Climate change, limits to growth and the imperative of socialism

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The 2007 assessment report by the United Nations Intergovernmental Panel on Climate Change (IPCC) confirms that it is virtually certain that human activities (mainly through the use of fossil fuels and land development) have been responsible for the global warming that has taken place since the industrial revolution. Under current economic and social trends, the world is on a path to unprecedented ecological catastrophes.[1] As the IPCC report was being released, new evidence emerged suggesting that climate change is taking place at a much faster pace and the potential consequences are likely to be far more dreadful than is suggested by the IPCC report.

The current evidence suggests that the Arctic Ocean could become ice-free in summertime possibly as soon as 2013, about one century ahead of what is predicted by the IPCC models. With the complete melting of the Arctic summer sea ice, the disintegration of the Greenland ice sheets may become unavoidable, threatening to raise the sea level by five meters or more within this century. About half of the world's fifty largest cities are at risk and hundreds of millions of people will become environmental refugees.[2]

The world is currently about 0.8˚C warmer than in pre-industrial times and is within one degree of the highest average global temperature over the past one million years. The world is warming at a rate of 0.2˚C per decade and given the greenhouse gases already in the atmosphere, there will be a further long-term warming of 0.6˚C. Moreover, now with the likely loss of Arctic summer sea ice, the Arctic Ocean will absorb rather than reflect back solar radiation, which may lead to an additional warming of 0.3˚C. Taking into account these developments, the world may be already almost committed to a 2˚C warming relative to pre-industrial times, widely considered to be a critical threshold in climate change.[3]

A 2˚C warming is likely to result in widespread drought and desertification in Africa, Australia, southern Europe, and the western United States; major glacial losses in Asia and South America; large-scale polar ice sheet disintegration; and the extinction of 15–40 per cent of plant and animal species. Worse, with 2˚C warming, substantial climate feedbacks, such as dangerous ocean acidification, significant tundra loss and methane release, and disruption of soil and ocean carbon cycles, will be initiated, taking the course of climate change beyond human control.

According to James Lovelock, one of the world's leading earth system scientists, if the global average temperature rise approaches 3˚C (relative to pre-industrial times) and the atmospheric concentration of carbon dioxide (CO_2) rises above 500 parts per million (ppm), both the world's oceans and the rainforests will turn into net emitters of greenhouse gases. In that event, the global average temperature could rise further by up to 6˚C, making the greater part of the earth uninhabitable for human beings, raising the sea level by at least 25 meters, and causing the extinction of 90 per cent of species and a possible reduction of the world population by 80 per cent.[4]

James Hansen, the director of NASA's Goddard Institute for Space Studies and one of the world's leading climate scientists, argued that to avoid a devastating rise in sea levels associated with the irreversible ice sheet loss in Greenland and Antarctica, as well as massive species extinction, the world should aim to limit further global warming to no more than 1˚C (or 1.8˚F) relative to 2000. According to the existing IPCC models, this implies an atmospheric concentration of CO_2 no more than 450 ppm. However, in a recent study, Hansen argued that the IPCC models failed to take into account various potential climate feedbacks. Paleoclimate evidence suggests that "if humanity wishes to preserve a planet similar to that on which civilization has developed and to which life on earth is adapted," atmospheric concentration of CO_2 must be reduced to about 350 ppm. The world's current CO_2 concentration is 387 ppm and growing at a rate of 2 ppm a year.[5]

It is quite obvious that the very survival of humanity and human civilization is at stake. Given the gravity of the situation, many people (including some who claim to have the socialist political perspective) put their hope on an ecological reform of the global capitalist system, insisting that such a reform is within the technological and institutional feasibilities of the existing social system. The urgent and unavoidable political questions are: is it at all possible for the existing social system—the system of global capitalism, in all of its conceivable forms—effectively to address the crisis of global climate change and avoid the most catastrophic consequences? If not, what would be the minimum requirements for an alternative social system that will have the institutional capacity to prevent the crisis or, if the crisis cannot be prevented, to help human civilization to survive the crisis? These are the questions that anyone who is seriously concerned with the global ecological crisis will have to confront one way or the other.

