The climate crisis …and the new green capitalism?

INTRODUCTION

Over the past two decades, climate change has emerged as the most pressing ecological issue of our time. June 2012 saw the 'Rio +20' summit come and go with little concrete outcomes. In December, the COP-18[1] in Qatar will be the 18th consecutive year of high-level talks on a deal to replace the Kyoto Protocol, to date the only international treaty aimed at addressing climate change. Kyoto was woefully inadequate to heading off the developing crisis, but its supporters defended it on the grounds it was a first step forward. Yet amidst divergent national interests, particularly between the oil-powered US and coal-hungry, rapidly industrialising China, India and Brazil, Kyoto is expiring with no replacement on the table. The second step has been a backwards one.

This has led many in the more radical wings of the environmental movement to identify capitalism itself as the problem: a system of endless growth incompatible with ecological limits. There is much to commend this view, yet it overlooks another tendency: the emergence of a nascent 'green capitalism', with multi-million pound markets emerging in emissions trading, renewable energy, and production of 'green' goods (wind turbines, electric cars etc). So while there are strong grounds for anti-capitalist pessimism for the prospects of avoiding severe climate change of 4°C or more by the end of the century, neither should we underestimate the flexibility of the capitalist system to profit from a crisis of its own making.

Before we move on, it is probably worth a brief survey of the science. The basic facts are familiar to any schoolchild: greenhouse gas (GHG) emissions, particularly carbon dioxide (CO_2) produced by human activities – particularly deforestation and burning fossil fuels – are increasing atmospheric concentrations of GHGs, leading to the greenhouse effect of rising temperatures, as more solar energy is trapped in the Earth's atmosphere. Despite significant attempts by 'climate sceptics' to muddy the waters, this represents an overwhelming scientific consensus, and furthermore the consensus has been firmed up by each subsequent iteration of the Intergovernmental Panel on Climate Change (IPCC) assessment reports.[2] The fourth of these, published in 2007 estimated global temperatures could rise somewhere between 1.1°C and 6.4°C on pre-industrial levels by the end of the century. The range represents different scenarios ranging from rapid mitigating action (low) to business-as-usual inaction (high).

The fifth IPCC assessment report (AR5), due in 2014, is widely expected to revise this band upwards. Indeed, the latest estimates from the Met Office predict temperature rises in excess of

[1] The 18th Conference of the Parties to the UN Framework Convention on Climate Change, which will be introduced properly below.

[2] Some firms are now even embarrassed to be associated with climate change denial. See Leo Hickman, 'Diageo to end funding of Heartland Institute after climate change outburst': guardian.co.uk/business/2012/may/06/diageo-end-funding-heartland-institute

7°C by 2100 on a business-as-usual scenario (see Figure 3). Anything in excess of 2°C is considered dangerous, due to the potential for positive feedbacks – such as the release of oceanic GHG deposits – to engage and make the temperature rises accelerate irreversibly.[3] Consequently, 2°C is the most talked about target for limiting emissions. However, there is widespread agreement that we are currently on course for warming of 4°C or more. Global warming has numerous environmental and social consequences, including increased extreme weather events (heatwaves, torrential rainfall), droughts, tropical cyclones and extreme high tides. And while sea levels are not going to rise anywhere near as far and as fast in the film *The Day After Tomorrow*, millions of people living in low-lying coastal areas home to numerous cities could be displaced and agriculture could be severely impacted.

PART I: THE CLIMATE REGIME AND ITS DISCONTENTS

The international climate regime

The IPCC was founded in 1988 out of two UN bodies, and later given full status by a vote of the UN general assembly. Four years later in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was signed at the Rio 'Earth Summit'. The UNFCCC treaty set out a non-binding framework for future agreements between states, known as 'protocols'. While environmental movements had emerged in the 1960s, they had typically been quite local in scope, focussing on particular pollutants or facilities (such as DDT or nuclear plants). There would seem to be three factors in the fairly rapid rise of climate change from scientific model to global issue towards the end of the 1980s. The first was simply the timing of the scientific evidence, which only really began to mount in the late 1970s with the availability of satellite data. Closely related to this was the discovery of 'holes' in the Earth's protective ozone layer. This was in a sense a single issue in the vein of existing environmentalism with an immediate, easily conceived problem and a relatively straightforward solution: banning refrigerant CFC gasses which damaged the ozone layer.

The 1987 Montreal Protocol did just that, beginning to phase out ozone-depleting gasses within a relatively short time of the discovery of the problem. This was no doubt accelerated by the relative ease of switching to substitute gasses which saw the world's states overrule some objections by the industry, but it nonetheless contributed to a sense of optimism for global environmental co-operation. Indeed, Kofi Annan has described the Montreal Protocol as "perhaps the single most successful international agreement to date."[4]

The third factor, and perhaps the most decisive, was the particular geopolitical juncture at the end of the cold war. For most of the century, the world had been divided into rival territorial blocs, first the various empires and then the NATO, Warsaw Pact and non-aligned states. By 1992, it was again possible to conceive of a truly world market, and with it, *global* governance. The mounting scientific concern with climate change thus found a receptive audience, and the original Earth Summit must be understood in this context.

From 1995, annual negotiations began under the UNFCCC to agree a protocol to reduce global GHG emissions. The Protocol was adopted in December 1997 in Kyoto, Japan, but did not enter force until February 2005 when the signature of Russia met the threshold requirement. The Kyoto Protocol divided countries into industrialised and non-industrialised/industrialising countries, with the former agreeing to binding GHG emissions reductions averaging 5% against a 1990 baseline for the five-year commitment period 2008-2012. Significantly, the parties without binding commitments have included China and India, home to around a third of the world's population and, through rapid industrialisation, a growing percentage of global emissions. The International Energy Agency predicts global energy demand will increase 50% by 2030, with China and India accounting for nearly half of that increase. This is expected to correlate closely to increased CO_2 emissions.[5]

Inertial interests backed by big oil were the first to mobilise in opposition to Kyoto, financing expensive advertising campaigns and forming lobbying front groups to hype up the costs of mitigating climate change and question the science behind it. Figures were produced showing that action to mitigate climate change would cost the US between $800bn and $3.6tn by 2100.[6] It would be another decade before other factions of capital began to mobilise in favour of limiting GHG emissions (we will encounter these in due course). This mobilisation was quite influential: on the eve of the signing of the Kyoto Protocol in 1997, the US senate passed the Byrd-Hagel resolution opposing any treaty which imposed

[3] Worryingly this has already begun to happen, sooner than expected: bbc.co.uk/news/science-environment-18120093

[4] See: theozonehole.com/montreal.htm

[5] Dieter Helm (2008), 'Climate-change policy: why has so little been achieved?', *Oxford Review of Economic Policy*, vol. 24, no. 2, pp. 211-238.

[6] For comparison, the US bank bailouts cost $11.6tn over 19 months, suggesting the banking system is too big to fail but the climate system is not.

