Multilevel Governance and Development

Clive L. Spash, Hendrik Theine

Voluntary Individual Carbon Trading

SRE-Discussion 2016/04 2016

Voluntary Individual Carbon Trading

Clive L. Spash and Hendrik Theine

October 2016

Abstract[1]

In recent years, the search for regulatory regimes in order to effectively address human induced climate change have become a prominent political and academic issue. Emission trading schemes have risen in popularity and are widely believed to be an effective, as well as economically efficient, measure and have become a favoured government strategy. On the individual level, many individuals in the industrialised nations now undertake actions to offset their personal direct greenhouse gas (GHG) emissions by voluntarily purchasing carbon credits, normally in association with product or service purchase. While this is a fast growing market, advertised as creating a carbon neutral consumer society, the voluntary carbon credit sector raises fundamental problems with respect to verification and credibility of the claimed offsets and associated projects. Lack of regulation and legal oversight leads to the impossibility of actually obtaining or verifying information on the consequences of voluntary credit purchases. Providers of offset credits who are driven by greed and easy profits will underfunded emissions abatement projects and pay little attention to quality standards. Corporate 'green washing' is also likely through voluntary offsets marketed as going carbon neutral.

This paper connects voluntary offsets to psychological and behavioural impacts on the individual. We identify three specific issues: the psychology of marketing and purchasing of voluntary offsets, commodification and crowding out of intrinsic motivations and the implicit ethics with its own psychological implications. We also discuss the political economy of voluntary carbon markets and their geo-political implications in terms of the global North-South divide and ethical responsibility for action on human induced climate change. This raises serious concerns over the individualisation of a collective problem, what can and should be expected of individuals as ethical consumers and how markets operate in practice. Such aspects place individual behaviour within a broader social and institutional context that questions the trend in market environmentalism and its impacts on the capability of humans to relate to nature.

[1] A version of this discussion paper will appear in Alan Lewis (ed.) *Cambridge Handbook of Psychology and Economic Behaviour*. Cambridge University Press, forthcoming.

Introduction

In recent years, the search for regulatory regimes in order to effectively address human induced climate change, by controlling greenhouse gas (GHG) emissions, have become a prominent political and academic issue. Emission trading schemes have risen in popularity and in the policy community are widely held to be an effective, as well as economically efficient, measure. They have become a favoured government strategy. Although carbon offsets have been developed as serious financial instruments in real markets, evidence has been accumulating as to their pervasive structural problems, negative social and environmental consequences and failure to actually address the reduction of GHGs that is supposed to be their *raison d'être* (Kollmuss et al. 2008; Spash 2010, 2015a, 2015b).

Carbon markets exist in two general types: (i) regulatory markets under a compliance regime with formal rules for both trading and offsetting, and (ii) voluntary offsets sold via typically informal arrangements. Voluntary offsets are a fast growing market, but they also involve fundamental problems relating to the verification and credibility of the claimed emissions reductions. Proponents of voluntary carbon trading tend to argue, from a purely deductive theoretical perspective, that (re)design to match a market ideal can address all the problems (Caney and Hepburn 2011; Caney 2010; Page 2013). A key aspect is then how voluntary markets operate in practice. The actual projects related to these markets have been the subject of ongoing and unaddressed criticism including their negative social and ecological impacts that go beyond the carbon sequestering and GHG reducing aims. This raises a series of behavioural questions, such as: What do individual purchasers think they are doing, do they seek adequate information on consequences and if not why not (e.g. warm glow)? What role do voluntary offsets play in, for example, addressing dissonance? Is ethical concern a major motivator? Are intrinsic motivations enabled or removed? Our aim is not to answer these questions directly but to layout the terrain and suggest some likely answers through a mixture

of theoretical exploration, critical institutional analysis and review of and reflection upon practical and applied experience.

The overall structure of this discussion paper is to start by reviewing the rise of emissions trading in general, before turning to voluntary markets in particular, and connecting their problems to the psychological and behavioural aspects of offset purchase. The critical review of voluntary carbon markets, their structure and functioning highlights the divergence between the expected and actual operation of voluntary markets in their role for achieving GHG emission reductions. We identify common commons problems as being a lack of information about and verifiability of actual emissions reductions claimed by offset providers. Why then are such markets expanding, what role are they performing for individual purchasers, and what are their implications for human behaviour? A range of issues arise from engaging individuals in such market based environmentalism. We focus on three specific issues, namely: the psychology of marketing and purchasing voluntary offsets, commodification and crowding out of intrinsic motivations, and the implicit ethics with its own psychological implications. The final section, before some concluding remarks, concerns the political economy of voluntary carbon markets and their geo-political implications in terms of the global North-South divide and responsibility for action on human induced climate change. This raises serious concerns over the individualisation of a collective problem, what can and should be expected of individuals as ethical consumers, and how markets operate in practice. Such aspects place individual behaviour within a broader social and institutional context that concerns how market environmentalism impacts the expression of value.

Background to the Establishment of Carbon Trading

The modern idea of controlling pollution emissions via trading in markets can be traced back

to academics in the United States of America (USA) writing in the 1960s. In general the literature developed from the promotion of private property rights as solving 'externalities' in the work of Ronald Coase (1960). More specifically the idea of pollution permit trading was originally proposed in a paper by Thomas D. Crocker (1966) and later elaborated in a book by John H. Dales (1968). Small scale markets for emissions trading were later introduced in the USA, but it took until the late 1990s before the idea of trading emissions became generally accepted and began to side-line other proposals such as direct regulation and taxes (MacKenzie 2009; Meckling 2014; Pearse and Böhm 2014).

In the area of human induced climate change, this approach follows from the more general idea that establishing a price for carbon is the best means of ultimately reducing GHG emissions because it will correct market failures. Mainstream economic theory regards markets as the only institutional arrangement for achieving efficient resource allocation. However, operating efficiently requires that all activities are included in the market system. Thus, where pollution occurs this is described as a market failure because a lack of property rights means pollution is 'external' to the process of market decision-making. Internalising such 'externalities' is then a matter of getting the prices right and making economic actors pay for the use they make of the environment as a waste sink.[2] This could be achieved by taxes. However, a regular argument is that emissions trading will achieve cost savings because markets are more efficient than government bureaucracies. As Bumpus and Liverman (2008, p.132) point out, carbon markets can be seen as "the newest arena for a market environmentalism that assumes that the way to protect the environment is to price nature's

[2] The concept of externalities has been challenged by Kapp (1978) as being a totally misleading description of how markets and the economy operate. Kapp explains environmental pollution, and a range of other problems, as arising from the deliberate shifting of costs on to others by economic actors. They do so for reasons of personal and corporate gain. The actions are not then external to the market as an institution. Rather than market failures they are market successes within the context of utility maximisation and profit seeking. Cost shifting is then the correct conceptualisation of the instituted process.

service, assign property rights, and trade these services within a global market". It is then clearly a neoliberal policy instrument. In political economy terms it has been described as the "latest incarnation of an ongoing process of commodification and capitalist expansion" (Böhm et al. 2012, p.14).

The idea of a market that buys and sells pollution permits is allied with the concept of offsetting pollution due to one activity by another that reduces pollution (i.e., creating a pollution credit). GHG offsets do not, as Broome (2012, p.85) notes, "remove the very molecules that you emit". Offsetting more precisely refers to the 'balancing out' of some or all of the emissions generated by an organisation or individual (Page 2013). This occurs through reductions in emissions elsewhere in time and space.

Polluters, whether organisations or individuals, pay a specified price to offset emissions. The market works because the price paid is lower than their willingness to pay for the action causing the emissions, or lower than the cost of reducing emissions directly (Bushnell 2012). Such trading is regarded as a form of market-based public policy instrument, founded on the idea that the reduction of pollution emissions is particularly efficient—least-cost—when individual actors are brought into situations of arbitrage and exchange.

Carbon trading, in general, refers to the idea of mitigating human induced climate change through a market for GHGs that buy and sell emissions permits or credits. Such an emissions trading system (ETS) could be restricted to a set of polluters within a given jurisdiction who must either control their emissions directly or buy permits held by other polluters. Offsetting in this model occurs if polluters reduce their emissions enough to allow them to have an excess of permits to sell to others. Typically offsetting goes far beyond this. A theoretical description is that of Dhanda and Hartman (2011, p.120): "if someone performs an act that

adds carbon to the atmosphere, then offset providers perform an activity that reduces that equivalent amount of carbon in the atmosphere". The fundamental idea behind carbon offsetting is that someone else is paid to avoid, absorb or reduce GHG emissions, which compensates for GHG emissions originating from the purchasers actions (Bayon et al. 2009; Kollmuss et al. 2008). These offset providers (or credit traders) may be outside the jurisdiction of the ETS or not be designated as polluters under the ETS. The offset purchasers may be those unable to meet their legal emissions reduction targets under a direct regulation. This is called compliance offsetting.

The Kyoto Protocol, adopted in 1997, but only effective from 2005 after sufficient countries ratified, was a major stepping stone that led to the establishment of both offsetting and ETS. Compliance offsetting was developed under two initiatives: the Clean Development Mechanism (CDM) and Joint Implementation (JI) projects. The CDM and JI have been termed "flexible mechanisms" that allow industrialised countries (or Global North) to pay others in order to meet their international reduction targets to achieve avoidance of severe disruption to the Earth's climate system. Under Article 2 of the 1992 United Nations Framework Convention on Climate Change (UNFCCC) the 197 countries who are parties to the convention agreed to the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (United Nations 1992, p.4). Instead of reducing carbon emissions, Annex I countries are allowed to offset emissions via projects in non-Annex I countries.[3] The original aim of these offset mechanisms was to promote technology transfer and assist with sustainable development only where unforeseen failures to reduce emissions occurred. However, the mechanisms have become used more broadly than that and, in contravention

[3] "Parties included in Annex I" means a Party included in Annex I to the UNFCCC and covered 35 countries plus the EU15.

with the spirit of the agreement, for planning avoidance of domestic mitigation measures. Both mechanisms and their impacts on the effectiveness of ETSs have been the subject of close examination and criticism (e.g., Kollmuss et al. 2015; Spash 2010; Wara and Victor 2008).