Stabilizing the climate: Technical options

To prevent or alleviate further global warming, greenhouse gas emissions from human activities (especially the CO_2 emissions resulting from the burning of fossil fuels) will have to be greatly reduced. The emissions of CO_2 in turn depend on the emissions intensity of energy consumption ("Emissions Per Unit of Energy Consumption"), the energy intensity of economic output ("energy consumption per unit of output"), and the level of economic output (typically measured as GDP.) Thus, CO_2 emissions = economic output ´ energy consumption per unit of output ´ emissions per unit of energy consumption.

Capitalism is an economic system based on the pursuit of profit and capital accumulation. Individual capitalists, corporations, and nation-states engage in constant and intense competition against one another in the capitalist world market. To survive and prevail in the competition, and driven by the desire for greater profits (or more rapid economic growth), individual capitalists, corporations, and nation-states are all pressured and motivated to expand production and accumulate capital on increasingly larger scales. Thus, under capitalism, economic output normally tends to grow, except in periods of economic crisis.

On paper, if energy intensity falls rapidly to offset economic growth, then the level of energy consumption does not have to grow. However, all economic activities inevitably involve certain physical or chemical transformations and must consume some energy (this is true not only for the material production sectors but also for the so-called services sectors). There is a physical limit to how much energy intensity can fall given any economic activity.

Given the way that capitalist markets operate, any decline of energy intensity tends to make energy products cheaper, as short-term demand for energy falls relative to supply. Cheaper energy products, however, encourage people to consume more energy in the long run. Thus, falling energy intensity (i.e., rising energy efficiency) is simply translated into more rapid capital accumulation (economic growth) and rarely leads to absolute declines in energy consumption.[6]

In reality, capitalist economic growth is usually accompanied by rising energy consumption. Since 1973, despite relatively sluggish world economic growth, world energy consumption has been growing at 2 per cent a year. At this rate, world energy consumption will increase by 130 per cent between now and 2050. Given these trends, the emissions intensity of world energy consumption will have to be cut drastically or the scale of economic output will have to decline markedly if there is to be any hope of reducing CO_2 emissions to an appropriate level.

Fossil fuels account for about three-quarters of the primary energy consumed in electricity generation. To reduce CO_2 emissions from electricity generation, there are three technical possibilities: carbon capture and storage; nuclear electricity; and electricity generation from renewables (such as geothermal, wind, solar, tides, waves, and ocean currents).

Emissions from power plants using fossil fuels can be reduced if the carbon emitted in the process of electricity generation can be captured and then stored underground without being released into the atmosphere. Carbon capture and storage is likely substantially to increase the capital cost of electricity generation and reduce energy efficiency (as the process of capturing and storing carbon requires energy). There may not be enough good, leak-proof sites to store very large amounts of carbon. The technology remains unproven, and cannot be applied to existing power stations. This means that, at best, it will take decades before carbon capture and storage is applied to a substantial portion of the world's power plants.[7]

Nuclear electricity has very serious environmental and safety problems. It produces massive amounts of radioactive wastes. It uses uranium, which is a nonrenewable mineral resource. The German Energy Watch Group points out that the world's proven and possible reserves of uranium would be able to support the current level of demand for uranium for at most seventy years and the world could face uranium supply shortages after about 2020. Moreover, given the long lead time to plan and construct nuclear reactors, it will be difficult to replace the half of existing nuclear power plants that will retire in the coming one to two decades.[8]

Electricity generation from renewables is not an environmental panacea. The equipment and buildings required for "renewable" electricity need to be built by the industrial sector using fossil fuels and nonrenewable mineral resources. Relative to conventional electricity, electricity generated from renewables remains expensive. Wind and solar—the two most important renewable energy sources—are variable and intermittent, and, therefore, cannot serve as the "base-load" electricity, requiring substantial conventional electricity capacity as backup.[9]

With the exception of biomass, renewables can only be used to generate electricity.[10] Electricity generation accounts for less than 40 per cent of the world's total primary energy supply and only 20 per cent of the total final consumption. About one-third of the primary consumption of fossil fuels is used for electricity consumption, but two-thirds are used as liquid, gaseous, and solid fuels in transport, industrial, agricultural, services, and residential sectors.

