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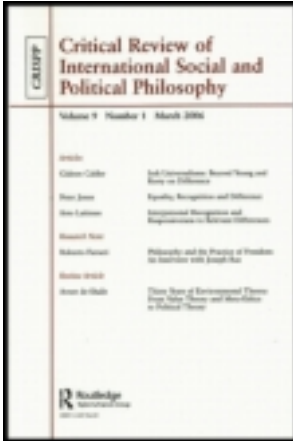
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### Cashing in on climate change: political theory and global emissions trading

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## **Cashing in on climate change: political theory and global emissions trading**

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Global climate change raises profound questions for social and political theorists. The human impacts of climate change are sufficiently broad, and generally adverse, to threaten the rights and freedoms of existing and future members of all countries. These impacts will also exacerbate inequalities between rich and poor countries despite the limited role of the latter in their origins. Responding to these impacts will require the implementation of environmental and social policies that are both environmentally effective and consistent with the equality and liberty of populations to which they are applied. This article considers whether global emissions trading, namely, the creation of a global market for tradable allowances conferring the right to emit a certain amount of greenhouse gas over a specified time period, is normatively defensible from a liberal egalitarian perspective. After a brief review of the theory and practice of emissions trading, a number of normative objections to the international trade in emissions allowances are analysed. These objections appeal to one, or a combination, of two claims. First, emissions trading schemes are likely to produce undesirable outcomes, such as environmental neglect, in the further future. I call these 'instrumental objections'. Second, emissions trading schemes violate non-consequential norms of justice and fairness. I call these 'intrinsic objections'. It is argued that, when combined, instrumental and intrinsic objections indicate that instituting a global network of emissions trading schemes, as envisioned by a number of parties to the Kyoto Protocol and Copenhagen Accord, would be illegitimate in absence of significant procedural and consequential safeguards.

**Keywords:** global climate change; consequentialism and non-consequentialism; environmental policy; emissions trading; environmental responsibility; commodification

### **Introduction**

Global climate change poses enormous challenges in terms of its likely impact on the well-being of existing and future generations. While some regions may escape dangerous climatic impacts – and others may even benefit from rises in temperature and sea level if they occur gradually – it is now evident that

the aggregate impacts of climate change will be adverse (Intergovernmental Panel on Climate Change (IPCC) 2007, pp. 17–18). It is also evident that developing countries and their citizens will be most severely affected (Stern 2007, pp. 65–103, United Nations (UN) 2007, pp. 1–10). Within this context, a consensus has emerged in support of a global climate policy response that will prevent the most serious climate impacts that are still avoidable (mitigation) and limit the human costs associated with climate impacts that are no longer avoidable (adaptation).

The objective of climate mitigation policy, which is the focus of this article, is to stabilize and later reduce atmospheric stocks of greenhouse gas in order to prevent dangerous climate change. Although there is no simple method for establishing the emissions pathway required to avoid dangerous climate change, an increasingly popular approach is to identify the danger threshold as a state of affairs where the combined stock of the six main greenhouse gases in the atmosphere exceeds 500 parts per million (ppm) of carbon dioxide equivalent ( $\text{CO}_2^e$ ) in the atmosphere (Hepburn and Stern 2008, pp. 263–265, UK Committee on Climate Change (UKCCC) 2008, pp. 9–12).<sup>1</sup>