Carbon offsets can be created through investing in a variety of projects. These can be broadly categorised into: (i) forestry and land use, (ii) renewable energy (iii) energy-efficiency, (iv) fuel switching and (v) methane capture (Broderick 2009; Gössling et al. 2007; Kollmuss et al. 2008). Typically voluntary offsets for carbon emissions have involved carbon sequestration via reforestation and/or low carbon technologies (Ari 2013; Bayon et al. 2009; Bumpus and Liverman 2008). Regulated offsets have, in addition, involved projects that 'destroy' or prevent man-made GHGs such as hydrofluorocarbons. Indeed, projects do not need to reduce CO_2 emissions, but can instead involve reductions in other anthropogenic GHGs such as nitrous oxide (N_2O), methane (CH_4), chloroflurocarbons (CFCs) and hydroflurocarbons (HCFCs). Determining how much an increase in one GHG can be compensated for by the reduction in another requires establishing a common metric and basis of equivalence.

CO_2 equivalent (CO_2e) is a quantity that describes for a GHG the amount of CO_2 that would have the same global warming potential. CO_2 as the numeraire is 1 and other GHGs are then, for example, CH_4 at 25, N_20 at 298, and HCFC-23 at 14800 times more powerful in their radiative forcing of the climate. This calculation of global warming potential requires a time horizon because different gases have different lifetimes over which they decay in the upper atmosphere; a normal horizon tat has been accepted is 100 years. These calculations to estimate equivalence are essential to making GHG emissions trading schemes functional; they establish the commensurability of different gases. A typical result is then to describe emissions in terms of tonnes of CO_2 equivalent (tCO_2e) with markets trading certificates

representing this artificial quantity.

Regulatory ETS markets are created as mandatory for a set of participants and can operate at regional, national or international levels. In the USA such markets are termed cap-and-trade systems. The theory is that an overall cap is set by a government authority or regulatory agency. Participants are allocated a certain amount of allowances, or permissions, to emit carbon based on staying under the overall cap. The cap should be binding, meaning that allowances are neither removed nor new ones created, but once created are available for trading. A prominent example of mandatory carbon markets is the European Union (EU) ETS "the first large-scale CO_2 emission trading system in the world" often termed the "cornerstone of EU climate policy" (Knopf et al. 2014, p.2). It was introduced in 2005 after years of failure by the European Commission (EC) to get a carbon tax established because a consensus, that was necessary for passing such a financial instrument in the EU, could not be reached. In contrast, as an environmental measure the EU ETS did not require the same consensus. The switch meant the EU ETS could be established in an "ultra quick" negotiation period (Wettestad 2005). This was also aided by the low Kyoto Protocol targets easily met in Europe by sharing East European emissions reductions achieved by the collapse of the Soviet Union (Spash 2016). That is Western Europe could offset their emissions on the basis of Eastern European emissions reductions through a joint EU emissions target. It is now in its third round of existence and neo-liberals and advocates of markets celebrate it as the successful transfer of climate change concerns into the "logic of the economic system" and an important step in the "right" direction (Rydge 2015).

Yet, the EU ETS has also attracted considerable criticism due to its lack of environmental effectiveness (Knopf et al. 2014; Martin et al. 2014), failure to reduce GHG emissions (Koch 2014), underlying political ideology (Bailey 2010; Grubb and Neuhoff 2006), wider negative

social and ecological impacts (Spash 2010), and the corruption and fraud that has been related to its operation including profiteering and racketeering which has been rife (Brinded 2012; Elsworth et al. 2011; Inman 2010; Jacobs 2013; Seager 2009). Rather than raising public funds, as would be expected by a tax, the free distribution of permits has passed billions into the hands of the biggest polluters (Coelho 2012; Fullbrook 2009; Gilbertson and Reyes 2009; Lohmann 2012). There are also concerns over the credibility of the offset projects.

Besides schemes targeting firms and corporations, the idea has been floated of creating regulated personal carbon trading. This is defined by Fawcett and Parag (2010, p.329) as "a general term used to describe a variety of downstream cap and trade policies, which locate rights and responsibilities for the carbon emissions from household energy use and/or personal travel at the individual level". Such schemes require mandatory participation by individuals, or households, and none have been implemented so far. This hypothetical idea has been discussed as a means of allocating personal carbon budgets to equitably distribute national, or international, targets on a per capita basis. These may then be traded or kept to offset personal/household emissions (see Capstick and Lewis 2010; Parag and Fawcett 2014; Starkey 2012a, 2012b). The per capita distribution is a key aspect regarded as producing equitable and just outcomes.

The Development of Voluntary Carbon Markets

Voluntary carbon offsets have developed in parallel with official and regulated ETSs. Guided by faith in the market system, voluntary offsets (like regulated ones) are promoted as creating price incentives for a low carbon economy based on consumer preferences expressed via willingness to pay. They are also linked with theories of ecological modernisation that promote the corporations as socially responsible agents in society who will freely adopt sustainable, 'green', business models for addressing environmental problems i.e., that

business is best at voluntarily controlling its own pollution (Rydge 2015; Spaargaren and Mol 2013).

Both regulated and voluntary offset markets have grown considerably since the establishment of the Kyoto Protocol with its promotion of trading as a flexible mechanism, and offsetting via the CDM and JI. By 2015 global trade under regulated ETS is estimated to have reached US$34 billion (World Bank Group and Ecofys 2015, p.13). Voluntary offset providers increased from a couple of dozen in 2006 to more than 170 in 2008, while the volume of CO_2 equivalent offsets increased from 24.6 to 123.4 Mt CO_2e over the same period (Dhanda and Hartman 2011). During 2006 and 2008, the value of trade also increased from approximately US$97 million to US$705 million (Brinkel and Antes 2011). Peters-Stanley and Yin (2013) agree on the 2006 trade volume, but give a higher 2008 quantity of 135 Mt CO_2e. They acknowledge the fall in annual trade volume, since the financial crisis, to 107 Mt CO_2e in 2009 and 101 MtCO_2e in 2012, and Hamrick et al. (2015) also note the decrease in trade value to US$485 million in 2009 and US$379 million in 2013. Thus, voluntary carbon trading appears to be, like all financial assets, quite sensitive to economic cycles. Trade volume had fallen further by 2013, but increased 14% from 2013 to 2014 to 87 Mt CO_2e with traded value rising by 4% to US$395 million. Almost 50% of the transacted volume for voluntary carbon offsets in 2014 was attributed to forestry and land use projects, 25% wind power projects, 5% to landfill methane, 5% cooking stove waste heat recovery projects and 10% ‘other’ (Hamrick et al. 2015).

In contrast to mandatory schemes, voluntary markets are basically unregulated and outside of legally binding frameworks and State emissions control. Voluntary offsets are traded carbon credits issued by companies and civil society groups. Voluntary markets do not entail a finite or regulated supply of allowances, thee is no cap. Carbon credits (and associated offsets) are

actualised when a new project is implemented. The created credits can subsequently be bought by polluters (e.g. firms or individuals) to offset their emissions. Companies and individuals freely choose to purchase those credits to offset their emissions.

Voluntary carbon markets are therefore separate from, or go beyond, any legal requirements for individuals or organisations to purchase emissions permits and have been advocated as testing grounds for innovative approaches for GHG reduction (Ari 2013; Bayon et al. 2009; Perdan and Azapagic 2011). Their role outside of official schemes has then been seen by some as a positive aspect and a means of taking independent action. In this latter respect they can extend emissions reduction where regulated markets have not been established (e.g. international flights), and encouraging small projects below the scale of regulated markets (Kollmuss et al. 2008). Indeed they originated in countries where governments were outside the Kyoto protocol and/or national policies failed to materialise (e.g. USA, Australia). Bumpus and Liverman (2008 p.132) point out that voluntary offsets emerged from "frustration with the lack of state action—when governmental policies were perceived to be slow, inadequate, or non-existent". Voluntary carbon markets were, thus, in part promoted by non-profit organisations providing carbon offsets for pro-environmental individuals or organisations who were attempting to bypass the political blockades around the establishment of Kyoto emissions reductions.

Yet, from the beginning, large GHG emitting corporations also participated in voluntary carbon trading. Among the first voluntary carbon offsets were investments in agro-forestry and forestry sequestration in Guatemala (1989) and Ecuador (1990) by US and Dutch electricity companies respectively (Bumpus and Liverman 2008 p.133). Corporations have also increasingly branded themselves as sustainable, environmentally friendly and 'carbon neutral'. In 2014 globally about 150 corporations claimed that they used a carbon price for

internal management purposes with prices ranging from US$6 to US$89 per tCO_2e (World Bank Group and Ecofys, 2015, p.48). In 2015 this had almost tripled to 435 corporations with internal prices ranging from US$1 to US$357 per tCO_2e. Companies making such public declarations seem stimulated by the existence of government schemes with 94% located in countries where mandatory pricing (ETS or tax) is in place or proposed (World Bank and Ecofys 2016). Appearing 'green' may therefore be a strategic manoeuvre to pre-empt GHG emission legislation that is expected to be more stringent and costly (Spash 2010; Spiekermann 2014).

Green branding, image creation and product marketing are also important drivers for the corporate purchase of voluntary carbon offsets (Brinkel and Antes 2011; Bayon et al. 2009). Ari (2013, p.911) points out that "private companies use the wording 'carbon neutral' in their products, events and activities by buying carbon credits to offset their associated emissions". This helps to neutralise public perception of environmental harm for companies with a large carbon footprint. Offsetting emissions to become 'carbon neutral' can contribute to an image of corporate social responsibility. That corporations promote and advertise carbon neutrality helps normalise the idea that this is both a legitimate response to human induced climate change and a 'good' thing to do. This then encourages individuals to adopt a similar behaviour and ethical stance.

