

CARBON EMISSIONS: PRICES AND VALUES

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The increasing levels of greenhouse gases in the atmosphere present an enormous challenge. This article argues that the weaknesses of the market-based preoccupations of most policy respondents do not address the fundamental issues and can have the effect of reproducing the causes of increased carbon emissions. A consideration of Marx's concepts of use value and exchange value and the fate of environmental values within capitalism leads to a quite different perspective, emphasising the benefits of non-market socialism as a means to establish environmental sustainability.

Global Warming

'Carbon emissions' is a commonly used generic term for greenhouse gases, the major ones being carbon dioxide, methane, nitrous oxide and high global warming potential gases, such as hydrofluorocarbons, which all contribute to climate change. These gases are often referred to in terms of carbon dioxide equivalents (CO₂-e). Their rising concentration in the atmosphere, primarily as a result of capitalist forms of production and consumption, has driven an unprecedented increase in average global temperatures in recent decades. These changing climatic conditions, on which many of the earth's life forms depend, have already contributed to an alarming rise in extinctions of animal species and extreme weather events — violent storms, tsunamis, heatwaves, droughts and floods — causing widespread damage to ecosystems, including human settlements.

Intergovernmental Panel on Climate Change (IPCC, 2009) scenarios extrapolated from different concentrations of atmospheric gases indicate that the level of carbon emissions from human activities must be reduced

rapidly. Analyses by well-regarded scientists (Hansen *et al.*, 2010; Rosenzweig *et al.*, 2008) indicate that humans have already set in train climatic changes that threaten their, and many other species' continued existence, as 'tipping points' will lead to even more precarious environmental conditions (Rockström *et al.*, 2009; Pearce, 2007; Spratt and Sutton, 2009). What humans elect to do now will determine the future of planet Earth.

Market-based Policies

Despite the enormity of this challenge, policy responses to limit activities that create carbon emissions have been characterized by delay and caution. Rather than implementing a carbon tax (Humphreys, 2007; Denniss & Richardson, 2010), popular policy options have been framed as emissions trading schemes (ETS) to create a market 'price on carbon'. However, these proposals are really schemes to trade in *rights to emit carbon*. Holistic 'cap-and-trade' schemes marry ambitious targets of reduced emissions with strongly enforced regulations covering and monitoring all kinds of industrial, agricultural, commercial and residential activities, but no such ideal scheme exists (Gilbertson & Reyes, 2009).

The prime example of cap and trade, the European Union (EU) ETS, illustrates the plethora of difficulties attached to establishing such systems (Burrows & Ascui, 2007; Gow, 2007). The difficulties centre on disagreements over: the specific levels of necessary and feasible targets within certain time frames; how to efficiently and reliably measure, report on and verify achievements; whether and how to exempt (or cover) certain activities; whether and how to incorporate carbon-absorbing activities (many of which already occur naturally); and how to efficiently and effectively supervise such a scheme.

Carbon trading incorporates a futures market: allowances are sold, provided gratis or auctioned ahead of their use, so that small secondary markets develop, and brokers are regularly employed to manage trading in allowances. Funds have evolved to pool investment resources and profit from secondary trading. The carbon market is 'pyramidal', set to diminish as the need to trade in allowances and credits decreases and the rate of emissions is restricted during the next few decades. As such, it is a rarefied market, trading in allowances that are treated as if they were

commodities and has developed in an experimental way, involving many familiar market uncertainties associated with ‘carbon prices’ and coverage.

Carbon emissions are part of natural, as well as artificial, cycles involving the oceans, land and air, whereby carbon changes from atmospheric to solid forms and vice-versa. Therefore nothing might appear simpler than to frame and redress the current imbalance of surplus emissions through an accounting framework. However, accounting in direct quantities of qualities as scientists do, and allotting property rights and responsibilities to integrate carbon into market systems with a value represented by a price presents serious problems. This is demonstrated in ongoing debates over how to integrate agricultural and forestry activities into an ETS, which reveals technical, administrative, and practical difficulties in accounting for and monitoring carbon emission offsets.