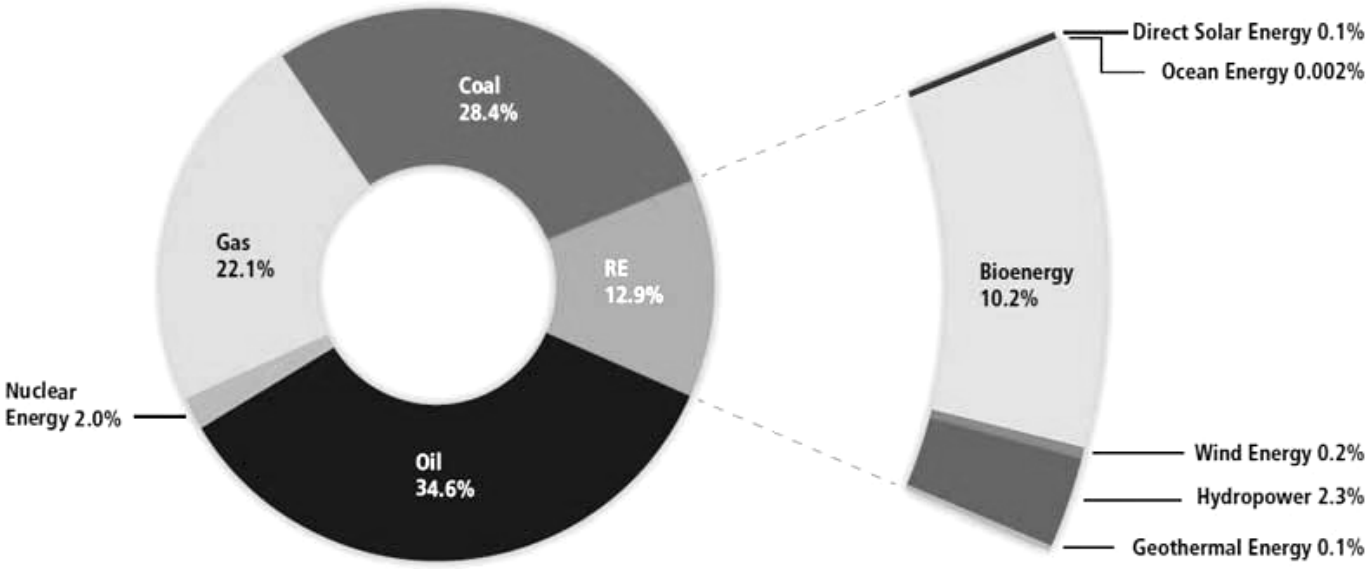

Figure 1: Current world energy mix (IPCC SRREN Report 2011: srren.ipcc-wg3.de/report)

obligations on the US not also placed on all other countries or which "would result in serious harm to the economy of the United States".[7]

With the formal withdrawal of the US from Kyoto in 2001, this meant the Protocol no longer included binding emissions caps on the US, and provided no targets for the fast-growing emitters India and China. Indeed, it only became operational in the first place after the EU horse-traded with Russia, including supporting their application for membership of the World Trade Organisation (WTO).[8] Russia's signature introduced a large volume of so-called "hot air" into the system, since Russia had *already* exceeded its Kyoto commitments by virtue of its economic contraction since the collapse of the USSR, and could thus sell its excess quota to other countries without any real net reductions in global GHG emissions.[9] Consequently, even if the Protocol had been fully implemented its targets have been described as "woefully inadequate to address climate change".[10] And of course, the protocol has not been fully implemented, and is now expiring without replacement.[11]

Thus, the subsequent evolution of the climate regime has put a dampener on the idea that the world was now entering a phase of rational global governance, unimpeded by rival national interests. Indeed the reality is the UNFCCC process reflects a careful balancing act; not resolving divergent interests but glossing over them.[12] Behind the hype of the Rio Earth Summit was old-fashioned realpolitik, a pattern which continues into Rio +20. Centrally, states have been unwilling to compromise economic growth for climate change mitigation. And this is not just true for the US. It has been noted that since the UNFCCC process began "the primary goal of China's policy has been to prevent the setting of emission targets from hampering its economic growth and modernisation".[13] Of course, economic growth is non-negotiable for capitalism and the states that operate within it.

Approaches to the climate crisis

The problem of climate change has given rise to various responses. The dominant one, enshrined in the Kyoto Protocol, is that of sustainable development: the proposition that capitalist accumulation and climate change mitigation can be reconciled, usually at minimal cost (1% of GDP is a figure oft cited). At the other end of the

[7] United States Senate (1997), 'Text of the Byrd-Hagel resolution': nationalcenter.org/KyotoSenate.html

[8] Helm (2008), p.212.

[9] Achim Brunnengräber (2007), 'The political economy of the Kyoto Protocol', in Leo Pantich and Colin Leys (eds.) *Socialist register 2007: coming to terms with nature*, London: Merlin Press, p.222.

[10] Peter Newell and Mike Paterson (2010), *Climate capitalism: global warming and the transformation of the global economy*, Cambridge: Cambridge University Press, p.147.

[11] The COP-17 in Durban in 2011 agreed to prepare an agreement by 2015, to enter in to force by 2020. As the text and contents have yet to be drafted, let alone agreed, it is unwise to take this kind of diplomatic manoeuvring at face value.

[12] Daniel Bodansky (2001), 'The history of the global climate change regime', in Urs Luterbacher and Detlef Sprinz (eds.) *International relations and global climate change*, London: MIT Press, p.34.

[13] Lichao He (2010), 'China's climate-change policy from Kyoto to Copenhagen: domestic needs and international aspirations', *Asian Perspective*, vol. 34, no. 3, p.9.

spectrum, various strands of ecological Marxism argue that capitalism's inability to respond to impending catastrophic climate change bolsters the case for its revolutionary overthrow as a matter of urgency. A third perspective, which we'll call 'green capitalism',[14] argues that capitalism will need to make major changes in order to deal with climate change, but that it is possible for this to happen. We have used this taxonomy to simplify the presentation of a vast range of perspectives as much as anything else. A comprehensive account would require a much longer article in its own right – what follows should be taken as a point of departure.

Sustainable development

Sustainable development has become a mantra so often heard it's hard to discern its meaning. In truth, this explains its political utility: everyone can agree on sustainable development, without ever having to agree what that actually means in practice. Indeed one literature review found that there are several hundred alternative definitions in use.[15] That said, we can certainly identify some recurring themes, including an emphasis on market-based mechanisms, the creation of new property rights and optimism with regard to technological fixes. Consequently, advocates of sustainable development tend to deny there is any contradiction between capital accumulation and ecological sustainability. For instance the UK government's 2006 Stern Report writes that:

> The world does not need to choose between averting climate change and promoting growth and development. Changes in technologies and in the structure of economies have created opportunities to decouple growth from greenhouse gas emissions. Indeed ignoring climate change will eventually damage economic growth.[16]

A central plank of this approach is the creation of new property rights in emissions combined with a market to trade in these rights. The theory is, by creating tradable credits in GHG emissions, and then rationing them, firms have an incentive to reduce their emissions as they can profit from selling their surplus emissions credits. In principle, these credits can also form the basis of derivatives markets. Pre-credit crunch, we found one advocate of emissions trading holding up the bundled fixed income mortgage derivatives market as the exemplary model![17] Post-2007, few are advocating the banking system as a model for the climate.