Existing international climate mitigation policy is dominated by the 1997 Kyoto Protocol to the United Nations (UN) and, more recently, the 2009 Copenhagen Accord (United Nations 1997, 2009). The Kyoto Protocol, which came into force in 2005, requires 38 developed countries to reduce their annual emissions of greenhouse gases by an average of 5% by the end of 2012. To meet this objective, the Protocol harnesses a combination of legally binding emissions targets, voluntary measures, technology and financial transfers to developing countries, and market-based ('flexible') mechanisms. In this regard, the Protocol's 'Emissions Trading Mechanism' (ETM) was a particularly important step forward in climate policy in that it introduced trading of emission allowances (AAUs) amongst countries with emissions reductions liabilities under the Protocol in order to reduce their compliance costs. The Copenhagen Accord, although it settled few questions regarding the nature and scope of the Post-Kyoto international policy response, stated that signatories to the agreement would 'pursue various approaches, including opportunities to use markets, to enhance the cost effectiveness of, and to promote, mitigation actions' (United Nations 2009, p. 2). By January 2010, emissions trading schemes were planned, or already in operation, in more than 35 countries with existing schemes overseeing the trade of 8.3 billion tonnes of  $\text{CO}_2^e$  worth €94 billion (*Point Carbon* 2010, pp. 3–4).

Despite widespread enthusiasm for emissions trading amongst policy-makers and economists operating in developed countries, proponents admit that emissions trading will only secure real, and cost effective, mitigation when the underlying regulatory framework is robust not only in terms of specifying an ambitious global mitigation but also in terms of subjecting users to tough penalties for non-compliance. In particular, the status of the

'global emissions cap' set by regulators is critical since the reduction in annual flows, and later stocks, of greenhouse gases delivered will reflect the number of allowances fed into the emissions trading markets. Unfortunately, the current global climate architecture, is limited both in terms of ambitiousness and enforcement. First, the scope of the Protocol is too narrow since, despite its ratification by more than 180 countries, it exempts *all* developing countries, and a significant number of developed countries, from binding emissions reductions. Second, while some major developed countries (such as the United States) remain legally unbound by the Protocol's mitigation mechanism, other developed countries (such as Canada) have indicated that they may simply refuse to comply with any legal penalties arising from violations of their mitigation obligations.<sup>2</sup> Third, because of its modest objectives and short duration, the Kyoto Protocol will achieve very small cuts in annual global flows, and almost certainly will not result in any reduction in global stocks, of greenhouse gases even if it secures full compliance amongst contracting Parties.

The above problems indicate that the existing international climate framework needs to be strengthened, and its participatory base widened, if stocks of CO<sub>2</sub><sup>e</sup> are not to surpass the 500 ppm danger threshold. On the assumption that the construction of a global emissions trading market remains at the heart of the international climate policy response, the question arises whether such a market is defensible from the ethical point of view. Ethical justifications, or condemnations, of emissions trading can be framed in terms of one, or in some cases a blend, of two approaches familiar to liberal egalitarians and their critics (Sheffler 1994, pp. 2–13, Banuri *et al.* 1996, pp. 85–86). Instrumental (or consequentialist) arguments evaluate environmental policies according to the goodness or badness of the outcomes they tend to produce. Liberals are motivated by instrumental reasoning when they support government intervention in order to promote economic stability, reduce income inequality, or create jobs for the sake of their welfare benefits (Dworkin 1985, pp. 181–204). By contrast, liberals and their critics are motivated by intrinsic (or non-consequentialist) reasoning when their normative evaluations of environmental policies are framed in terms of the way in which these policies were constructed, or express norms of equality, freedom, responsibility, or fairness in their operation (Sheffler 1994, p. 2, Dworkin 1985, pp. 187ff.).

The distinction between intrinsic and instrumental evaluation is in practice a subtle one and the balance between the two approaches, and their appropriate scope, are hotly contested by liberals and their critics. Nevertheless, the distinction provides a useful method for separating ethical objections to environmental policies into different categories for further analysis. In what follows, I aim to bring to the surface just some of the instrumental and intrinsic objections to emissions trading that have been poorly developed in the hitherto limited exchanges between proponents and opponents of emissions trading. The analysis reveals a surprising set of links to political

theoretical controversies concerning the ethical limits of market exchange; the relationship between incentives and moral motivations; and the notion of social responsibility. It also brings into focus some areas where emissions trading schemes might be modified in to make them more legitimate to atmospheric users.