Among others, the Australian economist Professor Ross Garnaut (2007: 5) has argued that the paucity of research and complexities of implementation make it easier to delay the integration of forestry and agricultural activities in an Australian ETS. In these sectors certain productive activities can encourage biosequestration, i.e. the natural processes of absorbing atmospheric carbon into soil and plant growth. Such activities, which would need to be included as credits or offsets in an all-encompassing carbon accounting framework, include:

- reforestation, afforestation and environmentally sustainable forest management
- avoiding clearing, and encouraging, grass and shrub growth
- agro-forestry (integrating forestry and conservation-style management into farming practices)
- bio-fuel production and use
- attempting to prevent the number and intensity of forest fires
- soil carbon enhancement through avoiding soil erosion and enhancing farming practices (e.g. ‘no-till’ or conservation tillage methods).

Because these kinds of carbon sequestering activities can be seen to counter carbon-emitting ones, such as use of fuel and fertilizer, it is argued that they must earn ‘carbon credits’ or ‘carbon offsets’. Indeed Australian government agencies, and non-governmental organizations and businesses, have already established voluntary carbon offset systems,

which allow companies and people, such as travellers, to offset their carbon emissions (see Carbon Offset Guide Australia 2010).

Carbon offsetting might seem fair from the point of social equity, but tends to shift the focus from reducing unsafe levels of carbon emissions and presents difficulties in avoiding incorporating existing stores of carbon, which ought to be considered neutral in the carbon accounting framework. DAFF (2005: 8) estimated that, in 2003, Australian native forests stored around 10.5 billion tonnes of carbon in biomass — and more in soil carbon — but less than one per cent of this biomass was in plantations. Therefore, when assessing agricultural and forestry sectors, conserving Australia's remaining native vegetation is critical.

Furthermore, there are various, and some severe, difficulties in soundly estimating how much carbon is absorbed by such activities, thus the environmental value of each carbon credit or offset activity. Comprehensive studies into the various properties of different kinds of soil, plant and human activities are still to be conducted — currently performed at taxpayers' expense by national agencies, such as the Commonwealth Scientific and Industrial Research Organization. Carbon accounting involves controversies over appropriate assumptions involving impermanence, reversion to poor practices and corruption. One of the clearest complications involves the inability of a landholder to protect their vegetation from natural fire, a hazard that not only prevents ongoing biosequestration but also produces carbon emissions. Similarly, how does a farmer or forester account for fuel-reduction activities, which produce carbon emissions, but which are aimed at reducing potentially more extensive emissions from fire in the future?

Therefore, implementation of an ETS involving the balancing of carbon accounts across all the productive and conservation activities on farms — Australia has around 130,000 — would be time-consuming, involving not only high transaction costs but also wide scope for error and non-compliance. Under these circumstances, it is hard not to conclude that the most efficient policy would simply encourage and reward strong land stewardship practices, such as tree planting for multiple benefits, rather than incorporate farmers and foresters into an elaborate, complex and detailed ETS with inevitable flaws. The intensification of capitalist approaches in agriculture is even more fraught given the hard-to-quantify yet expected impacts of climate change on the sector's future

investments and production. However, carbon offsets are being promoted to farmers as an avenue for diversification in a carbon adaptation mix.

Environmental researcher Larry Lohmann (2006) has pointed out most of the key problems with carbon offsets, which centre on difficulties with creating sound carbon ‘products’ and offsets, offering a way for the largest polluters to delay altering productive plants to make them produce less carbon emissions (e.g. making them less fuel dependent). These failings feed into broader concerns that the appropriate price level will be politically unachievable and that the price mechanism will not lead to needed structural change. In fact, at the moment the price of carbon in the EU ETS is around 15 euros per tonne but needs to be around 50 euros per tonne to produce the desired carbon policy reduction targets (Sir David King, interviewed by Doogue, 2010).