However, emissions trading schemes are forging ahead. The flagship example is the EU Emissions Trading Scheme (EU ETS), which covers 10,000 installations collectively responsible for 40% of the EU's GHG emissions. The scheme has been controversial, dogged by allegations of over-allocation of credits, price volatility and in 2011 a €30m cyber-theft of emissions credits from several national accounts. Supporters of the scheme have argued that these are mere teething problems, and that better regulation and a greater reliance on auctioning credits rather than simply allocating them will start to result in emissions reductions in later phases of the scheme.

As an alternative or supplement to emissions trading, advocates of sustainable development also often advocate 'carbon taxes', with a similar rationale of attaching financial costs to emissions and thus giving firms an incentive to reduce their carbon footprints. These are even more in their infancy, although at a rough count around 20 countries have some form of carbon tax in place. Finally, there is usually some reliance on technological fixes to keep the costs of 'decoupling' the economy from GHG emissions low.[18] In particular, Carbon Capture and Storage (CCS) technology features heavily. The UK has even built new, heavily emitting coal power plants with empty rooms for CCS technology when it's invented, thus claiming the expansion of coal power as 'green investment'. However, the technology is said to be a decade off deployment, is likely to be highly costly, and there are enduring doubts about how and where to safely store millions of tons of captured GHGs. When noted advocate of sustainable development Jeffrey Sachs admits that "if CCS proves highly costly and unreliable, our options will be much worse"[19], sustainable development begins to look like a

[14] Although we will drop the scare quotes, we do not use this term uncritically. 'Green capitalism', focussed myopically on climate change, may well be ecologically damaging in numerous other ways whilst still reducing GHG emissions. Similarly, it will likely prove socially regressive in ways we will explore towards the end of this article.

[15] Anil Markyanda and Kirsten Halsnaes (2002), 'Climate change and sustainable development: an overview', in Anil Markyanda and Kirsten Halsnaes (eds.), *Climate change and sustainable development: prospects for developing countries*, London: Earthscan Publications, p.2.

[16] Nicholas Stern (2006), *The economics of climate change: the Stern Review*, Cambridge: Cambridge University Press, p.xvii.

[17] See Richard L Sandor, Eric C Bettelheim and Ian Richard Swingland (2003), 'An overview of a free-market approach to climate change and conservation', in Ian Richard Swingland (ed.), *Capturing carbon and conserving biodiversity: the market approach*, London: Earthscan, p.59.

[18] For a critical guide to climate change technologies see: Corporate Watch (2008) 'Techno-fixes: a critical guide to climate change technologies', Oxford: Corporate Watch Report: corporatewatch.org.uk/?lid=3126

[19] Jeffrey Sachs (2008), *Common wealth: economics for a crowded planet*, London: Penguin Books, p.111.

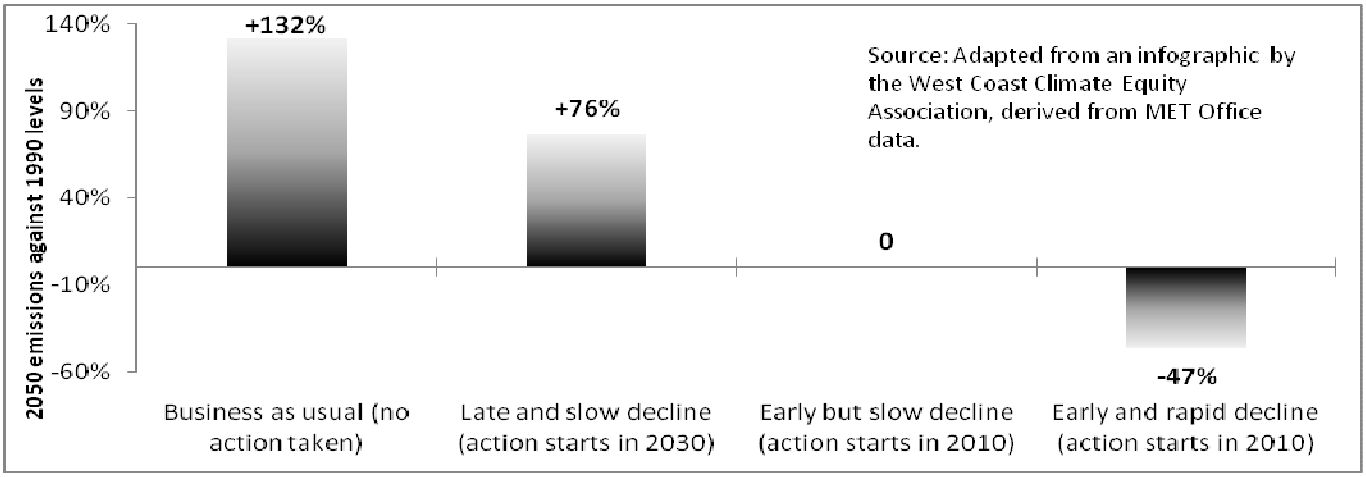

Figure 2: Projected world greenhouse gas emissions for 2050 under four scenarios against a 1990 baseline.

mantra without content serving as a fig leaf for a business as usual trajectory.

Marxist ecology

Marxist ecology arguably begins with Marx himself, who made detailed notes on how the developing divide between town and country was draining the soil of nutrients, necessitating the import of fertilisers (initially guano, later synthetic organophosphates). These notebooks have been the inspiration for more recent accounts to which we'll turn in a moment. But aside from Marx himself, ecological Marxism has one of its earliest proponents in Amadeo Bordiga, who in the 1960s wrote numerous pieces on the relationship between capitalism and the environment, some of which are only just appearing in English.[20] However, Bordiga's analysis, while an early and important contribution to Marxist ecology, is also rather simplistic, focussing on how capital's relentless drive for profit creates 'natural' disasters and unsustainable urban concentrations. While this analysis is important, a focus on capital's imperative to accumulate at all costs can only take us so far. There are also certainly counter-examples of ecocidal tendencies being curbed by state action, including the aforementioned Montreal Protocol. Bordiga lived before anthropogenic climate change was recognised, and his writings on environmental disasters and the unsustainability of cities have only indirect bearing on it.