Out of the total final consumption of fossil fuels, about 40 per cent is used in the transport sector, 24 per cent in the industrial sector, 23 per cent in the agricultural, services, and residential sectors, and 13 per cent is used as raw materials for chemical industries. Electricity obviously cannot replace fossil fuels as chemical industrial inputs. In addition, it would be very difficult or impossible for electricity to replace fossil fuels in their uses in sea and air transportation, freight transportation on roads, high-temperature industrial processes, and the powering of heavy equipment in industrial, construction, and agricultural sectors. While it might be technically feasible to replace the gasoline-fueled passenger cars with electric cars (and passenger cars might be the crux of modern capitalist consumer culture), the technology remains immature and it could take decades before the electric car dominates the market.

Moreover, as currently about three-quarters of the primary energy used in electricity generation derives from fossil fuels and about three units of coal are required to generate one unit of electricity, an electrification of transport, industry, and other sectors would tend to increase rather than decrease CO_2 emissions. For the purpose of climate stabilization, electrification of these sectors would not make much sense unless the bulk of the electricity generation has been "de-carbonized" (that is, the conventional fossil-fuels generated electricity replaced with carbon-captured, nuclear, and renewable electricity).

Even if all of the economic and technical difficulties discussed above were to be overcome, it is likely to take decades before the world's electricity generation is largely transformed, and it could take several more decades to electrify much of the world's industrial and transportation infrastructure. By then global ecological catastrophes would be all but inevitable.

Biomass is the only renewable energy source that can be used to make liquid and gaseous fuels.[11] However, limited by the available productive land and fresh water, biomass cannot provide more than a small fraction of the world's demand for liquid and gaseous fuels. Worse, recent studies reveal that taking into account emissions in land development and soil erosion, fuels made from biomass actually emit more greenhouse gases than conventional petroleum.[12]

Climate change and the limits to growth

According to the IPCC report, to limit global warming to 2–2.4˚C (relative to the pre-industrial temperature), it is necessary to stabilize the carbon dioxide equivalent (CO_{2e})—taking into account the total effects of CO_2 and other greenhouse gases—in the atmosphere at 445–490 ppm. This would in turn require that global CO_2 emissions peak between 2000 and 2015, and fall by 50–85 per cent from the 2000 levels by 2050.

Global CO_2 emissions have been growing at about 3 per cent a year since 2000. If the current trend continues, by 2010 global emissions would be 34 per cent greater than the 2000 levels. It follows that to stabilize the CO_{2e} at 445–490 ppm, global emissions need to fall by 63–89 per cent from the 2010 levels.

Can these emissions reduction targets be accomplished under the system of global capitalism, with its constant tendency towards accumulation of capital and economic growth? Table 1 presents several alternative scenarios of emissions reduction and economic growth that are consistent with a 63 per cent reduction of emissions (which would allow for stabilizing CO_{2e} in the atmosphere at 490 ppm), assuming global emissions peak in 2010 and decline thereafter. In other words, the intent is to point to some possible combinations of changes in energy intensity, emissions intensity, and economic growth that would meet the target of stabilizing CO_{2e} levels at 490 ppm. These scenarios, while hypothetical and based on optimistic assumptions, highlight the dramatic changes necessary to stabilize CO_2 levels. They help to illustrate that no sensible goals of climate stabilization can be accomplished under conditions of endless economic growth and capital accumulation.

As is discussed above, in many areas it is technically very difficult or impossible to replace direct consumption of fossil fuels with electricity. Nevertheless, in all scenarios, it is assumed that 50 per cent of the fossil fuels final consumption will be electrified by 2050. Moreover, despite various limitations to carbon-captured, nuclear, and renewable electricity, in different scenarios, it is optimistically assumed that 50, 75, or 100 per cent of the electricity generation currently using fossil fuels will be de-carbonized by 2050 (corresponding to average declines in emissions intensity of 1, 1.7, or 2.7 per cent a year respectively). Energy intensity is assumed to fall by 33, 45, or 55 per cent by 2050 (corresponding to average decline of 1, 1.5, and 2 per cent a year respectively). With a 33 per cent reduction of energy intensity, the world average would approach the average level of “energy efficiency” seen in “advanced” capitalist countries today. With a 45 or 55 per cent reduction, the world average would be comparable to the “energy efficiency” levels of Western European countries today.[13]

The observed levels of “energy efficiency” in the advanced capitalist countries result not only from some advanced technologies, but also from the massive relocation of energy-intensive industries to the global periphery. This raises the question whether these “efficiency” levels can ever be accomplished by peripheral countries, making the assumptions of global improvements in efficiency of this magnitude highly optimistic. It is also important to recognize that the three factors assessed in these scenarios—emissions intensity, energy intensity, and economic growth—are not necessarily independent of one another. Certain changes in the types of fuel used to alter emissions intensity, for example, may adversely affect the potential to improve energy intensity or economic growth, and vice versa. However, in the presented scenarios, these problems are optimistically ignored.