Downie (2007) has elaborated on the deficiencies of carbon offsets in the Australian context. So does Macintosh (2010: 1), who points out that:

For the past 20 years, Australia has had the highest rate of deforestation in the developed world — 370,000 ha of ‘Kyoto forests’ [vegetation classified as forest under the Kyoto Protocol] were cleared annually between 1990 and 2007, resulting in the emission of ~80 MtCO₂-e/yr. It is also the only developed country that will rely on reduced deforestation emissions as the primary way of meeting its quantified emission reduction target under the Kyoto Protocol.

Under international agreements, such as the United Nations (UN) Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (‘REDD’), *avoiding* deforestation, which *might* have occurred, creates ‘reductions’ (or carbon offsets). This is a key failing of the carbon accounting approach, which necessarily incorporates rewarding landholders for not engaging in land clearing and other carbon-emitting activities — rewarding them now for not being bad in the future.

Most significantly, forest and farming-based offsets detract from reducing emission-creating activities (such as using coal as a source of electricity). Carbon-emitting activities, whether fossil fuel use or land clearing, need to be stopped at source. Under our current system, national, State and industry targets are better linked to energy conservation and transitioning to a sustainable energy economy than setting up complicated carbon accounting systems, which reward and

punish at a micro-level through a carbon market. It makes more sense to deal directly with current levels of atmospheric greenhouse gases by expanding terrestrial carbon sequestration. Biosequestration is enhanced when natural ecosystem processes that generate carbon absorption are protected, expanded and intensified.

Restorative landscape management is critical to restore the atmosphere to the safe levels of greenhouse gases that existed centuries ago. It is a ruse to base carbon credits on either avoiding deforestation or on revegetation, reforestation and afforestation. Such activities must not be viewed as offsets for current or future industrial, agricultural and forestry emissions. Landscape conservation and low-emissions agricultural and forestry practices are direct and necessary ways of offsetting past land clearing and degradation and of restoring a range of healthy ecosystem services. Revegetation regulations and best practice schemes are required at all landscape scales.

Indeed the accounting framework for carbon offsetting seems so inappropriate that the Cheatneutral (2010) website has parodied it:

When you cheat on your partner you add to the heartbreak, pain and jealousy in the atmosphere.

Cheatneutral offsets your cheating by funding someone else to be faithful and NOT cheat. This neutralizes the pain and unhappy emotion and leaves you with a clear conscience.

If the United Nations Framework Convention on Climate Change (UNFCCC) made holistic examinations of the causes of dangerous levels of carbon emissions in human activities, it would point to the over-reliance of capitalist production methods on large-scale industrial technologies that use non-renewable environmental resources. The UNFCCC might also address the problem of over-consumption fuelled by the inherent capitalist dynamic of growth. However, such a focus would make plain that revolutionary socio-political and economic changes are required to reverse the drivers of climate change. Instead of sociological analysis, the international climate debate is bogged in a laborious process by which capitalists, who make decisions about what is produced and how it is produced, as well as politicians and bureaucrats argue over the reliability of scientific findings. International negotiations over how to manage and regulate to reduce emissions are strictly contained within a narrow market-focused neo-liberal paradigm. Thus,

for the business sector, even the simple tool of implementing a carbon tax seems too Keynesian, too likely to enhance governmental power.

The EU ETS has been criticized for achieving too little too slowly and, indeed, for rewarding polluters (Burrows & Ascui, 2007; Gow, 2007; Lohman, 2006). As mentioned, the price of carbon has not centred on a robust and steadily rising price as supposed in a market designed to achieve carbon emission reduction benefits. Instead, the price has fluctuated just as other prices do, relating to supply and demand as well as general market trends and other factors. For example, as a result of the over-allocation of permits in the first few years, ‘by the end of 2007 you could buy the right in Europe to emit a tonne of carbon dioxide for 4 euro cents’ (Professor Donald Mackenzie, cited in Quince, 2009). Again, during the recent recession associated with the global financial crisis, the price for the right to emit carbon fell. According to Gardner (2009) this led to a call from the University of Cambridge Climate Strategies think tank to create a minimum or floor price for carbon, to which an EU ETS representative retorted: ‘A floor price may unduly interfere with the market. We have had price lows already and the market has not collapsed.’ This response goes to the heart of the problem with market-based attempts to reduce carbon emissions: the means, the market, becomes more important than the ends.