In 1972 James O'Connor proposed that the relationship between capitalism and the environment constituted a 'second contradiction', in addition to the first contradiction of traditional Marxism between the forces and relations together. O'Connor argued that the forces and relations combined came into contradiction with the conditions of production – the natural and social environment that made capitalist accumulation possible. For O'Connor, just as the first contradiction gave rise to class conflicts, the second gave rise to a 'rebellion of nature' via the formation of new social movements. This seems like a reasonable account of how struggles against (for example) local industrial pollution relate to capitalism and can contain anti-capitalist potential. In this sense, there's a resonance with Bordiga's stress on capital's pursuit of "filthy lucre" driving it to ecological destruction. O'Connor adds that just like capital's exploitation of labour power forms the basis for the class struggle, so too does capital's destruction of nature give rise to new social movements.

However, when it comes to climate change, this theory tends to break down. Climate change is, by definition, a global issue. The places where its effects are most keenly felt – such as low-lying Pacific islands - are far removed from those places causing the climate change – heavily industrialised regions of the developed and developing world. Accordingly, concerns over climate change have largely not expressed themselves as a social movement – attempts such as climate camp aside – but via geopolitics, with states forming negotiating blocs based on their shared interests (for example the Alliance of Small Island States, AOSIS, the rapidly industrialising states of BASIC[21] and so on). An attempt to directly theorise climate change has come in the form of the theorists of the 'ecological rift',

[20] See Amadeo Bordiga, 'The legend of the Piave': libcom.org/library/legend-piave-bordiga; 'The human species and the Earth's crust': libcom.org/library/human-species-earths-crust-amadeo-bordiga and Antagonism, *Murdering the dead: Amadeo Bordiga on capitalism and other disasters*: libcom.org/library/murdering-dead-amadeo-bordiga-capitalism-other-disasters-antagonism

[21] Brazil, South Africa, India and China. A major bloc that has played a major role in the recent talks, opposing binding limits on emissions which are seen to hamper industrialisation and economic development.

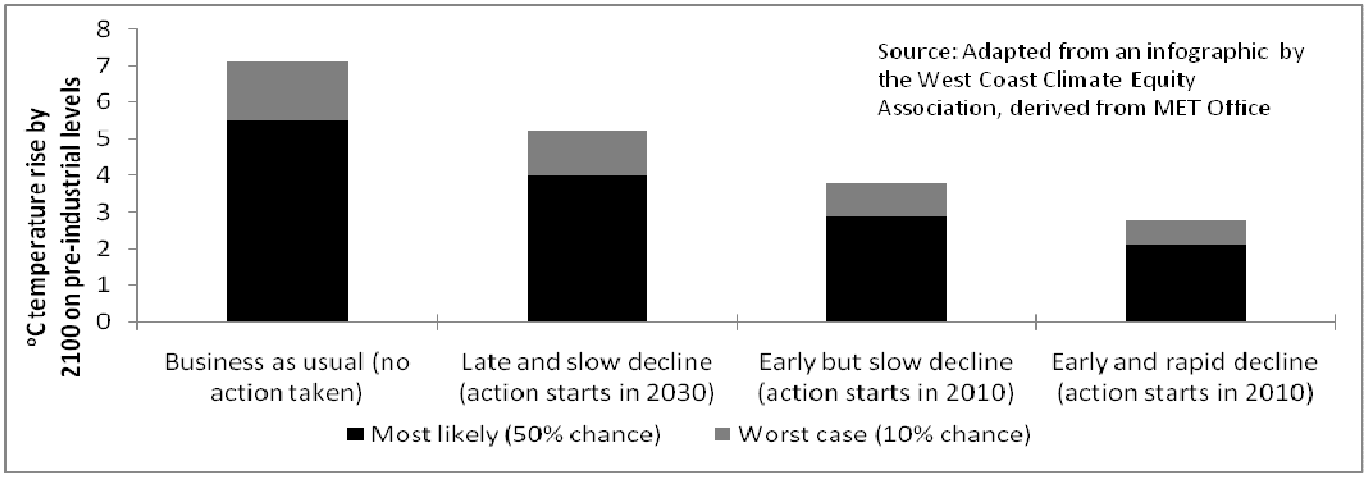

Figure 3: Global temperature rises by 2100 under the same four scenarios as Figure 2, against pre-industrial levels. +2^{0}C is acknowledged as the level above which climate change becomes 'dangerous' as positive feedback effects may begin to engage.

particularly John Bellamy Foster. The theory argues that "given the logic of capital and its basic operations, the rift in the carbon cycle and global climate change are intrinsically tied to capitalism."[22] Therefore, there is an "absolute general law of environmental degradation under capitalism."[23] We will consider the merits of this position in part II, but first we will briefly survey the various proponents of a green capitalism.

Green capitalism

Green capitalism represents a 'reformist' position rather than the revolutionary ecological Marxist one. Whereas Marxists trace the problem to capitalism and call for its revolutionary overthrow, many advocates of green capitalism have specifically put forward pragmatic proposals to save capitalism from itself. For example, Newell and Paterson's book *Climate Capitalism*[24] starts from an explicit diagnosis that capitalism's drive for growth is the problem, but then reasons that since we're stuck with it, they must come up with ways in which capitalism can be transformed to profit from a transition away from fossil fuels. But while politically this position is not a revolutionary one, it necessarily examines closely the possibilities of capitalism transforming itself to address climate change in a way which the Marxist positions, convinced that capitalism and climate change are inseparable, do not. So while we do not share the aim of saving capitalism from itself, we do find it worthy of serious consideration - not least because its starting point is already-existing tendencies and interest bases within capitalism that are pushing in a greener direction. A discussion of the potential for these tendencies to become dominant will form the basis of part II; here we will briefly sketch out some of the common features of green capitalist thinking.

Newell and Paterson's approach is to identify existing interest-bases within capitalism today, and to propose ways in which their interests could become aligned with a decoupling of capital accumulation from fossil fuels. Central to their account is finance capital, identified as both the most powerful section of capital under the neoliberal regime, and also the least bound up with fossil fuels. Here, they prescribe an expansion of emissions trading schemes, including derivative markets, to create the financial (dis)incentives for emissions. Essentially, this would shift the costs onto emissions-intensive manufacturing, agriculture, energy and transport sectors whilst creating vast new markets for financial capital. The problem here is whether this would actually contribute to new accumulation, or simply redistribute surplus value to financial capital from the more emissions-intensive sectors. Alone, we would say the latter, but potentially the shift to renewable energy, retrofitting transport infrastructure, insulating homes etc. which would be required to sustain such a regime may open up new areas for productive investment too.