Three types of buyers can then be distinguished in the voluntary GHG market sector: (i) middlemen, (ii) corporate/business, non-governmental and local community organisations and (iii) individual/household consumers. Middlemen purchase carbon offsets to trade them and may put out calls for carbon projects and propose carbon financing to fund projects. They trade permits for profit and may also engage in price speculation. The organisational and individual types of purchasers may have similar motives to each other, from promoting self

image to genuine concern for mitigating GHG impacts. While households and individual consumers are passive purchasers of offsets, organisations may proactively approach offset providers and suggest projects.

There are two forms of voluntary permit trading: direct and via a financial exchange. The majority of voluntary carbon trades are over-the-counter transactions, where buying and selling is conducted directly (Bayon et al. 2009; Peters-Stanley and Yin 2013). For example, travellers booking a flight might buy offsets directly from an airline along with their plane ticket. The direct character of such transactions means the price is often hidden from the customer or hard for them to estimate (Bayon et al. 2009). The other form of trading is via official exchanges and a formal trading platform. The Chicago Climate Exchange is an example of such a system. In this case price data is typically closely monitored (not least by traders) and recorded. Yet even here information about what exactly is represented by an offset credit can be far from transparent. As a result prices for CO_2 vary substantially. Several authors have reported that the cost of offsetting one tCO_2e in voluntary markets generally ranges from a few to around thirty Euros, with some suppliers charging up to €180 per tCO_2e (Brinkel and Antes 2011; Dhanda and Hartman 2011; Schiermeier 2006). What lies behind price differences and more generally what goes on in voluntary markets is often unclear. Comparability of offsets (in addition to any issues of carbon equivalence) is affected by considerable variety in the methods used for offsetting, project types and suppliers.

Unregulated Carbon Markets: Information and Validity

In this section we review a range of concerns about how voluntary markets operate. This critical institutional analysis brings to the fore the divergence between a theoretical model of the fully informed consumer and the operation of actual voluntary markets where information on offsets is opaque or lacking, as will be explained. This sections sets the stage for the

following enquiry into who is prepared to buy such an ill-defined product and what is their justification and motivation for doing so? First let us establish how ill-defined is the product.

Voluntary carbon markets lack governmental regulation and oversight—accordingly they have been termed “Cowboy markets” (Roy and Woerdman 2012, p.9). Without a regulatory body various forms of carbon credits have appeared that go under a number of titles (e.g., verified emission reduction, voluntary emission reduction, voluntary carbon unit, or just emission reduction units). Providers may engage in product differentiation purely for marketing reasons. This leads to comparability problems. That is, how are consumers meant to understand the differences, if any, between the various offset products? Is expecting the individual purchasers to be, or become, fully informed at all realistic?

A related concern then arises as to quality standards, especially with regard to the conditions ensuring implementation and control mechanisms. Kollmuss et al. (2008) survey different types of standards, which aim to guarantee the credibility and accountability of offsets. However, they found that offset standards differ substantially in accounting, monitoring and verification methods as well as enforcement systems. In a study of over 100 carbon offset providers, Dhanda and Hartman (2011) come to a similar conclusion that the standards are inconsistent and non-comparable. The attempts to provide a quality control standard covering different providers has also proven problematic. For example, the Voluntary Offset Standard screens and evaluates offset credibility, but this has itself been criticised for having vague screening criteria, an unclear evaluation process and lack of detailed specific information (Kollmuss et al. 2008).

The Chicago Climate Exchange has implemented specific rules in order to ensure the quality and ecological integrity of offset projects. However, in an international survey, Brinkel and

Antes (2011) find that market participants vary in their assessment of Chicago Climate Exchange's standards. While some of their respondents state that the requirements laid down are sufficient and ensure the proper working of offsetting mechanisms, others criticise the Exchange's lack of transparency and failure to disclose information. Kollmuss et al. (2008) also reference substantive criticism which questions the additionality of some Chicago Climate Exchange offsets.

Additionality refers to the need for emissions reductions to make a difference over business as usual. That is, if say a reforestation project were going to be undertaken anyway, without the offset funding, then there is no addition of carbon emissions reduction compared to what would have occurred in any case, i.e., under business as usual. There is then no justification for payment under economic efficiency criteria and no net reduction in emissions, indeed exactly the opposite will occur if permits are sold on the basis of a project violating additionality.

Another attempt to provide a quality criteria is the Gold Standard. This was established by the World Wide Fund for Nature to address concerns over the environmental and social integrity of projects. It is the only voluntary standard that has clearly defined additionality rules and requires third-party auditing. Thus, it is "generally accepted as the standard with the most stringent quality criteria" (Kollmuss et al. 2008, p.57). As a result, Gold Standard certification requires extensive documentation of the project. However, this also considerably increases the costs for those designing and implementing offset projects. The cost differential, relative to lower quality offsets, has implications for the adoption of high quality standards in an unregulated price-making market. As Spash (2010) notes, where standards are unenforceable (i.e., voluntary) all certificates are regarded as equally valid, and poor quality cheap offsets will drive out the high quality expensive ones; that is how price-making markets operate.

Thus, a general problem with the Gold Standard, and similar schemes, in a competitive price-making market, is that they are very likely to be undercut and sidelined.

The majority of offset providers use self-developed offset standards and verification processes instead of adopting the Gold Standard guidelines or other third party standards. Sterk and Bunse (2004, p.16) suggest that: "one feature that is indispensable is the auditing of projects by independent third parties; otherwise the compensation cannot be regarded as credible". Yet, this is not the norm and the quality and credibility of such self-developed standards has remained unclear and difficult to judge (Taiyad 2005).

Similarly, the validity of additionality is often highly problematic to establish. Several cases exist where the additionality of projects have been questioned and there is a lack of explicit justification in the project documentation (Bumpus and Liverman 2008; Dhanda and Hartman 2011). More fundamentally, Kollmuss et al (2008, p.89) argue that additionality is based on the idea that:

> "emission reductions have to be measured against a counterfactual reality. The emissions that would have occurred if the market for offsets did not exist must be estimated in order to calculate the quantity of emissions reductions that the project achieves."

Such a hypothetical reality is always sensitive to determining what would have happened in any case, i.e., baseline scenarios. Carbon offsets should be actual reductions of emissions that would not have occurred otherwise, rather than arbitrary paper projections. Worse offset projections are likely to be manipulated by providers to serve their own interests, and this includes claiming consequences are certain and known.

The verification of projected and claimed carbon offsetting is difficult to establish and subject

to both considerable wishful thinking as well as deliberate exclusion of risk and uncertainty. For example, the planting of forests to achieve carbon sequestration involves considerable unpredictability. Research has questioned the effectiveness of forestry as a means of carbon sequestration and it is subject to being overstated (Dhanda and Hartman 2011). The actual amount of carbon sequestrated depends upon the specific growth rates of the trees, their age, soil conditions and the local climate. Unforeseen events can and do intervene including human activities and natural disasters (e.g. drought, forest fires, hurricanes, flooding) which harm or destroy forests. However, predicting carbon sequestration rates on the basis of future growth projections is necessary in order to sell carbon credits before any actual sequestration has occurred. The promise is that trees will be planted in the future on the basis of payments made for past emissions or emission to be released immediately (Bumpus and Liverman 2008; Lohmann 2010).

In general, projects claiming GHG emissions reductions and avoidance face major ambiguities and uncertainties. Projected savings in GHG emissions require ensuring actual implementation as well as maintenance and repair of any associated project equipment and infrastructure. Legislative hurdles and local opposition to projects add political indeterminacy (Brinkel and Antes 2011). There is additional social indeterminacy due to the difficulty of fulfilling expected outcomes and the vagaries of human behaviour. That is, for example, economists' limited models of human behaviour fail to account for the rich array of potential responses because they assume a single simple causal mechanism (i.e. self-interested greed or more formally utility maximisation and its underlying preference utilitarianism). Actual behaviour results from a mixture of motivators, causal powers and tendencies. Social norms and cultural practices, that are absent from the economic model, are clearly important aspects of actual behaviour.

Thus, like forestry, carbon emission reductions due to renewable energy and energy efficiency are also far from self-evident and dependent upon human practices. Energy efficiency projects are often small scale and difficult to monitor and evaluate, e.g. distribution of energy efficient light bulbs in Australia treated as GHG reducing offsets, although not used, or hoarded, by households (Spash 2010). Lambe et al. (2015) in their study on cooking stove projects in Kenya report major uncertainties about the uptake and usage rates of the stoves. Determining the actual amount of carbon saved from distributing cooking stoves depends on several assumptions about cooking behaviour, changes in practices and fuel switches, which the authors find highly arbitrary in existing emissions reduction methodologies. There were several mismatches between the assumptions of international investors compared with local communities and non-governmental organisations working in the field. For example, Lambe et al. (2015) found divergence between how cooking stoves were used in the Kenya project and the assumed use based on practice in the global North. This led to a mismatch between enforcing the efficiency needs of a carbon project and cultural practices. Such cooking practices might relate to types of food affecting the length of cooking times and intensity of heat during cooking (e.g. cooking food all day on a low heat versus heating food for a short time with a more intense heat).

Typically, the energy savings resulting from such projects are calculated by comparing them to a hypothetical baseline scenario of using a fossil fuel intensive alternative. The investor as well as the project host have an incentive to overstate such scenarios to maximise the claimed gains. The decentralised and geographically distributed sites involved in such projects adds to the difficulty of establishing the baseline scenario necessary to estimate emissions and to monitor the reductions. The emissions reduction of cooking stove projects, for instance, is estimated based on small samples extrapolated to heterogonous communities (Bumpus 2011; Kollmuss and Bowell 2007).

Another issue with respect to the inconsistency of carbon accounting relates to carbon footprint calculators, which are widely employed by individuals to inform themselves about their potential environmental impact relating to the enhanced Greenhouse Effect. They may also be linked to providers' websites or incorporated into the product purchase process. Such calculators vary widely in their estimates of the impact from the same person or activity (Murray and Dey 2009; Schiermeier 2006). For example, in a comparison of different carbon credit providers, Schiermeier (2006) found that estimates of carbon emissions for the same flight varied from 2.1 to 6.9 tonnes of CO_2. Emission calculation methods vary so that one company only considered direct emissions emitted per passenger, while another included effects on ozone and climate. Dhanda and Hartman (2011 p.126) cite the case of a flight from Chicago to Melbourne estimated at anything from 3.8 to 8.0 tonnes of CO_2 costing from $48 to $267 to offset.