Reproducing the Cause

Market-based schemes fail to challenge the sources of carbon-emitting activities and merely reproduce and further ‘fetishize’ them. Capitalist activities have caused widespread environmental crises; global warming is just one of those symptoms. Steady-state economics and the de-growth movement grasp the holistic environmental challenges and causes of such crises by focusing on the general engine of capitalism, unending growth, and they discuss ways to create more manageable and sustainable systems of production and consumption. Worldwide, grassroots community action, anti-consumptionism, permaculture and non-monetary forms of exchange have gained ground. Nevertheless, they are marginal to mainstream politics, where even the Australian Greens party supports a price for carbon, through a carbon tax or well-designed ETS.

The ideals and principles of social justice and environmental sustainability have not been integrated satisfactorily in a broad Left vision and strategy for the future. The development of a plethora of single-issue campaigns, such as climate change, embodies a failing; the sources of global warming and associated environmental crises demand an holistic and radical response.

However, a unified way forward is possible if the politics of climate change is explained directly in ‘use values’. This is not a new idea. Over the last few centuries a ‘thin thread’ of non-market socialism (Rubel & Crump, 1987) has been developing alongside other forms of socialism, anarchism and communism. Like the latter, non-market socialists entertain a vision and strategy focusing on social freedom and justice. The uncompromising non-markets socialists have lost many struggles against the prevailing view that market systems could be improved, neutralized or even support socialist ideals. However, at this point, the Left’s poor cousin may have come into its own.

Use Values and Exchange Values

The distinction between use value and exchange value provides a constructive means of understanding the stand-off between scientists, such as Tim Flannery, who are eager to act immediately to seriously reduce emissions, and politicians and business people whose vision of the future treats money not only as a neutral tool, but also like a god. The discussion of use value and exchange value here is germane to reframing, and casting another light on, the current obsession with setting up a trading system and price for carbon as if it were a rational and efficient policy to deal with the challenge of reducing carbon emissions.

Marx, who referred to money as ‘the god of commodities’ (Nelson 1999), is only one of numerous writers who have treated capitalist money in this way (distinguishing it always from non-capitalist monies). The analogy between this kind of money and a god is not simple hyperbole. One might reflect that the strong and real religion dominating the world today revolves around money and markets. In times past, when religious leaders and bodies were forces of discipline in society, someone who disbelieved was treated as a heretic and considered a threat to society as a whole. It is extremely difficult today to challenge and resist trade, production for trade and exchange using money (e.g. monetary taxes are

compulsory and significant forms of welfare are monetary). The significance of producing to make money, and exchanging via money, is clear to Indigenous people, whose material colonization continues through the imposition of market forces. One example is the recent bipartisan policy of 'welfare' intervention in Aboriginal and Torres Strait Islander lives, which has the assimilating effect of drawing Indigenous peoples into social structures that facilitate trade and production for trade. Indeed the dominance of trade and production for trade is very clear in all of the debates around global warming, and policy responses to it, a perspective returned to in the 'Environmental values' section below.

Marx's analysis of the capitalist system provides an insightful understanding of the import of money in disguising the distinction between use value and exchange value. Marx begins with an examination of 'The Commodity', Chapter 1 of *Capital I* (1976: 125–77). The commodity is a 'thing', a good or a service that is exchanged for money, i.e., traded. In capitalist societies the 'commodity' is the explicit result of a process of production for trade, i.e. it is a good or service created for sale in a unified market where workers purchase their daily basic needs of living, and capitalists, who manage production, buy the materials, equipment and labour used to produce more commodities. In other words, the relationship between the capitalist and the worker turns their work into a commodity. Monetary exchange, which is the purpose of production and its result, means that goods and work are treated as commodities and everything that is, or might be, traded seems to have implicitly or by reflection an 'exchange value' as well as a 'use value'.

A 'use value' is self-explanatory. In non-capitalist societies, where trade is marginal to the basic social relations, and in exchanges where no money changes hands, we can appreciate things exchanged purely for what they are in terms of their use values, i.e. as various quantities of qualities for the exchangers. The term 'use value' covers the whole ambit of uses a thing might be seen and shown to have, including psychological, social and aesthetic benefits.