Struggles are not completely absent from Newell and Paterson's account, only they are seen as giving capitalism the 'push' it needs to enact the reforms to save it from itself. An analogy is drawn with the labour movement: "many union activists in the 1930s wanted to abolish

[22] John Bellamy Foster, Brett Clark and Richard York (2010), *The ecological rift: capitalism's war on the Earth*, New York: Monthly Review Press, p.138.
[23] Foster, Clark and York (2010) p.207-211, emphasis added.
[24] Newell and Paterson (2010).

capitalism, but in practice contributed to a better-regulated and more successful version of it."[25]

Here, it is worth noting the 'green Keynesian' policies of the UK Green party.[26] These have thus far been voices in the wilderness, but the underlying argument is similar: "working towards a stringent target will make the UK well-placed to adapt to the tightening of global emissions limits which are likely to occur over the next few decades."[27] Essentially, the argument is that capitalism will need to shift away from fossil fuels sooner or later; sooner is both better for the environment and puts the national economy at a competitive advantage in developing and deploying the technologies that will become central to future accumulation. In policy terms, this translates into an advocacy of the creation of a million jobs, via a multi-billion pound package of investment in renewables, public transport, insulation, social housing, waste management and retraining. [28]

While it's easy to dismiss this as the promises of a party nowhere near power, who know full well they won't have to make good on them, similar measures have actually already been implemented on the quiet by the Obama government. A $9bn grant programme known as the '1603' supported up to 75,000 jobs over three years, although the programme lapsed in 2011 after failing to clear congress.[29] Thus we cannot dismiss outright the viability of such proposals for a green(er) capitalism, which may represent a latent mode of regulating capitalism whose time has not yet come. We will explore the prospects for this in part II, but we would sympathise with libertarian Marxist critics who argue that the climate crisis is both a threat to capitalism and a potential opportunity to kick-start new areas of accumulation and new forms of regulation. [30]

PART II: PROSPECTS FOR DECOUPLING

Barriers and prospects for a green(er) capitalism

Following on from our discussion in part I above, the first question we need to confront is the possibility of a green capitalism versus the criticisms from ecological Marxism which argue such a capitalism is an *a priori* impossibility. Newell and Paterson pose the problem clearly:

> The origins of climate change are deeply rooted in the development of the global capitalist economy (…) a lack of growth is something that the capitalist system in which we live simply cannot tolerate – it would collapse as a system. So the challenge of climate change means, in effect, abandoning capitalism, or seeking to find a way for it to grow while gradually replacing coal, oil and gas.[31]

They come out in favour of the latter on pragmatic grounds. So what about the claim that this is impossible? In energy terms, Elmar Altvater has argued that capitalism and fossil fuels are so mutually dependent that he speaks of 'fossil capitalism'.[32] For Altvater, the growth rates capitalism has come to expect are simply impossible without the high energy return on energy invested (EROEI) unique to fossil fuels. Whilst certainly fossil fuels have provided cheap energy for capitalism, and remain cheaper than alternatives, we would question this kind of argument on two grounds: historical and theoretical. Historically, capitalism arose in the age of renewable energy. The industrial revolution was initially water-powered, with coal and steam power only becoming dominant later. And capitalist social relations emerged in the countryside, where the dominant forms of energy beyond human labour and animal power were windmills and timber. So historically, capitalist social relations emerged prior to fossil fuels playing a major role. And theoretically, we can certainly conceive of production lines or call centres powered by renewables. They already exist in fact. And again, these are capitalist social relations.

Fossil fuels may well boost growth rates, but that's not the same thing as being indispensible. Rather we would argue capitalism has exploited the abundant cheap energy of fossil fuels just like it exploits everything else when it is profitable to do so, be it natural or social in origin. But that capitalist growth and fossil fuel usage have been *historically* closely linked does not mean this link is a *necessary* one. A related argument is that any decoupling of economic growth from emissions will lead to economic collapse. Andrew McKillop, writing in the apocalyptically-titled 'Final Energy

[25] Newell and Paterson (2010), p.180.

[26] The Green party favour 'contraction and convergence' over 'cap-and-trade' (ETS); but the history of Green parties in power is one of accommodation to the market.

[27] See: policy.greenparty.org.uk/cc

[28] See: greenparty.org.uk/policies.html

[29] See Alex Guillen, 'DOE: Renewable grant program was a big jobs creator', Politico: politico.com/news/stories/0412/74916.html

[30] See Tadzio Mueller and Alexis Passadakis (2011), *Another capitalism is possible? From world economic crisis to green capitalism*, in Kolya Abramsky (ed.), Sparking a worldwide energy revolution: social struggles in the transition to a post-petrol world, Edinburgh: AK Press.

[31] Newell and Paterson (2010), p.9.

[32] Elmar Altvater (2007), 'The social and natural environment of fossil capitalism', in Leo Pantich and Colin Leys (eds.), *Socialist register 2007: coming to terms with nature*, London: Merlin Press.

Crisis' is adamant that: "energy 'decoupling,' for any length of time, is totally impossible without economic slump and mass unemployment."[33] But this seems to assume that renewable energy will not just be more expensive, but so expensive so as to render renewed accumulation impossible. Certainly, a rapid shift from cheaper fossil fuels to more expensive alternatives would constitute a massive economic shock. But the assumptions underlying this claim; the pace of this transition, the relative prices of fossil vs renewable energy, and the inability of capital to impose the costs of this transition onto the proletariat are very much open to question. Indeed the long-run cost of fossil fuels is only going to rise with increasing demand and squeezed supplies, while renewables are becoming more competitive. In fact Scotland already produces 35% of its electricity from renewables, and while venture capitalist Donald Trump has gone on a £1bn capital strike, his objection is principally aesthetic (a planned wind farm is near his luxury golf course development), with dubious arguments about 'economic suicide' being tacked on afterwards.[34]

While high-profile billionaires like Trump grab headlines, a growing number of individual capitalists and major firms have been emerging to push hard for a transition away from fossil fuels – on the grounds that it is the future of capital accumulation. In an open letter to President Obama, the 'We can lead' coalition wrote that:

> Putting a price on carbon will drive investment into cost-saving, energy-saving technologies, and will create the next wave of jobs in the new energy economy. Climate and energy legislation that caps carbon and supports clean energy will keep inventions here, keep innovative companies here, and keep the newly-created jobs in engineering, manufacturing and installation here in the US.[35]

Signatories included eBay, Hewlett Packard, Nike, Symantec, Starbucks and the national grid. While this might be dismissed as greenwash, a mere public relations exercise, there is a logic to the argument. Namely, there is money to be made by legislation targeting GHG emissions. This will force firms to either invest in emissions reduction technology, or make substitutes such as renewables more competitive and thus drive investment in those sectors. And retrofitting the economy for renewables would require huge amounts of production. The signatories, as mainly tech, service or energy infrastructure firms are not heavily invested in fossil fuels in the way other sections of capital are (e.g. big oil), and so they could well be sincere. Similarly, the Corporate Leaders Group on Climate Change[36] has issued communiqués at each of the COP summits in recent years. The 2007 'Bali Communiqué' stated explicitly that "in summary, we believe that tackling climate change is the pro-growth strategy", and subsequent communiqués have garnered over 1,000 signatures from major business figures and corporate CEOs.[37]