Brinkel and Antes (2011) argue that the pinning down of exact numbers is difficult because the actual amount of carbon emitted by companies depends on a variety of factors. For large companies calculating carbon emissions can be extremely complex due to the extent and variety of their operations so that producing reliable estimates requires numerous assumptions. In order to go 'carbon neutral', via offsets, a company needs to measure the GHG emissions it is producing. The critical literature on environmental accounting has questioned the data reliability disclosed by companies (Boiral and Henri 2015; Hopwood 2009). Based on an in-depth study of Canadian industry using qualitative interviews, Talbot and Boiral (2013) found the complexity of measuring corporate GHG emissions meant claims being made remained highly uncertain, opaque and imprecise. They concluded that: "The majority of businesses do not have confidence in their own [GHG] inventory and even less in that of their competitors" (Talbot and Boiral 2013, p.1082).

The result may be either under-estimation or over-estimation of GHG emissions as seems strategically convenient depending upon the institutional and regulatory context. For example, high GHG emissions scenarios may be projected to allow justification for claiming larger than actual reductions are achieved (Downie 2007). Under regulatory ETS with grandfathering exaggeration of emissions is incentivised in order to obtain free permits that can later be sold on the open market without any need to undertake pollution control (Spash 2010). In contrast, under unregulated markets, offset providers may claim their projects achieve very low emissions (i.e. underestimate actual emissions) in order to sell more offsets from larger overall emissions reductions than actually occur. As outline above, this has indeed been the case for forestry and energy offset projects.

In summary, unregulated voluntary markets incentivise the provision of low quality offsets. Bushnell (2012) argues that moral hazard is a likely problem because information is essentially an offset project developer's private property. Moral hazard means acting immorally is incentivised. Here the offset provider is incentivised to lie to make profits. Furthermore, adverse selection might be pervasive because offset markets will be particularly attractive to firms whose baseline scenarios prove to be lower than originally estimated or projected. This means projects are selected (moral hazard), or firms opt-in (adverse selection), due to the ease of assuming additionality where there is none. Both problems bring into question the claims made for offset markets, but also pose the question as to why do individuals buy offsets? Do they lack information on and awareness of the problems or do they just not care?

Effects on Individual Behaviour

As has been explained there are numerous problems with offsets and their validity as a means

for reducing GHG emissions. However, the expectations of voluntary markets is that the consumer, or permit purchaser, will be able to evaluate all relevant information. The foundation for this positions is an economic model where consumers have perfect information and make choices on the basis of perfect foresight of all consequences. This is a highly simplified and misleading conceptualisation of human choice in price-making markets and also neglects the interactions between human behaviour and institutional context (e.g. rules, regulations, norms). In this section we explore how three aspects of voluntary markets impact on individuals, namely via playing on their psychology, crowding out intrinsic motivation and promoting a specific ethical approach to environmental problems.

5.1. Psychology of voluntary offsets

Two issues that have been hypothesised to contribute to greater awareness of personal GHG emissions and incentivising their reduction are "increased visibility" and "cognitive availability". Both are discussed by Capstick and Lewis (2008) for the case of compulsory personal allowances with carbon trading, but seem potentially relevant to voluntary offsetting. Visibility refers to the revelation of information that was previously hidden or difficult to attain, e.g., displaying the amount of carbon emissions at the point of sale. Cognitive availability is where the display of such information "has the potential to act as an additional, novel form of feedback" (Capstick and Lewis 2008, p.8) leading to a change in behaviour. Such an effect has been claimed for the case of household energy (Capstick and Lewis 2010; Darby 2008; Lewis and Brandon 1999). For example, electricity customers are supplied with a digital display connected to a meter which is meant to be located in a prominent place to encourage reduced energy consumption. However, as has been explained, the information supplied in carbon offsetting is nothing like as reliable as that available from a household electric or gas metering system. Neither does voluntary carbon offsetting involve action to save money on an existing purchase. Voluntary market offsets are marketed products in

themselves.

The heterogeneity of consumers explains why voluntary offsets are able to operate within specific market segments and achieve price discrimination between different consumer groups. Take the example of flying. Burns and Bibbings (2009) use the derogatory term ‘New Puritans’ for people who take a critical stance on environmentally threatening consumption by refraining from flying altogether. More generally, the term ‘deep Green’ may be used to refer to those who aim to avoid and refrain from certain actions such as fossil fuel combustion and the resulting GHG emissions. The individuals being identified here are not then interested in buying permissions to undertake such actions. Similarly, the climate denialists and those who just “don’t care” will not purchase offsets at all. Spash (2010 p.186) has therefore hypothesised that this leaves as the primary marketing target the “moderately environmentally concerned consumer”. This is a person who weighs-up the consequences and feels a need to assuage guilt over wrong doing by balancing harmful acts with good acts. The existence and availability of offsets allows the moderately environmentally concerned consumer to purchase permission to perform a specific environmentally harmful action rather than avoid that action. Thus, the widely acknowledge environmentally harmful behaviour of flying can be compensated for by purchasing offsets. Many airlines offer voluntary carbon offsets directly when purchasing tickets. Mair (2011) studied voluntary carbon offset purchasers in the UK using an online questionnaire. Among those who were offsetting emissions from aviation, most were driven by pro-environmental attitudes. However, frequent reasons for offsetting were the lessening of guilt and the ease of doing so. McLennan et al. (2014) in a survey of international visitors to Australia found that purchasers of voluntary carbon offsets for aviation are to a large extent ‘nature based visitors’, i.e. travelling to Australia to undertake whale or dolphin watching, rainforest walks and visits to wildlife parks, zoos or aquariums. This supports the hypothesis of Spash (2010) that purchasers of voluntary carbon offsets are

"moderately environmentally concerned consumers". Yet, despite their apparent environmentalism, some such individuals may actually ignore the implications and outcomes of their offset purchases.

Where individuals are driven by a 'warm glow' and guilt avoidance, there is limited concern for the actual environmental consequences of their purchase (Andreoni 1989, 1990). Kotchen (2009) notes that is it the 'warm glow' of good feeling and the 'reputational boost', that play an important behavioural role when purchasing carbon offsets. People who buy offsets for such reasons engage in conspicuous consumption and therefore wish to show-off their carbon offsets purchases e.g., making use of window stickers. Thus, emissions reduction is transformed into a means of achieving social status as a 'good' person instead of being an end in itself. Carbon providers sell the 'feel good factor' and guilt reductions of carbon credits rather than the actual GHG abatement (Spash 2010).

Ignorance about the effectiveness of the purchased offset is then unproblematic and the purchaser is similarly unconcerned over harmful side effects of projects, at least as long as they remain unknown. There is certainly no desire to discover more about such things. This fits well with carbon markets because they do not directly transfer a tangible good or service to the consumer, there is no actual consumption by the purchaser, nor any physical product to inspect for quality. Meanwhile offset providers are driven by making money and that means finding the cheapest low quality offsets and overstating project emissions reductions, which as has been explained is easily done.

Spiekermann (2014) doubts the motivation behind participating in carbon offsetting and argues that there are strong signs that buying offsets is mainly to clear ones conscience. He argues that many of the participants of voluntary schemes would be unwilling to pay higher

prices to justify their unsustainable consumption practises. They participate because it is cheap and easy to do so. This point is also illustrated by Lohmann (2006a). He recounts the story in an article that appeared in the *Daily Telegraph*, a British right wing newspaper. The article concerned a business executive reporting her experiences with carbon footprint accounting. She discovered that her carbon footprint was about 24 tonnes of CO_2, which was a great relief to her because the amount necessary to pay for carbon neutrality was minor compared to even trivial other expenditures that she commonly undertook.

Spiekermann (2014) regards such offsetting as undermining the duty one has to reduce carbon emissions. He questions the "robustness of motivation" behind voluntary carbon offsetting, which would disappear if prices rose, and speculates that such a price rise should occur as offsetting successfully increases demand while reducing carbon emissions. Thus, Spiekermann (2014, p.927) states that the:

> "lack of robustness in the offsetting system matters: the system fails as an institution because it would be undermined by its own success. Perhaps even worse, it creates incentives and price signals that convey the impression that climate neutrality could be easy to achieve for everyone without sacrifice."

Hymans and Fawcett (2013, p.96) basically agree and question the motivation individuals have for participating in carbon offsetting stating that "motivation is rather weak, and disappointingly easily defeated by other interests". They argue that on the basis of such a weak motivational foundation carbon offsets cannot offer a general solution to human induced climate change.

Two implications are worth highlighting here. First, such offset purchasers are not particularly motivated to assess the reliability and additionality of offsets. They avoid the psychological costs of questioning offset credibility. Maintaining their belief that offsets are beneficial

addresses their cognitive dissonance (Spash 2010). This conjecture is supported by a survey of green tourism in the context of climate change by Becken (2004, p.341). She found that:

> "A preferred way of avoiding the dissonance resulting from actual behaviour and pro-environmental attitudes is to contribute financially (and therefore internalise externalities), while keeping the privilege of continuing current practices".

If the primary motive is to preserve ones lifestyle then the extent to which actions have real results is at best secondary. This lack of concern over quality and actual consequences of offset purchases means projections of emissions reductions can more easily "prove to be illusory" (Hymans and Fawcett 2013, p.96). Second, taken together with the dubious foundations of many offset projects, this results in a "principal-agent problem", i.e., the purchaser, or principal, cannot observe the actions of offset provider, or agent (Spash 2010). The low quality of offsets is hardly noticed and can stay unpunished. The different standards and rating systems of carbon offsets only adds more confusion that makes such an outcome even more feasible.