Given the assumed declines in emissions intensity and energy intensity, one can then calculate the maximum economic growth rate that is consistent with the emissions reduction objective. For example, in scenario 1, assume that 50 per cent of electricity generation currently using fossil fuels will be de-carbonized by 2050 (implying that emissions intensity declines at an average annual rate of 1 per cent) and that energy intensity falls at an average annual rate of 1 per cent. Then to reduce emissions by 63 per cent from 2010 to 2050, the average annual economic growth rate from 2010 to 2050 must not exceed –0.4 per cent, that is, the economy must contract. Similarly, in scenario 9, assume that 100 per cent of electricity generation currently using fossil fuels will be de-carbonized by 2050 (implying that emissions intensity declines at an average annual rate of 2.7 per cent) and energy intensity falls at an average annual rate of 2 per cent, then the average annual economic growth rate from 2010 to 2050 must not exceed 2.3 per cent.

It is clear from table 1 that the assumed declines in emissions intensity and energy intensity are much more dramatic than the historical performance of the global capitalist economy (what the IPCC refers to as “business as usual”) and the assumptions for all scenarios are, therefore, very optimistic. Nevertheless, in most of the scenarios, the world economy would have virtually to stagnate and in one scenario, the world economy actually needs to contract absolutely. And this is even assuming declines in emissions and energy intensity that exceed historical averages, and dramatically so in the case of emissions intensity, where the scenarios are based on a rate of improvement of at least more than three-fold and up to nine-fold the historical rates. Considering that the world population growth rate is about 1 per cent a year, only the most optimistic scenarios would result in positive growth of per capita GDP.

Table 1. Stabilizing CO_{2e} in atmosphere at 490 ppm, 2010–50: scenarios relying on various declines in emissions intensity of energy and energy intensity of the economy and the rates of economic growth they allow (annual rates of change).

	Decline in emissions intensity	Decline in energy intensity	Maximum economic growth rate allowed
Historical: 1973-2005	0.3%	0.9%	3.0%
Scenario 1	1.0%	1.0%	-0.4%
Scenario 2	1.0%	1.5%	0.1%
Scenario 3	1.0%	2.0%	0.6%
Scenario 4	1.7%	1.0%	0.3%
Scenario 5	1.7%	1.5%	0.8%
Scenario 6	1.7%	2.0%	1.3%
Scenario 7	2.7%	1.0%	1.3%
Scenario 8	2.7%	1.5%	1.8%
Scenario 9	2.7%	2.0%	2.3%

Source: Historical data for world economic growth, energy consumption, and emissions are from World Bank, World Development Indicators Online, 2008.

And even with these highly optimistic scenarios on atmospheric carbon stabilization, according to the IPCC estimate, the world would still warm by 2.4˚C (relative to pre-industrial times). Indeed, the IPCC projections fail to take into account many of the latest developments. The Arctic summer sea ice is now likely to disappear and the Arctic Ocean will, therefore, absorb more heat. An atmospheric concentration of CO_{2e} of 490 ppm will probably lead to a global warming of 2.7˚C (rather than the 2.4˚C suggested by the IPCC report), taking the world dangerously close to the 3˚C threshold, which according to James Lovelock would amount to a global collective suicide by humanity.

If the goal is to stabilize atmospheric concentration of CO_{2e} at 445 ppm, instead of 490 ppm, then the global emissions need to fall by 89 per cent, not just 63 per cent. At 445 ppm, global temperature would still rise by 2˚C (relative to pre-industrial times). Some major ecological catastrophes would be unavoidable and dangerous climate feedback cycles could be initiated. Far more drastic cuts in global emissions would be required if the goal is truly to stabilize the climate and create a sufficiently large safety margin.

Table 2. Scenarios of emissions reduction and world economic growth (stabilizing CO_{2e} in atmosphere at 445 ppm, 2010–50, annual rate of change).