In 'The Commodity' Marx presents the concept of 'exchange value' as it develops from a barter-like exchange and moves right through to exchanges simply for money. The final apparition of Marx's 'exchange value' is 'money', a social creation and practice (and from this social creation another concept and practice emerges, which is 'capital'). Capitalists manage labour and labour relies on money and capitalists so

that use values and exchange values become more entwined to result in ‘the world upside down’ (Marx, 1977: 132). Labour creates capital/ists yet workers come to see their products as the result of capital/ists. That is a reasonable view because, even though workers provided their effort and skill, they also submitted to working under capitalist processes to create products for exchange, and they feel this alienation keenly in terms of the products’ not being theirs. This is another aspect of commodity fetishism.

Furthermore, in the capitalist processes of production and trade exchange values become dominant, such that by 1893 British playwright Oscar Wilde (1993: 189) has his character Lord Darlington refer to those who know ‘the price of everything and the value of nothing’ (Act III, *Lady Windemere’s Fan*). Along with other scholars, Marx pointed to the increasing tendency for things that weren’t traded to appear to have no value at all. For example, in many places until recently water has been free; although, of course, human and other forms of life are impossible without water so water ought to have a higher value than diamonds or gold. This focus on exchange value was a key characteristic of Marx’s theory of commodity fetishism, which became central to explaining certain social and cultural aspects of capitalism.

Marx develops his exchange-value concepts of commodity, money, labour (work for money) and capital in order to strip the commodity, production for the market and money back to their simplest and clearest analytical forms. He wants to show that we do not need money or capital to live adequately as humans, that we create money and capital as cultural necessities to engage in a social ritual — capitalism — which involves power relations between people and enforces a particular discipline of work. Marx must do this because he is trying to break down, and break apart, the fetishism within capitalism whereby:

the development of the *social* productive forces of labour and the conditions of that development come to appear as the *achievement of capital*, an achievement which the individual worker endures passively, and which progresses at his expense’ (Marx, 1976: 1055 — *emphasis in the original*).

In this way the distinction between use value and exchange value expresses and reproduces social ‘alienation’ and an artificial sense of humans’ separation from nature and, just as significantly, a determination to control nature. These notions are so intertwined with capitalist

concepts of civilization, and trade and production for trade has gone on for so many generations, that it has become normal to believe that human progress rests on such development.

Environmental Values

Scientists, who study the human and ecosystem qualities of various matter and measure them in physical units, have pointed out all kinds of damage caused by capitalist production, consumption and waste. Assessments, such as the *State of the World* reports produced by the independent environmental sustainability research body the Worldwatch Institute (2010), are based in analyses of social and environmental use values. Like the IPCC and UNFCCC, the Worldwatch Institute assesses what natural and artificial conditions, such as diminished old growth forests, have on ecological sub-units, such as endemic species, and processes, such as future climate. These kinds of scientific reports indicate what will happen if we continue ‘business as usual’ and what we need to do in concrete terms to alleviate climate change, such as stopping the destruction of natural habitats.

However, when capitalist governments attempt to create policies incorporating authoritative scientific advice, economic feasibility and presenting reforms in business forms becomes a priority. Rather than directly regulate, they favour market-based strategies that encourage private enterprises to improve their practices. The best example of this is the popular ‘triple-bottom-line’ approach to sustainability, which seeks resolutions that satisfy economic as well as environmental and social needs. Under this approach, options for addressing environmental problems must be economically feasible, as well as environmentally and socially beneficial. The belief in market efficiencies is so entrenched that in environmental crisis after crisis there have been constant calls, including many from environmentalists, to place ‘prices’ on forests, water and carbon.

There seems to be a belief that drawing wild nature into the religious ritual of exchange with money and the creation of capital will automatically tame and manage it. Therefore, markets are created for the right to pollute with carbon and ‘offsets’ to compensate for trees to absorb carbon, a function they have performed without change from time immemorial. Government, business and civilians alike ignore that this

direction has a high risk of reproducing the cause of the very challenges being addressed. Government and international agency recommendations to price environmental goods and services is fraught with systemic irrationalities: capitalist prices rise out of markets, they are not set. Similarly, on the face of it, setting up trading rights to pollute would appear to be a cumbersome, time-consuming and inefficient way of lowering carbon emissions.