Ecological modernisation has also been cited as culpable in spreading the ideological commitment to offsetting as a legitimate response from businesses that results in neglecting actual conduct in the marketplace. In a study of the paucity of regulation in the voluntary carbon trading sector, McKie et al. (2015, p.477) report that activities in the market "include the false selling of carbon credits, exploitation of weak regulations, tax and security fraud, money laundering and internet crimes". This has resulted in investigations of such markets by Interpol and the UK Financial Conduct Authority. Trading companies use marketing and advertising techniques that promote sustainability, play on beliefs in ecological modernisation and concerns over ethical conduct in their attempts to cover traditional fraud and theft. McKie et al. (2015, p.483) argue that "motivated offenders and victims come together in the marketplace because ecological modernisation ideology is such a strong behavioural driving

force". A world ideologically committed to trust in business and markets appears to create a blindness to how those same markets are used to achieve ulterior motives and fail to fulfil their promises.

On a behavioural level, it is quite likely that carbon offsets solidify and lock-in unsustainable consumer practices, rather than changing consumption patterns, because negative effects on the climate are perceived to be neutralised. Gössling et al. (2007, p.241), for instance, state that voluntary carbon offsets carry the "risk of encouraging people to believe that they need not change their behaviour, thus creating irreversibility in current consumption and production patterns". Cohen et al. (2011), in reporting interviews with regular air travellers, note the expressions of guilt over conducting behaviour known to have negative consequences for the environment, but that voluntarily offsets relieved this tension and were regarded as a useful neutralisation strategy that enabled interviewees to continue flying on a regular basis. Similarly, in a survey of self-selected green consumers, McDonald et al. (2015) found, when exploring reasons for continuing to fly, that interviewees discussed purchasing carbon offsets instead of changing their behaviour. Voluntary carbon offset provision can act as a means for justify environmentally harmful consumption while eroding social norms against such acts.

Lohmann (2008) argues that carbon offsetting convinces high emissions consumers to see their emissions simply as unavoidable instead of contributing to a consumption pattern that needs to be changed through individual and collective action. In this way it:

> "hides the roots of climate change—that is, the historical overuse and skewed use of the Earth's carbon cycling capacity by a global minority—as well as other systemic social and technical processes" (Lohmann 2008, p.363)

Hence, well-developed carbon offset markets can jeopardise public support for binding limits, carbon taxes and the introduction of cleaner technologies. Carbon offsets carry the risk of

locking-in unsustainable practices instead of contributing to the actual behavioural changes necessary to reduce carbon emissions in industrialised nations and consumer economies. The argument here is that, while carbon markets might be able to collect some 'low hanging fruits', in doing so they hinder more profound changes (Broderick 2009; Lohmann 2008). The availability of carbon offsets individualises and isolates responsibility for human induced climate change while simultaneously reducing collective psychological controls. This individualisation of responsibility also inhibits serious debate over the necessity of large scale, social ecological transformation.

Carbon offsets might even lead to behaviour that generates more emissions. Spash (2010) further illustrates this point. Evidence from the consumption of food products and enhanced safety features show that individuals are encouraged to increase their overall food consumption because they now eat 'healthy food', and take greater risks because they use better safety features. Hence, providing technical fixes as substitutes for behavioural change can produce the opposite of intended outcomes.

Commodification of carbon and crowding out

A concern related to the preceding discussion is that transforming emissions into tradable commodities might crowd out intrinsic environmental motivation and erode individual action to protect the climate. In contrast to mainstream economic understanding, several studies have shown—theoretically and empirically—how extrinsic incentives, such as pricing, can crowd out the intrinsic motivations which underlie voluntary actions (Frey and Oberholzer-Gee 1997; Frey 1997; Rode et al. 2015). A central reason for crowding out is that individuals hold a variety of motivations and values other than preference utilitarianism (Spash 2000a, 2000b, 2006). Decision-making is also recognised as a realm where non-monetary motivations play an important role, particularly concerning social dilemmas and public goods (Fehr and

Fischbacher 2002).

A major psychological process of crowding out is that external incentives are perceived as a constraint on the possibility to act autonomously. An individual's sense of responsibility and control decreases, replaced by economic rationales and self-interested behaviour (Bowles 2008; Frey and Stutzer 2012). Carpenter (2005) finds that decisions which take place in market settings erode social preferences. The anonymous and competitive setting of markets creates an atmospheres that weakens social control, to achieve collective action. This is also supported by Kerr et al. (2012) who find that in the case of a low price for buying an offset (as found in voluntary carbon markets) fewer people are likely to participate in collective actions to address the same issue.

Vatn (2005) argues that people only have well-defined preferences for a few types of familiar goods. For others, and in this case particularly environmental 'goods', preferences are often unclear and socially contingent. This means that institutional arrangements that promote autonomy, trust, and social preferences are able to crowd-in intrinsic motivations (Frey and Stutzer 2012; Frey 1997). The institutions of the market place are then aimed at promoting exactly the wrong type of values in society (Spash 2010).

On top of these concerns the extent to which Nature can be commodified without associated values being destroyed or transformed by market institutions is brought into question. In order for carbon credits to be exchanged on markets, carbon reductions need to be transformed into tradable commodities.

> "Offsets are generally commodified into saleable units through the development of specific emissions-reduction projects, the outputs of which can be quantified, owned, and traded" (Bumpus and Liverman 2008, p.134).

Page (2013, p.238) argues that the value of carbon offsets cannot be captured by a scheme based on such an economic rationale because this creates a "false commodity" that lacks the properties of "goods that can be owned, bought, and sold". Even if commodification were possible and credible, the atmosphere is not private property but fundamentally owned by either all equally or no one. In either case, transferring emissions into commodified Nature implies a misappropriation of the atmosphere (Bumpus and Liverman 2008) and a transformation of the associated values from the social to the private. So the institutional setting of private property, competition and individual choice would crowd-out the motivations found under social ownership, cooperation and collective decision-making.

Ethical dimension of carbon trading

There is only a small literature on the ethical aspects of carbon trading and the ethics of offsetting have seldom been explored in any depth. Influential contributions have been made by Goodin (1994) and Sandel (1997), who both raise objections to emissions trading as a general practice. Aldred (2012) discusses whether an idealised ETS could address the ethical objections that have been raised. More specifically, he argues against Caney (2010) who rejects ethical objections on the basis of the standard economists position (also taken by Page 2013) that in theory redesign can solve all problems.[4] The specific concern for ethical aspects of voluntary carbon trading with respect to individuals is almost absent from the literature; three exceptions are Spash (2010), Dhanda and Hartman (2011) and Hyams and Fawcett (2013).

As already noted there is a strong association in the marketing of voluntary offsets with guilt over wrong-doing. Dhanda and Hartman (2011, p.126) cite and reference a common argument concerning offsets as being that:

[4] The paper by Caney and Hepburn (2011) is a repetition of Caney (2010).

> "There is no need to change one's personal lifestyle since consumers can 'purchase forgiveness with money'. In essence, the global emissions market permits countries to trade emissions credits while the carbon credit market permits wealthy individuals or organizations to buy themselves out of responsibility to reduce emission"

The idea of buying ones way out of an ethical responsibility may be seen as objectionable, but emphasising the possibility of forgiveness through a socially approved institution has its own appeal. This appears to be a particularly Christian aspect of the marketing approach employed, where some form of repentance for sin is being coded into the purchasing practice. In a different context, Lopez et al. (2012) provide empirical support for the idea that, in a Christian country, guilt and shame are important mechanisms that strengthen long-term cooperation.

The notion of offsets being like indulgences, where a sinner could buy relief from time in purgatory with a payment to the Roman Catholic Church, was first discussed by Goodin (1994). He reviewed the practice of medieval indulgencies, arguing that these sin offsets enabled the wealthy to pay for their wrongdoing, allowing relief for their conscience, removing the need to change behaviour and avoiding the necessity for completely refraining from sinning. Medieval indulgencies substituted individual action to avoid wrong-doing with monetary transactions justifying immorality. In this way sinning was actually encouraged because wealthy people were provided with a quick alternative to lengthy penitence. Translated into "environmental indulgencies", Goodin (1994, p.579) argues that this is the sale of the unsaleable, transforming the moral duty of (Christian) stewardship for Nature into paying money to offsets sins of environmental destruction. Thus, purchasing GHG offsets permits individuals to commit a sin, justifying environmental harms and removing their moral reprehensibility. Compensating for environmental harm through monetary payments relieves people from feelings of guilt and responsibility.

However, the extent to which GHG emissions can be regarded as similar to an act of Christian 'sin' is highly questionably. Spash (2010) criticises the use of this religious perspective as relevant to the emission of GHGs. For instance, consider the range of GHG emitting acts involved that are being regarded as equally sinful, e.g. from simply lighting a fire to keep warm or stay alive to flying first class from London to New York to go shopping. There is a flaw in arguing that fundamental necessities of life that lead to GHG emissions should be regarded as a moral sin, e.g. releasing methane when relieving ones bowels. This changes the emphasis to the ethical distribution of GHG budgets and raises the question as to what emissions are necessary for 'decent' living (Rao and Baier 2012), or a meaningful/worthwhile life. A useful ethical distinction to draw here is between subsistence and luxury emissions (Shue 1993). The release of GHG emissions does not then appear morally wrong (or sinful) in and of itself. Instead, as argued by Spash (2002, 2010), a key ethical concern in the context of human induced climate change is the deliberate creation of harm of the innocent, and the creation of harm through avoidable, and unnecessary, actions. This raises the question as to what is the appropriate ethical basis for judging an act as harmfully polluting?

Hyams and Fawcett (2013, p.94) argue that carbon offsetting rests on a consequentialist ethics; that is, the claim that acts should be judged only by their consequences. In a consequentialist understanding, purchasing carbon credits to offset emissions is just the same as not emitting carbon emissions beforehand. Different acts, by different people, in different times and spaces are then made commensurable. Sandel (2012) exemplifies the problems this can entail by comparing buying carbon offsets to being allowed to toss a can of beer into the Grand Canyon when paying someone else to collect waste in the Himalayas. When considering offsetting as a general means of addressing harm, or wrong doing, it can then easily be ridiculed. For example, the website "cheatneutral.com" satirically collects money

from people who cheat on their partners (e.g. having extra marital affairs) to pay others not to cheat, thus supposedly neutralising the acts of betrayal.