	Decline in emissions intensity	Decline in energy intensity	Maximum economic growth rate allowed
Historical: 1973-2005	0.3%	0.9%	3.0%
Scenario 1	1.0%	1.0%	-3.4%
Scenario 2	1.0%	1.5%	-2.9%
Scenario 3	1.0%	2.0%	-2.4%
Scenario 4	1.7%	1.0%	-2.7%
Scenario 5	1.7%	1.5%	-2.2%
Scenario 6	1.7%	2.0%	-1.7%
Scenario 7	2.7%	1.0%	-1.7%
Scenario 8	2.7%	1.5%	-1.2%
Scenario 9	2.7%	2.0%	-0.7%

Source: Historical data for world economic growth, energy consumption, and emissions are from World Bank, World Development Indicators Online, 2008.

Table 2 presents the alternative scenarios of emissions reduction and economic growth that are consistent with an 89 per cent reduction of emissions. The rest of the assumptions are the same as table 1. It turns out that the world economy would have to contract in all scenarios. For scenarios 1 to 3 (where the assumed declines in emissions intensity and energy intensity are clearly optimistic in comparison with the historical performance of global capitalism), the world economy would have to fall by two-thirds to three-quarters after 2010 to accomplish the objective of emissions reduction.

The results presented in tables 1 and 2 suggest that under no plausible circumstances could the objective of climate stabilization be compatible with the endless expansion of the global capitalist economy. However, the capitalist economic system is inherently incapable of operating with a non-growing (not to say contracting) economy.

The politics of climate change and the imperative for socialism

Could this author be too pessimistic? Is the “ingenuity,” “innovativeness,” “adaptability,” and “resilience” of capitalism underestimated? The spokespersons of the mainstream environmental movement, such as Lester R. Brown (author of Plan B and director of Earth Policy Institute) and Amory Lovins (coauthor with Paul Hawken and L. Hunter Lovins of Natural Capitalism), try to convince us that magical technologies will come to the rescue. Solar panel costs will fall to the floor, as energy efficiency will surge ten-fold. Greenhouse gases emissions and other pollution can be reduced drastically, while gross domestic product will keep growing explosively. For them, there is no inherent conflict between production for profit and capital accumulation on the one hand and ecological sustainability on the other.

Their typical line of argument is that “the technology is already available” and “all that is needed is political will.” By “political will,” they are of course not referring to anything like fundamental social transformation. Instead, they are talking about some legislative reforms and international agreements within the basic capitalist framework. At most, they would demand some limited changes in personal consumer behavior.

The mainstream environmental movement, as far as its social composition is concerned, mainly consists of people who belong to the upper middle class in a capitalist society. They include the university professors, engineers, technicians, managers, financial analysts, and other professionals. Although they typically do not own significant amounts of the means of production, they play important managerial and technical functions for the capitalists and enjoy substantial material privileges relative to the working class.

In periods of revolutionary upsurge, such as in the 1960s, some of them could be rapidly radicalized and become various “ultra-leftists.” In periods of counter revolution, they could become the most important ally of the ruling class in the offensive against the working people. In the 1980s and ’90s, the upper middle class was an important social base for neoliberalism in many countries and they played a crucial role in the restoration of capitalism in the former Soviet Union, Eastern Europe, and China.

As the global ecological crisis deepens, some among the upper middle class recognize or sense that the existing capitalist “life style” is in serious trouble and cannot be sustained indefinitely. Yet, they are unable or unwilling to imagine anything beyond the capitalist system, on which their relatively privileged material life depends. They are not yet ready to give up their implicit political support for the capitalist class. Their living conditions and experiences are very much detached from those of the working class. It is therefore difficult for them to see that only with a massive mobilization and organization of the working class could there be any hope for the social transformation required for ecological sustainability to be accomplished. The upper-middle-class environmentalists, as a result, have to put their desperate hope (or faith) in technological miracles on the one hand and the power of moral persuasion on the other hand (which they hope would convince the capitalist class to behave morally and rationally).

However, the laws of motion of capitalism will keep operating so long as the capitalist system remains intact, independent of the individual wills and against the best wishes of the upper-middle-class environmentalists. Sooner or later, those truly conscientious environmentalists will have to choose between the commitment to ecological sustainability and the commitment to an exploitative and oppressive social system. Furthermore, with the deepening of the global ecological crisis and the crisis of global capitalism in general, it may soon become increasingly difficult for the capitalist system to accommodate the material privileges of the upper middle class while simultaneously meeting the requirements of production for profit and accumulation.