However, many citizens continually express a belief that capitalism is the most advanced and efficient social system of economy and governance. Even in Soviet Russia, after the introduction of the New Economic Policy, and in Cuba, after Che Guevara left, formal policy debates stopped discussing money-free versions of communism and, instead, incorporated more market mechanisms, although frequently they did not function in exactly the same way as prices and money in capitalism. Many leftist versions of aid rest on market reforms, such as microcredit and fair trade. They ignore the implicit broader social inequities that capitalism entails. These effects are exacerbated as globalization accentuates the power of banks (financial capital), an effect exposed by the recent global financial crisis and tensions between transnational companies (versus small local businesses).

The biggest stumbling block for capitalist reform is evident in advanced economies such as Australia where, for instance, continual growth demanded by capitalism threatens to counteract policies aimed at reducing carbon emissions, and agricultural reforms to expand biosequestration and reduce emissions run counter to market requirements to produce at the lowest cost. In other words, capitalist production for trade does not provide the necessary conditions for addressing climate change. In contrast, certain models of non-market socialism promise direct governance in local, collectively sufficient economies.

A non-market socialist framework provides the necessary, even if not sufficient, conditions for social organization based on transparent values associated with the needs of people and nature. Sufficient conditions rely on ethical principles and practices. These are important points: contemporary movements that focus on encouraging local and sufficient production to reduce carbon emissions, such as 'Transition Towns' (Transition Network 2010), are continually frustrated by working within

a capitalist context that does not provide even the necessary, let alone sufficient, conditions for their advance.

Non-market Socialism

Non-market socialists have a vision of a money-free, market-free, wage-free, class-free and state-free planetary society. Non-market socialist models centre firmly on production and exchange on the basis of use value. It is hard to envisage an easier way to make everyday life sustainable in environmental, social, political and economic terms. We would live simply and fulfill human needs through more creative, democratic and ecologically respectful practices. The contrast with uncontrollable capitalist growth is stark.

Non-market socialists claim Marx as one of their own or, at least, a source of inspiration. It is not widely acknowledged that he recognized capitalism's damaging approach to, and impacts on, nature. Marx (1981: 911) wrote:

From the standpoint of a higher socio-economic formation, the private property of particular individuals in the earth will appear just as absurd as the private property of one man in other men. Even an entire society, a nation, or all simultaneously existing societies taken together, are not the owners of the earth. They are simply its possessors, its beneficiaries, and have to bequeath it in an improved state to succeeding generations.

Even if one reads a Promethean tone to this passage, construed from the words 'improved state', he did express a respect for the earth. Marx's (1981: 963) specific concern was that, within capitalism, sectional interests speak for 'nature': 'so land is personified in the landowner, he is the land similarly standing up on its hind legs demanding its share, as an independent power, of the products produced with its aid.' Marx (1977: 73, 127–32) recognized both that 'man is a part of nature' and that money camouflages and contorts this relationship, which instead ought to be direct. Human fulfilment requires direct power that capitalist markets and states prevent.

Although the contributors to Rubel and Crump (1987) certainly present examples of non-market socialists with little interest or concern for the natural environment, the principles of a money-free, market-free, wage-

free, class-free and state-free planetary society can be expressed through various environmentally friendly models (Nelson & Timmerman 2011). A brief incomplete sketch of one model, centring on bioregional communities comprising neighbourhoods and households that provide as much as possible directly for each other's needs, follows. Bioregionalism offers a sound environmental context for efficient, sustainable human settlement.

Under this 'compact' model, work would be organized in a direct and collective way. Local plans would centre on collective sufficiency — a broader but similar notion to self-sufficiency — so that people would grow plants, keep animals and engage in appropriate technologies to satisfy their needs as directly as possible. However, these associated producers would exchange with other bioregional communities — using the closest available source — to fulfil needs that they could not meet locally. Innovations such as permaculture, buying local and 'food swaps' (Jackson 2010) already demonstrate some of these principles.