In one respect these examples question what is being valued. That is the consequences are not being related to the specific act undertaken nor the specific individuals or place involved. There is a misappropriation of the consequences from the specific to the general. In philosophical terms the confusion relates to conflating the particular (*de re*) with values relating to a general function (*de dicto*), e.g. a specific can of beer in the Grand Canyon with waste in general anywhere, a specific personal act of betrayal with acts of betrayal in general by anyone. In another respect the applicability of consequentialist ethics itself is being brought into question, and so the foundation of all mainstream economic thinking. This implies that other dimensions of morality and different ethical systems become relevant, such as fairness, justice and rights (Dhanda and Hartman 2011; Hyams and Fawcett 2013). Acting virtuously would be another ethical approach and was indeed a reason why Martin Luther, and others, opposed indulgencies, i.e. buying them was divorced from the acts required of a virtuous person.

A separate ethical issue concerning GHG emissions is their distributional dimension. Shue (1999), appeals to a concept of fairness in order to claim that contributions to reducing emissions need to be made by those better-off, irrespective of whether the existing inequality is justifiable. Yet, the voluntary aspect of offsets implies the exact opposite will occur because the poorest lack the ability to pay their way out of GHG emissions while the rich can pay the poor to undertake such actions. This cost shifting exercise is indeed the basis for economic efficiency claims and why such carbon offsetting is feasible in the first place. As Hyams and Fawcett (2013, p.95) state, offsetting implies that “the rich are able to continue high rates of emissions at the expense of emissions of the poor”. Furthermore profits made and wealth

created in the development of such markets and business models go to the already rich in the global North (Broderick 2009; Bumpus and Liverman 2008). All the above intensify and solidify the social order responsible for the existing inequalities in the first place (O'Neill 2007).

The International Political Economy of Carbon Offsets

In contrast to regulated compliance markets, voluntary offset markets operate without any "reference to higher institutional levels of governance and free themselves from national boundaries or spatial constraints" (Bumpus and Liverman 2008, p.141). As a result, complex international relations can develop. Bumpus and Liverman (2008) exemplify this with the case of the company Climate Care providing funding for the conversion of cow dung to cooking gas used by local communities. A non-governmental organisation monitors the process and transfers relevant data to Climate Care, which calculates the emission reductions that are then sold to the United Kingdom Cooperative Bank. Multiple actors become engaged in management arrangements with interdependencies between partners from the Global North and South (Bumpus and Liverman 2008). In general, carbon offset projects largely take place in the global South because it is cheap to carryout projects there, while the demand for offsets as well as project developers are typically located in the global North (McKie et al. 2015). This spatial dimension to carbon offsets contains elements of unfair/unequal trade, where economically powerful actors in the North profit from carbon reductions in the South "opening the door to a new form of colonialism" (Bachram 2004, p.10).

The focus of individual offset purchases is on carbon and this leads to the neglect of other social and ecological impacts arising from projects. There are concerns over the social impacts of carbon forestry projects especially on local communities. Jindal et al. (2008) and Lyons and Westoby (2014) provide evidence from Uganda, where international investors

enabled by neoliberal policies have built large scale plantation forestry for carbon sequestration activities. Both studies report that in the course of privatisation of forest areas local communities suffered negative consequences. Local villagers were regularly charged as illegal trespassers and heavy fines were imposed on people violating the rules. Some local communities reported the destruction of burial sites. Similarly, local communities did not benefit from the carbon revenues from the Forest Rehabilitation Project in Mt. Elgon and Kibale National Parks in Uganda while being partially excluded from the parks (Lang and Byakola 2006). Bachram (2004) reports cases where local farmers and fisher folk have been evicted from their lands for large scale carbon sink projects in Uganda and Brazil.

Carbon offset projects can therefore add to an emerging 'green grabbing' problem, where land and ecosystem functions are increasingly appropriated for what are stated to be environmentally related projects, such as biofuels, biocarbon sequestration, ecotourism or GHG offsets (Fairhead et al. 2012). This involves the restructuring of authority and access rules, transforming the use and management of resources. Land is seized in the South for large scale monoculture plantations (e.g. palm oil), while the poor lose their land and rights to use formerly common property resources. Land grabbing has become a widespread problem due to the incentives provided to carbon project developers to make money (Bachram 2004; Fairhead et al. 2012; Lyons and Westoby 2014). Kollmuss et al. (2008, p.90) conclude that:

> "although carbon markets […] are intended to deliver development co-benefits for their host countries, these have not been widely realised. In practice, offset projects often rely on relatively conventional technologies, and rarely benefit poor communities with insufficient access to energy services".

Wittman and Caron (2009) in their case study on a solar electrification carbon offset project in Sri Lanka find that, although communities benefitted from the off grid solar technology, the projects produced tensions and social inequalities between communities. Such conflict arises

due to the replacement of non-monetary by monetary economies and the deliberate undermining of traditional resource management practices.

The total transformation of local ecosystems can also remove traditional practices. This is particularly so where carbon sequestration projects are focused on fast-growing trees or single species plantations. Such plantations can create substantial loss of water availability and in-stream flow as well as increasing salinisation and acidification. Plantations based on exotic species threaten local biodiversity and destroy native species e.g., removing the undergrowth that supports a range of flora and fauna (Jindal et al. 2008). Lohmann (2006a) cites cases where exotic species and mono-cultures were planted for forest carbon sequestration resulting in the loss of people's livelihoods, changing soil conditions and increasing fires and droughts. Similarly, he documents several case studies covering a range of offset projects (e.g., biomass, gas and landfill methane combustion) that expose exploitation of local communities.

Drawing on Harvey's concept of accumulation of dispossession, Bumpus and Liverman (2008) argue that offsetting emissions reductions through projects in the global South can be interpreted as a form of neo-colonial trade relations. Emission offsets are based on the transformation of former public commons to private commodities and financial assets, implying unequal exchange between companies in the global North and communities in the global South. This reinforces economic inequalities by transforming what was publicly owned (or owned by the poor or even owned by no one) to private ownership of international investors (Lyons and Westoby 2014). Twyman et al. (2015) claim that carbon trading and offsetting arise from a specifically Eurocentric relationship with Nature, although, in fact as noted earlier, the concept was developed in the USA (Lohmann 2006b), and adopted later in Europe (Spash 2010). Still the key point is the implications of commodification for the conceptualisation of Nature and the imposition of a specific set of economic relationships,

values and understandings. Local and indigenous knowledge of Nature and approaches to forest management are replaced by scientific logic and top-down corporate management (Lyons and Westoby 2014). In communities where Nature and its elements (such as carbon) are not regarded as commodities, or potential commodities, for trading, offset projects intervene in customary and traditional meanings of Nature and effectively operate to invalidate them.

Conclusions

The idea of voluntary markets for offsetting individual GHG emissions fits well within a neoliberal ideology. It emphasises the ability of individuals as consumers to change the world through their purchasing decisions. Individual responsibility for environmental harm is highlighted and a means offered to assuage the resulting guilt. In the process the need for collective action, changing behaviour, new public policies and institutional reform are all undermined.

Despite their fast growth voluntary carbon markets appear at best a dubious means for addressing human induced climate change, even if purely a supplement to government policy. Yet there appears to be a lack of critical reflection as to their operation despite a series fundamental problems. We have identified two broad sets of issues. One is the validity of carbon markets in their own terms as a means for achieving the control of GHGs to prevent human induced climate change. The other is the political economy of such markets, their role as social institutions impacting individual behaviour and embedding it within a capitalist and formal economic logic that has implications for international resource exchange and the geo-political order.

Clear quality and additionality standards for voluntary carbon offsets are missing. Existing

standards vary in scope and rigour, appear inconsistent and/or difficult to assess. There is no mandatory structure that binds offset providers to a particular standard. Purchasers of carbon offsets are unable to obtain reliable information on additionality, as well as the social and ecological integrity of carbon offsets. The average purchaser of offsets is left with a variety of providers and standards with unclear quality differences. The ideal of consumer choice as an informed decision appears highly susceptible to violation and purchasers also cannot be assumed to have the technical literacy necessary to judge the qualities of different carbon offsets. This raises the question as to why individuals buy offsets?

That the individuals targeted by offset providers are liable to be only moderately concerned environmentalists, who are preoccupied by personal image but feel guilty over their materialist lifestyles, means a further absence of scrutiny as to offset quality. Crowding-out of intrinsic motivation means the net outcome may be worse in terms of overall GHG emissions. The ethical critiques of voluntary carbon markets question their basis in consequentialist reasoning and raise the importance of fairness, justice and rights. That voluntary carbon trading also involves concerns over negative effects on indigenous and local communities in the Global South, not least through land grabbing, adds to the list of issues.

Overall the idea that markets can be independently established to address environmental problems appears totally fallacious. Rather markets are structured institutions that require social regulation like all institutions by which humans attempt to cooperate and coordinate their activities. What the problems we have presented reveal is that other institutions may actually be both more efficient and more effective as well as providing a direct means of achieving social and ecological goals. Perhaps most importantly the idea of ‘solving’ the climate crisis through unregulated markets leads to a set of value commitments being adopted in public practice as ‘normal’ which assuage psychological conflicts but do not address the

biophysical reality of climate change. Human behaviour in a price-making market comes with a set of self-justifications that appear to be the antithesis of what is necessary to achieve an informed responsibility for taking joint communal action to implement the social ecological transformation necessary to prevent human induced climate change.

References Cited

Aldred, J. (2012) 'The Ethics of Emissions Trading,' *New Political Economy*, 17(3), 37–41.

Andreoni, J. (1989) 'Giving with Impure Altruism : Applications to Charity and Ricardian Equivalence,' *Journal of Political Economy*, 97(6), 1447–1458.

Andreoni, J. (1990) 'Impure Altruism and Donations To Public Goods: a Theory of Warm-Glow Giving.,' *The Economic Journal*, 100(401), 464–477.