As I discussed earlier, there are many technical obstacles to the de-carbonization of the world's energy system. Brown and Lovins have greatly exaggerated the potentials of technical change. But even if many of the proposed highly efficient energy technologies using renewables become available right away, their application will be delayed by the inherent obstacles to technological diffusion in the capitalist system. In an economic system based on production for profit, a new technology is "intellectual property." People or countries that cannot afford to pay are denied access. Even today hundreds of millions of people in the world have no access to electricity. How many decades would it take before they start to have access to solar-powered electric cars?

Moreover, unlike consumer novelties such as cell phones or lap tops, which can be readily manufactured by the existing industrial system, the de-carbonization of the world's energy system requires fundamental transformation of the world's economic infrastructure. This basically means that the pace of de-carbonization, even under the most ideal conditions, cannot really be faster than the rate of depreciation of long-lasting fixed assets. Considering that many buildings and other long-lasting structures will stand for half a century or even longer, the assumed rates of de-carbonization presented in tables 1 and 2 must be seen as extremely optimistic.

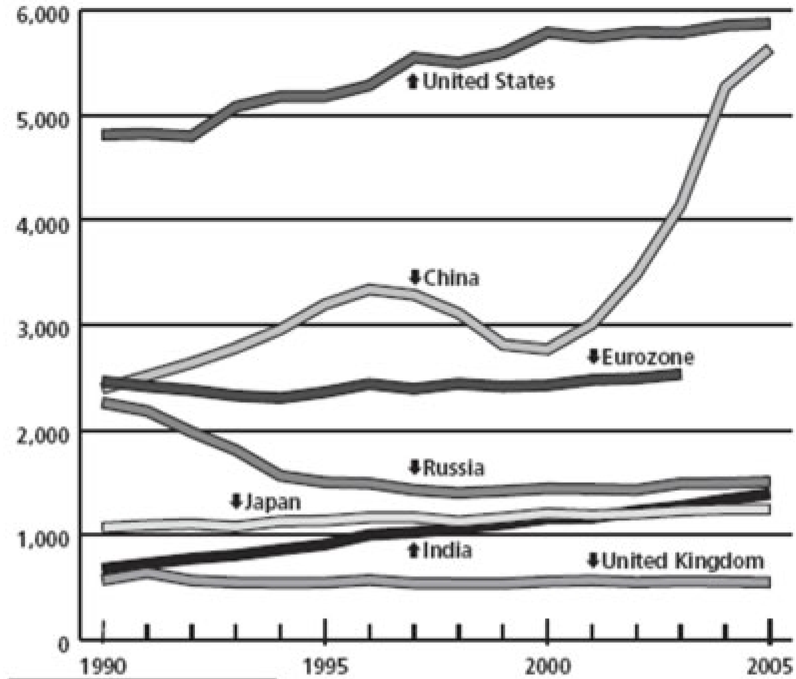
From a purely technical point of view, the most simple and straightforward solution to the crisis of climate change is immediately to stop all economic growth and start to downsize world material consumption in an orderly manner until the greenhouse gases emissions fall to reasonable levels. This can obviously be accomplished with the existing technology. If all the current and potentially available de-carbonization technologies are introduced to all parts of the world as rapidly as possible, the world should still have the material production capacity to meet the basic needs of the entire world's population even with a much smaller world economy (scenarios 1 to 3 in table 2 would roughly correspond to a return to the 1960s material living standards).

However, under a capitalist system, so long as the means of production and surplus value are owned by the capitalists, there are both incentives and pressures for the capitalists to use a substantial portion of the surplus value for capital accumulation. Unless surplus value is placed under social control, there is no way for capital accumulation (and therefore economic growth) not to take place. Moreover, given the enormous inequality in income and wealth distribution under capitalism, how could a global capitalist economy manage an orderly downsizing while meeting the basic needs of billions of people? Economic growth is indispensable for capitalism to alleviate its inherent social contradictions.

