopoly Capitalism* (New York: Monthly Review Press, 1986), 39, and "The Ecology of Marxian Political Economy," *Monthly Review*, 63, no. 4 (September 2011): 12. In the latter piece, Marx's general formula for capital, M-C-M′, is seen as increasingly transformed under monopoly capital into M-CK-M, where specifically capitalist use value, CK, predominates. The concept of specifically capitalist use value is somewhat different than the notion of negative use value, advanced by Custers, in that the former concept emphasizes not so much the absolute "negativity" of such use values, but rather that they are artificially generated by capital in order to enhance the realization of surplus value and/or secure the reproduction of the system, and do not have as their main purpose the fulfillment of genuine human-social needs. On this methodological point see the comment of Samir Amin, in his "Introduction," in Custers, *Questioning Globalized Militarism*, xiv–xv.

49. ↩ Annie Leonard, *The Story of Stuff* (New York: Free Press, 2010), 160–63, and Juliet Schor, *True Wealth* (London: Penguin, 2011), 25–48. On positional goods see Fred Block, *Postindustrial Possibilities* (Berkeley: University of California Press, 199), 180–88. The classic work on product obsolescence is Vance Packard, *The Waste Makers* (New York: Simon and Schuster, 1960).

50. ↩ Albert Einstein, "Why Socialism?" *Monthly Review* 1, no. 1 (May 1949): 14.

51. ↩ On the ecologically based movement in the rural areas see Wen Tiejun, et. al, "Ecological Civilization, Indigenous Culture, and Rural Reconstruction in China," *Monthly Review* 63, no. 9 (February 2012): 29–35.

52. ↩ Walter Benjamin, *Illuminations* (New York: Schocken, 2007), 257.

53. ↩ Marx and Engels, *The Communist Manifesto* (New York: Monthly Review Press, 1964), 39.

54. ↩ Ibid, 2.