Ari, I. (2013) 'Voluntary emission trading potential of Turkey,' *Energy Policy*, 62, 910–919.

Bachram, H. (2004) 'Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases,' *Capitalism, Nature, Socialism*, 15(4), 5–20.

Bailey, I. (2010) 'The EU Emissions Trading Scheme,' *Wiley Interdisciplinary Reviews: Climate Change*, 1(1), 144–153.

Bayon, R., Hawn, A., Hamilton, K. (2009) *Voluntary Carbon Markets: An International Business Guide to What They Are and How They Work*, 2nd ed, Earthscan: Oxon.

Becken, S. (2004) 'How Tourists and Tourism Experts Perceive Climate Change and Carbon-offsetting Schemes,' *Journal of Sustainable Tourism*, 12(4), 332–345.

Böhm, S., Misoczky, M.C., Moog, S. (2012) 'Greening Capitalism? A Marxist Critique of Carbon Markets,' *Organization Studies*, 33(11), 1617–1638.

Boiral, O., Henri, J.-F. (2015) 'Is Sustainability Performance Comparable? A Study of GRI Reports of Mining Organizations,' *Business & Society*, à paraître.

Bowles, S. (2008) 'Policies Designed for Undermine "The Moral Sentiments": Evidence from Economic Experiments', *Science*, 320(5883), 1605–1610.

Brinded, L. (2012) 'Deutsche Bank Chiefs Under Investigation in Carbon Trading Tax Scam', *International Business Times*, http://www.ibtimes.co.uk/deutsche-bank-carbon-trading-investigation-juergen-fitschen-414318.

Brinkel, S., Antes, R. (2011) 'Voluntary Carbon Offsets – Empirical Findings of an International Survey,' in Antes, R., Hansjürgen, B., Letmathe, P. and Pickl, S. (eds.), *Emissions Trading: Institutional Design, Decision Making and Corporate Strategies*,

Springer: Heidelberg, Berlin, 243–262.

Broderick, J. (2009) 'Voluntary Carbon Offsetting for Air Travel,' in Gössling, S. and Upham, P. (eds.), *Aviation and Climate Change: Issues, Challanges and Solutions*, Earthscan: London [u.a.], 329–346.

Broome, J. (2012) *Climate Matters: Ethics in a Warming World*, Norton: New York.

Bumpus, A.G. (2011) 'The Matter of Carbon: Understanding the Materiality of tCO2e in Carbon Offsets,' *Antipode*, 43(3), 612–638.

Bumpus, A.G., Liverman, D.M. (2008) 'Accumulation by Decarbonization and the Governance of Carbon Offsets,' *Economic Geography*, 84(2), 127–155.

Burns, P., Bibbings, L. (2009) 'The end of tourism? Climate change and societal challenges,' *Twenty-first Century Society*, 4(1), 31–51.

Bushnell, J.B. (2012) 'The Economics of Carbon Offsets,' in Fullerton, D. and Wolfram, C. (eds.), *The Design and Implementation of U.S. Climate Policy*, University of Chicago Press: Chicago and London, 197 – 209.

Caney, S. (2010) 'Markets, Morality and Climate Change: What, if Anything, is Wrong with Emissions Trading?,' *New Political Economy*, 15(2), 197–224.

Caney, S., Hepburn, C. (2011) 'Carbon trading: unethical, unjust and ineffective?,' *Royal Institute of Philosophy Supplement*, (59), 201–234.

Capstick, S.B., Lewis, A. (2008) *Personal Carbon Trading: Perspectives from Psychology and Behavioural Economics*, University of Bath, Department of Psychology, Paper commissioned for the Institute for Public Policy Research.

Capstick, S.B., Lewis, A. (2010) 'Effects of personal carbon allowances on decision-making: evidence from an experimental simulation,' *Climate Policy*, 10(4), 369–384.

Carpenter, J.P. (2005) 'Endogenous Social Preferences,' *Review of Radical Political Economics*, 37(1), 63–84.

Coase, R.H. (1960) 'The Problem of Social Cost,' *The Journal of Law and Economics*, 3(1).

Coelho, R. (2012) *Green Is the Color of Money: The EU ETS Failure The EU ETS Failure as a Model for the 'Green Economy'*, Carbon Trade Watch.

Cohen, S.A., Higham, J.E.S., Cavaliere, C.T. (2011) 'Binge flying. Behavioural addiction and climate change,' *Annals of Tourism Research*, 38(3), 1070–1089.

Crocker, T.D. (1966) 'The Structuring of Atmospheric Pollution Control Systems,' in Wolozin, H. (ed.), *The Economics of Air Pollution*, WW Norton: New York, 61–68.

Dales, J.H. (1968) *Pollution, Property, and Prices*, University of Toronto Press: Toronto.

Darby, S. (2008) 'Energy feedback in buildings: improving the infrastructure for demand

reduction,' *Building Research & Information*, 36(5), 499–508.

Dhanda, K.K., Hartman, L.P. (2011) 'The Ethics of Carbon Neutrality: A Critical Examination of Voluntary Carbon Offset Providers,' *Journal of Business Ethics*, 100(1), 119–149.

Downie, C. (2007) *Carbon Offsets: Saviour or Cop-Out?*, The Austrian Institute, Research Paper No. 48.

Elsworth, R., Worthington, B., Buick, M., Craston, P. (2011) *Carbon Fat Cats 2011: The Companies Profiting from the EU Emissions Trading Scheme,* Sandbag Climate Campaign: London.

Fairhead, J., Leach, M., Scoones, I. (2012) 'Special Issue:- Green Grabbing: a new appropriation of nature?,' *The Journal of Peasant Studies*, 39(2), 237–261.

Fawcett, T., Parag, Y. (2010) 'An introduction to personal carbon trading,' *Climate Policy*, 10(4), 329–338.

Fehr, E., Fischbacher, U. (2002) 'Why Social Preferences Matter-The Impact of Non-Selfish Motives on Competition,' *The Economic Journal*, 112, 1–33.

Frey, B., Stutzer, A. (2012) 'Environmental morale and motivation,' in Lewis, A. (ed.), *The Cambridge Handbook of Psychology and Economic Behaviour*, Cambridge University Press: Cambridge, 406–428.

Frey, B.S. (1997) *Not Just for Money: An Economic Theory of Personal Motivation*, Edward Elgar: Cheltenham.

Frey, B.S., Oberholzer-Gee, F. (1997) 'The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding-Out,' *American Economic Review*, 87(4), 746–755.

Fullbrook, E. (2009) 'Carbon credits: Britain's richest man cleans up', *Real-World Economics Review Blog*, http://rwer.wordpress.com/2009/12/07/carbon-credits-britain%e2%80%99s-richest-man-cleans-up/.

Gilbertson, T., Reyes, O. (2009) Carbon Trading: How It Works and Why It Fails, *Critical Current*, No.7, November 2009, Hammerkjöld Foundation: Uppsala.

Goodin, R.E. (1994) 'Selling Environmental Indulgences,' *Kyklos*, 47, 573–596.

Gössling, S., Broderick, J., Upham, P., Ceron, J.-P., Dubois, G., Peeters, P., Strasdas, W. (2007) 'Voluntary Carbon Offsetting Schemes for Aviation: Efficiency, Credibility and Sustainable Tourism,' *Journal of Sustainable Tourism*, 15(3), 223–248.

Grubb, M., Neuhoff, K. (2006) 'Allocation and competitiveness in the EU emissions trading scheme: policy overview,' *Climate Policy*, 6(1), 7–30.

Hamrick, K., Peters-Stanley, M., Goldstein, A. (2015) *Ahead of the Curve: State of the*

Voluntary Carbon Markets 2015, Ecosystem Marketplace.

Hopwood, A.G. (2009) 'Accounting and the environment,' *Accounting, Organizations and Society*, 34(3-4), 433–439.

Hyams, K., Fawcett, T. (2013) 'The ethics of carbon offsetting,' *Wiley Interdisciplinary Reviews: Climate Change*, 4(2), 91–98.

Inman, P. (2010) 'Three Britons charged over €3m carbon-trading 'carousel fraud'', *The Guardian*, https://www.theguardian.com/business/2010/jan/11/eu-carbon-trading-carousel-fraud.

Jacobs, R. (2013) 'The forest mafia: How scammers steal millions through carbon markets', *The Altantic*, http://www.theatlantic.com/international/archive/2013/10/the-forest-mafia-how-scammers-steal-millions-through-carbon-markets/280419/.

Jindal, R., Swallow, B., Kerr, J.T. (2008) 'Forestry-based carbon sequestration project in Africa: Potential benefits and challenges,' *Natural Resources Forum*, 32, 116–130.

Kapp, K.W. (1978) *The Social Costs of Business Enterprise*, 3rd ed, Spokesman: Nottingham.

Kerr, J., Vardhan, M., Jindal, R. (2012) 'Prosocial behavior and incentives: Evidence from field experiments in rural Mexico and Tanzania,' *Ecological Economics*, 73, 220–227.

Knopf, B., Koch, N., Grosjean, G., Fuss, S., Flachsland, C., Pahle, M., Jakob, M., Edenhofer, O. (2014) *The EU ETS: Ex-Post Analysis, the Market Stability Reserve and Options for a Comprehensive Reform*, Nota di Lavoro 79.2014.

Kollmuss, A., Bowell, B. (2007) *Voluntary offsets for air-travel carbon emissions: evaluations and recommendations of voluntary offset companies*, Tufts Climate Initiative, Medford: Boston.

Kollmuss, A., Schneider, L., Zhezherin, V. (2015) *Has Joint Implementation Reduced GHG Emissions ? Lessons Learned for the Design of Carbon Market Mechanisms*, Stockholm Environment Institute, Working Paper 2015-07.

Kollmuss, A., Zink, H., Polycarp, C. (2008) *Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards*, WWF Germany.

Kotchen, M.J. (2009) 'Offsetting Green Guilt,' *Stanford Social Innovation Review*, 7(2), 26–32.