The Kyoto protocol requires that the advanced capitalist countries reduce their CO_2 emissions by 5 per cent from 1990 to 2012. Figure 1 presents the CO_2 emissions of the world's largest economies from 1990 to 2005.14 The United States refused to sign the protocol and U.S. emissions grew by 22 per cent from 1990 to 2005. Among the signatories of the Kyoto protocol, Japan's emissions grew by 16 per cent and the Euro-zone emissions tended to grow since the mid-1990s. UK emissions (due mainly to its massive shift from coal to North Sea gas) have been on a flat trend.

Ironically, Russia is the only large economy that has reduced emissions substantially since 1990, during a period in which its economic output and population declined. Russia's emissions fell by one-third from 1990 to 2005, with an annual rate of reduction of 2.7 per cent. If the world economy were to repeat the Russian experience three times, that is, to experience the kind of economic collapse that Russia experienced in the 1990s three times with a comparable reduction of emissions, then by 2050 the world emissions would fall by two-thirds. This would only allow the atmospheric concentration of CO_2 equivalent to stabilize at about 490 ppm. As is discussed above, this would still fall short of what is necessary.

Chart 1. CO_2 emissions, selected countries (millions of tons)



Source: World Bank, World Development Indicators Online, http://devdata.worldbank.org/dataonline.

Since 1990, China’s emissions and India’s emissions have more than doubled, and China has now overtaken the United States to become the world’s largest emitter of greenhouse gases. At the current rate, China’s emissions will double in ten years and India’s will double in less than fifteen years. The European Union is currently committed to a reduction of emissions by 20 per cent (from the 1990 levels) by 2020. All of this reduction would be offset by just one year of China’s economic growth. With the great Chinese capitalist boom, China now builds two coal-fired power plants every week. This means that every four years China will build as many coal-fired power plants as currently exist in the United States. What hope is there for climate stabilization with this kind of fanatical drive for accumulation? What magical technology can make this kind of capitalism sustainable?

It should be pointed out that the Chinese workers and peasants have not at all benefited from this relentless search for capitalist profit. It is the transnational corporations (who use China as the world’s “workshop”) and the Chinese capitalist elites that have reaped enormous profits from this. To a lesser extent, the upper middle classes in the advanced capitalist countries have also benefited from the cheap consumer goods and “services” produced by the workers in China, India, and other parts of the periphery.

On June 14, 2007, *Financial Times* published a quite bizarre article (“What is at risk is not the climate but freedom”) by Václav Klaus, the president of the Czech Republic and the former leader of the anticommunist “velvet revolution”:

> We are living in strange times. One exceptionally warm winter is enough...for environmentalists and their followers to suggest radical measures to do something about the weather…Rational and freedom-loving people have to respond. The dictates of political correctness are strict and only one permitted truth, not for the first time in human history, is imposed on us…
>
> [Global] warming hysteria has become a prime example of the truth versus propaganda problem. It requires courage to oppose the “established truth”…As someone who lived under communism for most of his life, I feel obliged to say that I see the biggest threat to freedom, democracy, the market economy and prosperity now in ambitious environmentalism, not communism. This ideology wants to replace the free and spontaneous evolution of mankind by a sort of central (now global) planning.

The freedom-loving President Klaus (who is apparently a good student of Friedrich Hayek) then demanded that scientists “have an obligation to declare their political and value assumptions and how much they have affected their selection and interpretation of scientific evidence.” Klaus then assured us that “advances in technology” and “increases in disposable wealth” will continue and “will solve any potential consequences of mild climate changes.”

One has to admit that it does take some courage for Klaus to defend “freedom” at a time when an important political consensus is being formed among the international bourgeoisie that the issue of climate change cannot be ignored any more. Given my own political experience and background in China (a former socialist state like Czechoslovakia), I do feel some strange familiarity with Klaus’s position.

Frankly, only an extremely reactionary politician who has deep-in-the-heart hatred of the working class and socialism could have made such outlandish comments. In one respect, however, Klaus is closer to the truth than all the mainstream environmentalists. It does take global "central" planning for humanity to overcome the crisis of climate change, if by "central" one is talking about self-conscious, rational coordination by democratic institutions.

The technical requirements for climate stabilization are clear. The global energy infrastructure needs to be fundamentally transformed to be based on renewables. Much of the world's economic infrastructure will have to be changed accordingly. Agriculture will need to be reorganized to follow sustainable principles and to be freed from dependence on fossil fuels for fertilizers and machineries. The entire transportation system will have to be re-built, with railways and public transportation operated by renewable electricity playing prominent roles. The scale of the world economy will need to be reduced in accordance with the emissions reduction objectives. All of these need to be accomplished without undermining the basic needs of the world's population.