In the next section, I briefly outline the theory and practice of emissions trading. I then explore, in the following three sections, three objections to emissions trading schemes over and above concerns pertaining to economic efficiency of emissions markets or their vulnerability to policy failure as a result of flawed implementation or construction. The three objections arise from the way in which emissions trading schemes (1) necessarily violate, or are likely to erode in the future, norms of responsibility; (2) commodify the atmosphere in an illegitimate and socially counter-productive manner; or (3) erode the environmental morale of agents residing in communities where these schemes are applied with adverse consequences for the management of environmental problems in the further future.

### **Global emissions trading in theory and practice**

Emissions trading schemes introduce markets in tradable allowances that authorize bearers to emit a certain amount of CO<sub>2</sub><sup>e</sup> over a certain period. 'Cap-and-trade' schemes have four main components. First, a global emissions ceiling is determined representing the total stock of greenhouse gas the earth's atmosphere can withstand without triggering dangerous climate change. This is largely a natural scientific enterprise, although one which also involves normative elements such as the interpretation of the amount of climate change that would be 'dangerous' for human life (Schneider and Lane 2007, p. 7). Second, each of the scheme's participants (who could be countries, firms or individuals) are granted an authorization, or permit, to emit greenhouse gases in their daily activities over a specified time period. Third, a fixed number of authorized emissions allowances are distributed in each year of the scheme amongst the participants that must be surrendered annually for every tonne of CO<sub>2</sub><sup>e</sup> they emit. The quantity of allowances in the scheme is then reduced over successive commitment periods to reflect progressively deeper cuts in the flows of greenhouse gases required to protect the initial emissions ceiling which is calculated in terms of global stocks of CO<sub>2</sub><sup>e</sup>. Fourth, the participants are encouraged to buy and sell emissions allowances on the global emissions markets in order to balance their greenhouse emissions budgets at least cost. Non-compliers are subject to legal sanctions such as cash penalties or reduced emissions budgets in subsequent commitment periods.

The main advantage of emissions trading over rival climate policies is that it enables a price to be set for each tonne of CO<sub>2</sub><sup>e</sup> released into the atmosphere through free market exchange. This renders more explicit than rival

policy interventions the opportunity costs of activities that emit CO<sub>2</sub><sup>e</sup>. Emissions trading schemes do not, however, introduce an unconstrained set of property rights over the atmosphere allowing users to pollute the atmosphere at will, as some critics (Sandel 2005, p. 93, Frey 1997, p. 62) have claimed. Rather, such schemes distribute amongst selected atmospheric users a limited authorization (or ‘permit right’) to emit a certain amount of CO<sub>2</sub><sup>e</sup> in a given year. The users do not *own* a slice of the atmosphere in proportion to the number of authorizations they have in their possession, but rather obtain a permission from regulators to use a certain amount of the atmospheric sink according to their holdings of emissions allowances. When users possess fewer of these allowances than is required to cover their emissions in any given year, they effectively pay a fee to other participants for the right to use the atmospheric sink to the desired level. In this sense, the rights created are ‘rights of access’, not ‘rights of property’, and therefore subject to additional regulatory control, suspension or withdrawal (Tietenberg 2005, p. 181, McCann 1996, pp. 88–90).

In theory, by creating a market for a new class of fungible assets with a clear instrumental value for atmospheric users covered by the scheme, emissions trading removes the risk of emissions overshoots associated with emissions taxes (which set a price for each tonne of emitted CO<sub>2</sub><sup>e</sup> in isolation of a global emissions ceiling) and avoids the informational and bureaucratic costs to regulators of imposing strict emissions limits, or mandating strict efficiency standards, on particular users or industries. Instead, a smoothly functioning market will involve emissions allowances flowing as required to their highest valued use thereby guaranteeing emissions reductions take place where they are least costly to implement (Tietenberg 2006, pp. 40–46).