We have already encountered the EU Emissions Trading Scheme, which despite its failings is expected to deliver a 21% reduction in emissions from participating facilities on 2005 levels by 2020.[38] There is a developing derivatives market, which while relatively small, will only grow if the scheme becomes established as a permanent feature of European capitalism. The business literature here is mainly concerned with whether ETS derivatives will behave like pure financial products, or whether the closer involvement of the state in setting quotas will change the market dynamics, as well as what mechanism will be used to introduce scarcity into the market. But as these uncertainties recede, investment is likely to increase. After all, capital will flow to where the returns are, and an ever-reducing emissions quota would more or less guarantee inflationary scarcity for investors in ETS derivatives.[39]

There is also the Trans-Mediterranean Renewable Energy Co-operation (TREC), a project which aims to build solar generation facilities in the north African desert and pipe the electricity to Europe using high-voltage DC cables suited to long-distance transmission. The scheme began life as the brainchild of the Club of Rome, but has attracted some serious backers with 12 firms

[33] McKillop, A. (2005) 'The myth of decoupling', in McKillop, A. & Newman, S. (eds), *The final energy crisis*, London: Pluto Press, p.199.

[34] For the 35% figure see: scotland.gov.uk/News/Releases/2012/03/geenenergytargets29032012 and for Donald Trump's capital strike see: bbc.co.uk/news/uk-scotland-north-east-orkney-shetland-17706763

[35] See 'Open letter to President Obama and Congress': wecanlead.org/ad0623.html

[36] A lobby group of business leaders from energy producers, manufacturers, banks, retailers, utilities and others, mainly from the UK, EU. See: cpsl.cam.ac.uk/Leaders-Groups/The-Prince-of-Wales-Corporate-Leaders-Group-on-Climate-Change.aspx

[37] See 'Communiqués': cpsl.cam.ac.uk/Leaders-Groups/The-Prince-of-Wales-Corporate-Leaders-Group-on-Climate-Change/Communiques.aspx

[38] There are numerous criticisms to be made of emissions trading from both ecological and communist perspectives, but here our focus is on the way in which they have the potential to align capitalist imperatives with decoupling accumulation from emissions.

[39] However on the present over supply of emissions permits, see 'EU ETS emissions down in 2011, permit glut grows': reuters.com/article/2012/05/15/eu-carbon-idUSL5E8GF83X20120515

signing a memorandum of understanding in July 2009. Signatories included Munich Re, Siemens, E.ON and Deutsche Bank.[40] China, whose rapid industrialisation is fuelled largely by coal, has also become a world leading manufacturer of wind turbines, solar panels and electric cars, and so has a developing interest in climate change policies which will promote a transition from fossil fuels (outside China at least).[41] In short, *green capitalism already exists as a sector within the wider capitalist economy*. Whether its backers will outmanoeuvre the interests of the fossil capitalists is an open question, but it is important to note the interests of different sections of capital are not identical with regard to fossil fuels, and that there are significant interests lining up behind decoupling accumulation from emissions. Should these forces gain ascendancy, they may well impose the costs of a transition onto 'fossil capital' and/or the proletariat and capture a redistribution and any expanded production of surplus value for themselves.[42]

This leaves the geopolitical problem. While the above analysis shows that decoupling makes possible *absolute* gains in terms of new opportunities for accumulation, geopolitics tends to operate on the basis of *relative* gains. That is to say states may be punished by acting early, e.g. by capital flight or through absorbing the R&D costs which other states then 'free ride' on. This is often conceptualised as a version of the prisoners' dilemma, where the optimum solution is frustrated by the isolated position of the agents, for whom 'cheating' is just too tempting. But this is not entirely accurate. The prisoners' dilemma is highly abstracted and incorporates several assumptions not applicable in the case of climate change. In particular, the world's states are not acting in isolation and being played off against one another, but are in constant communication and have been holding annual negotiations under the UNFCCC process. Rather than the nature of the game, it is the diverging national interests of the players which are most responsible for the UNFCCC deadlock. Simply put, some states face climate change as an immediate threat (AOSIS), while others are heavily invested in fossil fuels to sustain their economies (US) or rapidly industrialise (BASIC), and yet others have already exported many of their dirtiest industries and are pushing hard for emissions trading (EU).

This explanation does not get rid of the relative gains problem, but it does cast it in a new light. The UNFCCC process was premised on a post-national multilateralism which flourished following the end of the cold war. The vision was of rational, technocratic global governance where states set aside mere national interests for the common good in the face of overwhelming scientific evidence. But in practice the UNFCCC process been dominated by competing, divergent national interests which have continually frustrated attempts at a binding global emissions regime. It seems utopian to think such a process could lead to a durable, binding emissions regime any more than the League of Nations could lead to a durable, lasting world peace. However, neither are national interests fixed and without history. They are bound up with capitalist development, and capitalist development is a contradictory and uneven process. We have already encountered significant sectors of capital aligning with an emerging green capitalism, and the same is true at the state level.

Scotland plans to produce 100% of its electricity from renewables by 2020, and then become a net exporter to England. Denmark plans something similar by 2050. The EU has pushed ahead with its ET scheme despite international opposition and significant criticism. At a sub-national level, several major US states have pushed ahead with their own ET schemes despite federal policy, notably California, the eighth largest economy in the world. These states have faced some first-mover penalties – witness Donald Trump's capital strike – but there's no guarantee these will derail a shift to renewables. Essentially, these states are gambling that decoupling is the future, and positioning themselves ahead of the pack. If they turn out to be right, first-mover penalties could turn into first-mover advantages as states compete to deploy new technologies and retrofit their infrastructure. *What is emerging is a struggle for supremacy between the dominant fossil capitalists and the emerging green capitalists.* This struggle is playing out at the domestic level over energy policy (witness the well-funded astroturf opposition to wind farms[43]), and at an international level through the wrangling of the UNFCCC process and the WTO.

[40] See Munich Re, 'Desert power initiative: an electrifying vision for Europe': munichre.com/en/group/focus/climate_change/desert_power/desert_energy_initiative/default.aspx

[41] See Du Juan, 'Solar Industry 12th Five-Year Plan issued': china.org.cn/business/2012-02/25/content_24728487.htm; John Landers, 'China's road to solar panel manufacturing dominance': energytrend.com/China_Solar_Dominance_20111017 and Will Oremus, 'Solar Disarray*'*: http://slate.me/KhLVZJ

[42] This line of argument could constitute a fallacy of composition, but only if it could be demonstrated why fossil fuels are indispensible to capitalist social relations.

[43] Donald Trump has promised £10m to fund 'grassrooots' anti-wind farm groups. We're not disputing here that there can be negative environmental impacts to wind farms, but simply pointing out that residents and environmentalists concerns are becoming pawns in a larger intra-capitalist political battle.