Lambe, F., Jürisoo, M., Lee, C., Johnson, O. (2015) 'Can carbon finance transform household energy markets? A review of cookstove projects and programs in Kenya,' *Energy Research and Social Science*, 5, 55–66.

Lang, C., Byakola, T. (2006) *'A Funny Place to Store Carbon': UWA-FACE Foundation's Tree Planting Project in Mount Elgon National Park, Uganda*, October, World

Rainforest Movement: Montevideo, Uruguay.

Lewis, A., Brandon, G. (1999) 'Reducing Household Energy Consumption: A Qualitative and Quantitative Field Study,' *Journal of Environmental Psychology*, *19, 7*5–85.

Lohmann, L. (2006a) 'Offsets – The fossil economy's new arena of conflict,' *Development Dialogue*, no. 48 sep, 219–328.

Lohmann, L. (2006b) ''Made in the USA': A Short History of Carbon Trading', *Development Dialogue*, no. 48 sep, 31–70.

Lohmann, L. (2008) 'Carbon Trading, Climate Justice and the Production of Ignorance: Ten examples,' *Development*, 51(3), 359–365.

Lohmann, L. (2010) 'Uncertainty Markets and Carbon Markets: Variations on Polanyian Themes,' *New Political Economy*, 15(2), 225–254.

Lohmann, L. (2012) 'Financialization, commodification and carbon: the contradictions of neoliberal climate policy,' *Socialist Register*, 48, 85–107.

Lopez, M.C., Murphy, J.J., Spraggon, J.M., Stranlund, J.K. (2012) 'Comparing the effectiveness of regulation and pro-social emotions to enhance cooperation: Experimental evidence from fishing communities in Colombia,' *Economic Inquiry*, 50(1), 131–142.

Lyons, K., Westoby, P. (2014) 'Carbon colonialism and the new land grab: Plantation forestry in Uganda and its livelihood impacts,' *Journal of Rural Studies*, 36, 13–21.

MacKenzie, D. (2009) 'Making things the same: Gases, emission rights and the politics of carbon markets,' *Accounting, Organizations and Society*, 34(3-4), 440–455.

Mair, J. (2011) 'Exploring air travellers' voluntary carbon-offsetting behaviour', *Journal of Sustainable Tourism*, 19(2), 215–230.

Martin, R., Muûls, M., Wagner, U. (2014) *The Impact of the EU ETS on Regulated Firms: What Is the Evidence after Eight Years, http://ub-madoc.bib.uni-mannheim.de/40180/1/Martin-Muu%CC%82ls-Wagner-Final.pdf*

McDonald, S., Oates, C.J., Thyne, M., Timmis, A.J., Carlile, C. (2015) 'Flying in the face of environmental concern: why green consumers continue to fly,' *Journal of Marketing Management*, 31(13-14), 1503–1528.

McKie, R.E., Stretesky, P.B., Long, M.A. (2015) 'Carbon Crime in the Voluntary Market: An Exploration of Modernization Themes Among a Sample of Criminal and Non-criminal Organizations,' *Critical Criminology*, 23(4), 473–486.

McLennan, C., Becken, S., Battye, R., So, K.K.F. (2014) 'Voluntary carbon offsetting: Who does it?,' *Tourism Management*, 45, 194–198.

Meckling, J. (2014) 'The future of emissions trading,' *Wiley Interdisciplinary Reviews: Climate Change*, 5(5), 569–576.

Murray, J., Dey, C. (2009) 'The carbon neutral free for all,' *International Journal of Greenhouse Gas Control*, 3(2), 237–248.

O'Neill, J. (2007) *Markets, Deliberation and Environment*, Routledge: London and New York.

Page, E.A. (2013) 'The Ethics of Emissions Trading,' *Wiley Interdisciplinary Reviews: Climate Change*, 4, 233–243.

Parag, Y., Fawcett, T. (2014) 'Personal carbon trading: a review of research evidence and real-world experience of a radical idea,' *Energy and Emission Control Technologies*, (2), 23–32.

Pearse, R., Böhm, S. (2014) 'Ten reasons why carbon markets will not bring about radical emissions reduction,' *Carbon Management*, 5(4), 325–337.

Perdan, S., Azapagic, A. (2011) 'Carbon trading: Current schemes and future developments,' *Energy Policy*, 39(10), 6040–6054.

Peters-Stanley, M., Yin, D. (2013) *Maneuvering the Mosaic: State of the Voluntary Carbon Markets 2013*, A Report by Forest Trends' Ecosystem Marketplace & Bloomberg New Energy Finance.

Rao, N and Baer, P. (2012) '"Decent living" emissions: A conceptual framework' Sustainability 4, 656-681.

Rode, J., Gómez-Baggethun, E., Krause, T. (2015) 'Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence,' *Ecological Economics*, 117, 270–282.

Roy, S., Woerdman, E. (2012) *End-User Emissions Trading: What, Why, How and When?*, University of Groningen Faculty of Law Research Paper Series No. 02/2012.

Rydge, J. (2015) *Implementing Effective Carbon Pricing. Contributing Paper for Seizing the Global Opportunity: Partnerships for Better Growth and a Better Climate*, New Climate Economy Working Paper Series.

Sandel, M.J. (1997) 'It's Immoral to Buy the Right to Pollute', editorial article from the *New York Times*, December, 15, 1997, 29.

Sandel, M.J. (2012) *What Money Can't Buy: The Moral Limits of Markets*, Macmillan.

Schiermeier, Q. (2006) 'Climate credits,' *Nature*, 444, 976–977.

Seager, A. (2009) 'European taxpayers lose €5bn in carbon trading fraud', *The Guardian*, https://www.theguardian.com/business/2009/dec/14/eu-carbon-trading-fraud.

Shue, H. (1993), 'Subsistence Emissions and Luxury Emissions,' *Law and Policy*, 15 (1), 39–59.

Shue, H. (1999) 'Global environment and international inequality,' *International Affairs*, 75(3), 531–545.

Spaargaren, G., Mol, A.P.J. (2013) 'Carbon flows, carbon markets, and low-carbon lifestyles: reflecting on the role of markets in climate governance,' *Environmental Politics*, 22(1), 174–193.

Spash, C.L. (2000a) 'Ethical motives and charitable contributions in contingent valuation: Empirical evidence from social psychology and economics,' *Environmental Values*, 9(4), 453–479.

Spash, C.L. (2000b) 'Multiple value expression in contingent valuation: Economics and ethics,' *Environmental Science and Technology*, 34(8), 1433–1438.

Spash, C.L. (2002) *Greenhouse Economics: Value and Ethics*, Routledge: London.

Spash, C.L. (2006) 'Non-Economic Motivation for Contingent Values : Rights and Attitudinal Beliefs in the Willingness To Pay for Environmental Improvements,' *Land Economics*, 82(4), 602–622.

Spash, C.L. (2010) 'The Brave New World of Carbon Trading,' *New Political Economy*, 15(2), 169–195.

Spash, C.L. (2015a) 'The politics of researching carbon trading in Australia,' in Stephan, B. and Lane, R. (eds.), *The Politics of Carbon Markets*, Routledge: London and New York, 191–211.

Spash, C.L. (2015b) 'Bulldozing biodiversity: The economics of offsets and trading-in Nature,' *Biological Conservation*, 192, 541–551.

Spash, C.L. (2016) 'The political economy of the Paris Agreement on human induced climate change: a brief guide,' *Real World Economics Review*, 75, 67–75.

Spiekermann, K. (2014) 'Buying low, flying high: Carbon offsets and partial compliance,' *Political Studies*, 62(4), 913–929.

Starkey, R. (2012a) 'Personal carbon trading: A critical survey Part 1: Equity,' *Ecological Economics*, 73, 7–18.

Starkey, R. (2012b) 'Personal carbon trading: A critical survey Part 2: Efficiency and effectiveness,' *Ecological Economics*, 73, 19–28.

Sterk, W., Bunse, M. (2004) *Voluntary Compensation of Greenhouse Gas Emissions*, Wuppertal Institute Policy Paper No. 3/2004.

Taiyad, N. (2005) *The Market for Voluntary Carbon Offsets: A New Tool for Sustainable*

Development?, Gatekeeper Series 121.

Talbot, D., Boiral, O. (2013) 'Can we trust corporates GHG inventories? An investigation among Canada's large final emitters,' *Energy Policy*, 63, 1075–1085.

Twyman, C., Smith, T.A., Arnall, A. (2015) 'What is carbon? Conceptualising carbon and capabilities in the context of community sequestration projects in the global South,' *Wiley Interdisciplinary Reviews: Climate Change*, 6(6), 627–641.

United Nations (1992) *United Nations Framework Convention on Climate Change*, Fccc/Informal/84.

Vatn, A. (2005) 'Rationality, institutions and environmental policy,' *Ecological Economics*, 55(2), 203–217.

Wara, M.W., Victor, D.G. (2008) 'A Realistic Policy on International Carbon Offsets,' *Program on Energy and Sustainable Development Working Paper*, 74(April), i–24.

Wettestad, J. (2005) 'The Making of the 2003 EU Emissions Trading Directive: An Ultra-Quick Process due to Entrepreneurial Proficiency?,' *Global Environmental Politics*, 5(1), 1–23.

Wittman, H.K., Caron, C. (2009) 'Carbon Offsets and Inequality: Social Costs and Co-Benefits in Guatemala and Sri Lanka,' *Society & Natural Resources*, 22(8), 710–726.

World Bank Group, Ecofys (2015) *State and Trends of Carbon Pricing*, World Bank: Washington, DC.

World Bank Group, Ecofys (2016) *Carbon Pricing Watch 2016*, World Bank: Washington, DC.

Multilevel Governance and Development
Wirtschaftsuniversität Wien
Institutsvorstand : ao.Univ.Prof. Dr. Andreas Novy
Welthandelsplatz 1
A-1020 Wien, Austria
Tel.: +43-1-31336/4777 Fax: +43-1-31336/705 E-Mail: mlgd@wu.ac.at
http://www.wu.ac.at/mlgd