It is clear that capitalism cannot accomplish these objectives. If we do not want to undermine the ecological conditions that support civilization, what else can accomplish these goals other than socialism with public ownership of the means of production and democratic planning?

So-called "market socialism" is not an option. Both theory and historical experience have demonstrated that "market socialism" inevitably leads to capitalism. Those who object to socialist planning might argue that the experience of historical socialisms suggested that socialist planning would be "inefficient."

Leave aside the question that the future socialism would no doubt do better than the historical socialisms in democracy and economic efficiency, given the extreme gravity of the global ecological crisis, "efficiency" is simply not a relevant issue. The real question is: can socialism provide food, education, and health care to everyone on the earth? We know that historical socialisms were able to, and Cuba is still able to accomplish this with quite limited material resources.

Capitalism has always failed to provide food, education, and health care to at least hundreds of millions of people. If the global ecological crisis is not overcome, then capitalism will eventually fail the entirety of humanity. Is the choice not clear enough?

Notes

1. Intergovernmental Panel on Climate Change, "Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report," November 2007, http://www.ipcc.ch.

2. David Spratt, "The Big Melt: Lessons from the Arctic Summer of 2007," October 2007, http://www.carbonequity.info/docs/arctic.html.

3. David Spratt and Philip Sutton, Climate Code Red (Friends of the Earth, 2008), http://www.climatecodred.net.

4. David Spratt and Philip Sutton, Climate Code Red; Jonathan Leake, "Fiddling with Figures while the Earth Burns," Times Online, May 6 2007, http://www.ecolo.org/lovelock; James Lovelock, The Revenge of Gaia (New York: Basic Books, 2006), 15–38.

5. James Hansen et al., "Target Atmospheric CO_2: Where Should Humanity Aim?" (abstract), April 2008, (accessed May 2008). Also see John Bellamy Foster, "The Ecology of Destruction," Monthly Review 58, no. 8 (2007): 1–14.

6. This is known as the Jevons Paradox, named after the nineteenth-century British economist William Stanley Jevons who first took note of this perverse effect. See Brett Clark and

John Bellamy Foster, "William Stanley Jevons and The Coal Question," Organization & Environment 14, no. 1 (2001): 93–98; John Bellamy Foster, Ecology Against Capitalism (New York: Monthly Review Press, 2002), 94–95.

7. Ted Trainer, Renewable Energy Cannot Sustain A Consumer Society (Dordrecht, Netherlands: Springer, 2007), 110–11.

8. Energy Watch Group, "Uranium Resources and Nuclear Energy," EWG-Series No.1/2006 (December), http://www.energywatchgroup.org.

9. Michael H. Heusemann, "The Limits of Technological Solutions to Sustainable Development," Clean Technology and Environmental Policy 5 (2003): 21–34. A recent experiment sponsored by the Germany government intends to show that a network with 61 per cent of electricity from wind, 14 per cent from solar photovoltaics, and 25 per cent from biomass, can meet up to 100 per cent of electricity demand ("Renewed Energy," The Guardian, February 26, 2008). But as discussed below, biomass is very problematic and could emit more greenhouse gases than fossil fuels. Thus, the experiment suggests a 75 per cent limit to de-carbonization of electricity generation.

10. The energy statistics discussed here and in the following paragraph are from: International Energy Agency, Key World Energy Statistics 2007.

11. Although there has been much talk of developing a "hydrogen economy," hydrogen itself is not a primary energy source (i.e., there are no natural stores of hydrogen to be exploited). Hydrogen fuel is produced from water, a process which requires energy input. Thus, hydrogen is simply an energy storage mechanism (much like a battery), and its environmental consequences depend on the source of energy that is used to produce it.

12. Joseph Fargione, et al., "Land Clearing and the Biofuel Carbon Debt," Science 319, no. 5867 (2008): 1235–38; Timothy Searchinger, et al., "Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change," Science 319, no. 5867 (2008): 1238–40.

13. According to Key World Energy Statistics (see footnote 9), in 2005, measured by 2000 U.S. dollars, the energy intensity of OECD countries was 37 per cent below the world average, France 41 per cent below world average, Germany 44 per cent below world average, and UK 56 per cent below world average.