Factors in the emergence of green capitalism

In light of the internecine power struggle between 'fossil' and 'green' capitalists, we can identify five key factors in determining the outcome: (1) rising energy prices; (2) energy security and the geopolitics of the Middle East; (3) possible future international agreements; (4) the durability and rigidity of the neoliberal trade regime, and; (5) the duration and severity of the ongoing economic crisis. In addition there may be additional contingent factors, such as extreme weather events in the oil heartlands of Texas or droughts in China focussing the minds of particular ruling classes.[44] We will take each of these in turn. These factors could interact in numerous ways, and our discussion is necessarily somewhat speculative. However, we hope it gives a sense of certain possibilities which are easy to overlook in the headline appearance of capitalism hurtling headlong into climate chaos.

Rising energy prices. The only direction fossil energy prices are going in the medium term is up. Demand is increasing rapidly and supply is finite and will peak soon if it hasn't already. However, this is a double-edged sword from a climate change point of view. On the one hand, rising energy costs make renewable more competitive. As fossil fuels approach and overtake the costs of renewable energy, capital is likely to flow into renewable, further stimulating supply and technological development, further lowering costs. This is even without state intervention, e.g. through emissions trading or carbon taxes, which would further raise the cost of fossil energy relative to renewables. On the other hand, rising costs make previously uneconomic reserves of fossil fuels viable by raising the possible returns relative to costs of extraction. This has the effect of stimulating investment in fossil fuels to expand supply. The most striking example of this is the exploitation of bituminous sands (a.k.a. tar sands), difficult and expensive to extract petroleum deposits which have become commercially viable with rising oil prices.[45]

Other non-conventional fossil fuels include oil shale, which actually has a worse environmental impact than crude oil, and the controversial development of hydraulic fracturing (a.k.a. fracking) to exploit shale gas and coal seam gas deposits. Fracking too is actually worse for emissions than conventional sources, as there is significant leakage of methane, a major greenhouse gas. But rising energy prices are also central to the viability of renewables, and the large scale deployment of wind farms, as well as more ambitious projects like the TREC are unthinkable without them. In the UK, renewables are already effectively subsidised by consumers to the tune of 2p per person per day via the government's Renewables Obligation, which mandates energy firms to source an annually increasing percentage of their output from renewables. Rising fossil energy costs will either reduce the need for the subsidy, or make the same amount of money go further. Thus rising energy costs on their own (i.e. without some kind of carbon pricing) are benefiting both sides of the fossil vs green capital divide.[46]

Energy security and the geopolitics of the Middle East. Fossil fuels don't just have an economic and environmental cost, but also a political and military cost. And while statesmen are wont to dismiss environmental concerns as the domain of tree-hugging hippies, energy security concerns register as hard-headed realpolitik. Since 9/11, the US has become increasingly and expensively embroiled in conflicts in Afghanistan and Iraq, with the perennial spectre of war with Iran and the associated disruption to the Strait of Hormuz, a strategic choke point in Middle East oil exports. There are numerous scenarios under which US ruling class sentiments could shift towards cutting loose from the Middle East on the grounds of energy security. Conflict with Iran is one, although this is largely within US planners control – insofar as these things ever are – since Iran is unlikely to deliberately start a shooting war. However, a proxy war may be more likely, for example with Israel striking Iran's nuclear facilities and/or a conflict involving Sunni fundamentalist Saudi Arabia with Shia fundamentalist Iran. Any such proxy war would likely see the US sucked in by default, and any disruption to energy supplies could be a boon to those pushing for more energy self-sufficiency as

[44] Climate and weather are distinct phenomena; however studies have suggested weather events are the single most important factor in sceptics' perceptions of climate change. See Bill Blakemore, 'Climate change 'swing voters' affected by weather, not denialists, says analyst': http://abcn.ws/LjisJa; On the impact of the 'Black Saturday' bush fires in Australia on climate policy see Richard Flanagan, 'Australia's carbon tax is a brave start by a government still gripped by fear', Comment is Free: guardian.co.uk/commentisfree/2011/jul/10/australia-carbon-tax-modest-beginning

[45] On the growth of the shale oil industry see Izabella Kaminska, 'Saudi oil puzzle, continued', *Financial Times* alphaville blog: ftalphaville.ft.com/blog/2012/04/25/973651/saudi-oil-puzzle-continued; On China's possible expansion of shale gas and methane see *China GreenTech Report 2012*: ukmediacentre.pwc.com/Media-Library/China-GreenTech-Report-2012-87d.aspx and for a photo essay on the Alberta tar sands see Robert Johnson, 'Canadian oil sands flyover': businessinsider.com/canadian-oil-sands-flyover-2012-5

[46] There is also a battle to end fossil fuel subsidies in the US, with the End Polluter Welfare Act being introduced into Congress. See Gina-Marie Cheeseman, Bill to end fossil fuel subsidies introduced into Congress: triplepundit.com/2012/05/bill-fossil-fuel-subsidies-introduced-congress

a means to withdraw from global policing operations.

Further scenarios could involve unforeseen energy shocks. A repeat of the OPEC oil embargos of the 1970s may not be on the cards, but other supply disruptions could have an impact on the thinking of state planners. Likewise, the US's global network of military bases must be incredibly expensive to maintain.[47] The US isn't going to step down as an imperial power, but if the green capitalists gain ground domestically the prospect of scaling back the overseas presence and ploughing the cash into renewables instead might gain traction. In itself, this doesn't seem particularly likely, but in conjunction with one or more of the other factors, from regional conflicts and oil shocks to rising energy prices, the energy security argument for weaning off Middle East oil may fall on more favourable ears. Of course, that could just mean an increase in domestic unconventional fossil fuel exploitation, such as the Alaska tar sands. Numerous contingent variables are in play.

Possible future international agreements. As we have seen, the UNFCCC process has not resulted in a successor regime to Kyoto, and Kyoto itself failed in its relatively modest aims amidst a divergence of national interests. In theory, the Conference of the Parties (COP) agreed at the COP-17 in Durban in 2011 to a binding emissions regime whose terms would be agreed by 2015 to enter into force in 2020. There are good reasons to be sceptical. Essentially, the parties couldn't agree, so thrashed out a face-saving agreement which essentially amounts to 'we agree to agree on something we've yet to agree on by 2015.' There's no reason to believe the underlying conflicts of interest will have disappeared by 2015 or 2020. Or is there? While the likelihood may be slim, there are some grounds for thinking a binding emissions regime could be agreed. There are numerous factors here, perhaps most importantly the contradictory position of China. China has consistently opposed binding limits on its emissions as it pursues rapid, coal-powered industrialisation. However, it has also become a world-leading manufacturer of wind turbines and electric cars. It is possible, indeed highly likely that China is playing a long game. Dirty industrialisation has been fuelling rapid economic growth and the development of a domestic consumer market. Increasingly, we are told on the pages of the *Economist*, all those consumers are wanting cars, and televisions, and so on (and bear in mind it will be easier to mass market electric cars when the pre-existing oil-based infrastructure is far less developed than the US).