Where deemed necessary, large infrastructure would be established and maintained through work arranged via compacts made between bioregional communities. Such infrastructure might include water supply and would include electronic networks to enable fast communication between disparate and close communities. E-communications would facilitate the accumulation and sorting of orders by households responsible for making indicative plans of needs, rearrangements required when expected production did not result (say, because of drought and, equally, to reassess distribution in bountiful times) arranging and delegating work, and collective planning for production and a modicum of necessary exchange. People would travel in limited environmentally friendly ways, such as bicycle and pedicab and the use of energy and water sources would focus on renewable and sustainable processes.

Individuals and groups might begin a transition to this vision by engaging more and more in activities based in directly democratic, non-monetary forms of organization, relationships and exchanges. Some strategies include taking up part-time work and volunteering in activities compatible with the long-term vision, consuming less, strengthening local collective sufficiency and sharing surpluses. Therefore a transition involves a practical transcendence, a revelation of more sustainable ways of living simply by doing them. At a certain point the conversion from

contracts, based on private property and production for trade, to compacts, based on organizing for collective and worldwide sufficiency, would signal revolutionary change. Transitional strategies would be bottom-up and community-based, replacing states with networks from household to worldwide levels.

A bioregional focus is the most environmentally sustainable framework: producing and exchanging as locally as possible, local management allowing for easy and quick monitoring and alteration of techniques and targets (working with natural conditions), and avoiding substantial amounts of carbon-emitting transport and travel. Spheres of exchange of goods and services that a bioregion could not provide for locally would represent a small fraction of the transport-intensive trade and travel-intensive work that currently occurs. These exchanges would not fit the regular definition of ad hoc individual-to-individual barter. These planned formal exchanges, created as part of household to bioregional production plans, would meet mutually accepted needs of humans and nature. Again all these structures do is provide the necessary but not sufficient conditions for environmental sustainability. Appropriate, or ethical, decisions would still be needed. The key distinction is between this kind of framework, which facilitates the implementation of environmentally friendly production and exchange, and capitalism, which actually frustrates and often prevents such attempts.

A fuller explanation of such a model and strategies is developed in Nelson (2010) and Nelson & Timmerman (2011). The main point to make here is that this kind of regenerative economic and political transformation would pre-empt further climate change (i.e. beyond what current levels lock in) by reversing the trend in carbon emissions and changing the practices that have created such imbalances in ecosystem processes. The new model would move our society from exploitative and competitive capitalist market relations to more caring relations between people and nature.

Conclusion

Reducing carbon emissions means changing how, how much and what humans produce and consume. Capitalist states and businesses rely on growth as a socio-economic driver so they are incapable of curbing the over-production of carbon emissions, which is intricately interwoven

with the production of commodities, *i.e.* exchange values for money. In contrast, scientists have sketched the dilemmas involving carbon emissions in terms of use values. Likewise, ethical, non-market socialist models self-organize directly on the basis of use values. Both voices are grounded in a respect for humans and nature. An immediately achievable response to climate change already exists.

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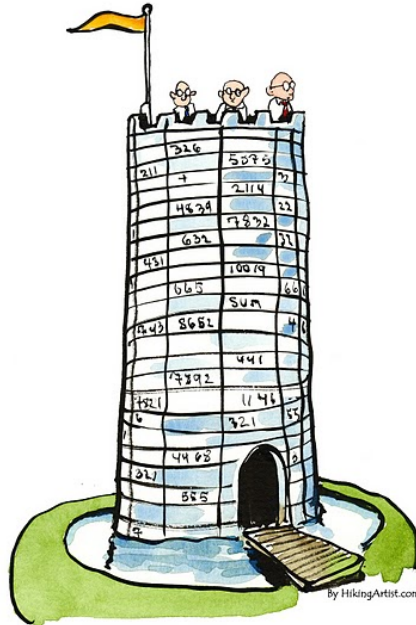
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Economists in spreadsheet tower