If China is indeed trying to emulate the western developmental model condensed into several decades, the next step would be to outsource its manufacturing to its periphery and develop a post-industrial service economy.[48] While from an ecological point of view where emissions take place is irrelevant, from a geopolitical point of view it is crucial: it would align China's interests more with the EU, and outsource emissions to geopolitically weaker states with less muscle in international negotiations. This is by no means certain, but it is one scenario. Similarly in the US, if the green capitalists are ascendant, US climate policy may begin to shift. Remember, there are already regional emissions trading schemes. There would seem to be the potential – but only the potential – of an emerging constellation of interests amongst several of the key players which may give rise to a successor to Kyoto. If that's the case, it would set the rules of the game for everybody and tip the balance in favour of an emerging green capitalism.

The durability and rigidity of the neoliberal trade regime. Climate change regulations are likely to come into conflict with free trade rules banning discrimination against imports. The most high-profile case to-date is China's dispute with the EU over the ETS (India, the US and numerous other states have also registered objections). China has banned its airlines from passing on the costs of the ETS onto consumers, which will mean a big dent in the profit margins if not loss-making for Chinese carriers operating routes into EU airspace. There is already been talk of trade wars, but a more likely scenario would be China taking the EU to the WTO claiming discriminatory trade practices. China could argue the scheme discriminates against long-distance operators. The EU could argue the same rules apply to everyone in EU airspace. And the WTO could conceivably rule either way.

The case will prove a big test for the WTO's claims to green credentials, and will be an indicator of whether neoliberalism is likely to adapt to the imperatives of climate change or dig in its heels. There are likely to be other disputes of this kind, as all sorts of climate change policies from carbon taxes to renewables subsidies could be construed as discriminatory trade practices. For example, the US recently introduced 30% tariffs on Chinese solar panel imports, after

[47] Nobody seems to know how many there are; estimates range from 500 to 1,000+.

[48] This is unlikely to happen in a timescale short enough to impact climate change, but the goal is likely to shape long-term Chinese planning. And there are some signs of this trajectory; Chinese outbound foreign direct investment (FDI) increased *fourteen-fold* between 2003 and 2008, and continued to grow in 2009. Most FDI is concentrated in manufacturing, textiles and machinery sectors. See Lucian Cernat and Kay Parplies, 'Chinese foreign direct investment: What's happening behind the headlines?': voxeu.org/index.php?q=node/5301

China's strategic investment in the sector drove down costs by 75% in just 3 years to 2012.[49] The question is whether the neoliberal regime begins to give way to a more active role for states in climate-related issues, or whether it seeks to ban climate change policies. If it i the latter, and the EU (or whichever state is being sued) refuses to back down, it could lead to a splintering of the WTO regime so painstakingly assembled over the past decades. For that reason, some accommodation to climate change seems the most likely, probably in a compromise allowing the EU to require credits for emissions over its own airspace but not beyond as at present.

The duration and severity of the ongoing economic crisis. Finally, the present economic crisis could prove crucial. The longer it rumbles on without a return to economic growth, and the greater the social conflicts austerity provokes, the more chance of hitherto marginalised ideas coming in from the wilderness. The neoliberal policies which have dominated capitalism for the past few decades began life as lonely criticisms of Keynesian orthodoxy in the University of Chicago economics department. One test run in Pinochet's Chile and a crisis of Keynesian accumulation later, and they were catapulted into the ruling ideas and have remained there ever since. The longer the present crisis rumbles on, the more chance the ruling class start to 'think outside the box', and the prospect of stimulating renewed accumulation through investment in renewables or other climate change related sectors could start to appeal. Indeed, even the arch neoliberal, Jeffrey Sachs, argues that "markets alone will not carry us to safety."[50] Some analysts have suggested the China-India energy partnership could prove highly profitable in renewables co-operation.[51]

But while the present crisis may open the door to a more activist state role in the economy, possibly in support of an emerging green capitalism, it should also give us reasons to be cautious. Green capitalism is still capitalism. Capitalism is still a system of class exploitation that will seek to impose its costs of restructuring onto the proletariat. That remains so even if it manages to stop itself destroying the planet. Consequently, while green capitalism may be 'progressive' from an ecological point of view, that doesn't mean it will be good for us in any other way. In fact, it is likely much of the costs of transition will be passed onto us, most likely as consumers through rising costs, and in a context of widespread wage freezes, falling standards of living. Even the creation of 'green jobs' would take place in this context – if the jobs were even paid at all, which is by no means a given with the current expansion of workfare schemes.

CONCLUSIONS

Green capitalism already exists as a sector within the global capitalist economy. Renewable energy is already big business, and is expanding rapidly. The question is whether this sector will move from the margins to the centre of world accumulation, playing a role in the twenty-first century analogous to that of the motor car in the twentieth, and whether this will happen soon enough to prevent runaway climate change or alongside it. The various Emissions Trading schemes, if they overcome their teething problems could establish themselves as a central mechanism in such a transition. This, certainly, is a theoretical possibility. Whether it is also a practical possibility depends on the outcome of the numerous contingent factors, geopolitical manoeuvrings and internecine struggles amongst capitalists which we have sketched out in this article. These battles seem unlikely to be resolved fast enough to avert serious global warming of 4°C or more (the 'early but slow decline' scenario from Figure 3, somewhat delayed).

Even if capitalism moves towards addressing the climate crisis, from a working class perspective this is a double-edged sword. Indeed, it is likely that any capitalist solution to climate change will displace the ecological crisis into a social one. The costs of reorienting global capital accumulation away from fossil fuels grow by the day. Should capitalism move in this direction, it is inevitable that capital will attempt to impose the costs of this transition onto the proletariat, whether through inadequate adaptation measures leading to population displacements or through 'green austerity'. Indeed, we can imagine an army of unpaid workfare labour installing insulation in every home being a far easier 'sell' than forced labour for Tesco.

Even a crisis as serious as climate change does not produce a unity of interests between capital and proletariat, and the possibility of a green capitalism is not a substitute for class struggle. But neither should we underestimate the flexibility of capital to restructure itself in response to crises and to open up new areas of accumulation. Indeed, given the business as usual path to 6°C or more warming, the social impacts of both significant climate change and a capitalist decoupling from fossil fuels are not mutually exclusive.

[49] See Will Oremus, 'Solar Disarray': http://slate.me/KhLVZJ for the 75% statistic and *US imposes import tariffs on Chinese solar panels*: bbc.co.uk/news/business-18112983

[50] Sachs (2008), p.83.

[51] See Madhumitha Madhavan, 'Climate change and cooperation in "Chindia"', *International Affairs Review*: iar-gwu.org/node/410