It is worth noting that the two main international experiments in atmospheric emissions trading, Kyoto’s ETM and the European Union Emissions Trading Scheme (EU ETS), have thrown up a number of problems with the idealized account of emissions trading markets outlined above. The first concerns the price of the allowances distributed to scheme participants. Until a major policy shift in 2008, EU ETS regulators permitted individual member states to allocate over 90% of emissions allowances to participants *without charge* (Metcalf 2009, pp. 19–20). In conjunction with the decision to establish the level of allocation for each participant in terms of their emissions before the onset of the scheme – the ‘grandfathering principle’ – free allocation meant that regulators lost the opportunity of generating funds for additional mitigation or adaptation measures by more systematic use of allowance auctions. It also meant that large firms (EU ETS) or individual countries (ETM) evaded any tangible penalty for the atmospheric changes they caused prior to the ‘base-year’ of 1990 adopted by both schemes. Finally, it created the conditions, which were readily exploited, for large firms to pass on the notional cost of emissions allowances they received free-of-charge to consumers in the form of higher prices. According to one study, power



companies in the Netherlands, Belgium, France and Germany collectively achieved additional revenues of €5.3 billion to €7.7 billion in the first year of the scheme by acting in this manner (Sijm *et al.* 2006, pp. 62–63).

Second, the first phase of the EU ETS (2005–2008) was characterized by *excess permit allocation*. National regulators, wary of the phenomenon of ‘carbon leakage’ where firms operating in countries outside of the EU have a competitive advantage over firms with EU ETS responsibilities, protected strategic industries by allocating more emissions allowances amongst firms in their jurisdictions than would realistically be required to cover their projected emissions. The result was that, for these firms, there was little urgency to reduce greenhouse emissions in their daily operations. Firms in several EU countries subsequently took advantage of their emissions allowance surplus by selling them to firms in sectors not subject to over-allocation, thereby enjoying a second tranche of windfall profits. In fact, total emissions were higher than total allowance allocations in only five countries in 2005 (Ellerman and Buchner 2007, p. 79). There are clear parallels here with the ETM in that several Economies in Transition, such as Russia and Ukraine, are expected to earn billions of Euros from selling AAUs to other countries before the scheme ends in 2012. Economies in Transition (EITs) have surfeit allowances because their allocation under the Protocol was modelled on emissions levels prior to the collapse in economic activity in these states after 1991.

Third, participants in the EU ETS have reported difficulties in planning for peaks and troughs in the price of emissions allowances. Such *price volatility* has plagued the scheme since its inception in 2005, with the price of European Union Allowances (EUAs) varying wildly in the first two years of the scheme (Betz and Sato 2006, pp. 352–353). There are three key mechanisms at work here. Public confirmation of the over-allocation of allowances by several EU countries, as explained above, not only led to windfall profits for some firms but also to a major collapse in the price of EUAs in April/May 2006 from €31 to €11 (*Point Carbon* 2006, pp. 2–3). Next, the lack of a facility to retain EUAs for use in later phases of the EU ETS led to the spot price for EUAs being just € 0.03 at the end of first phase of the scheme in December 2007. Finally, general uncertainties concerning the future of climate policy, shocks to the wider economy and lack of coordination in the publication of national emissions data have prompted continuing volatility in the price of EUAs in the second phase of the EU ETS (2008–2012). EUAs for December 2009 delivery, for example, achieved a high and low value of €27 and €13 during 2008 before a selling spree by industrial firms at the height of the economic slowdown led prices to drop to €8.20 on 12 February 2009 (*Point Carbon* 2009a, pp. 1–2).

Emissions trading schemes that have one or more of these defects are wide open to the charge of injustice on a wide variety of consequentialist and non-consequentialist grounds. They are likely to subvert public confidence in the international climate response and delay the investment decisions

necessary lowest cost mitigation. However, in what follows I assume that it is at least possible to implement a global emissions scheme that (1) auctions all future allowances and strictly determines the number of allowances auctioned according to the objective of preventing dangerous climate change in order to avoid the excess allowance and windfall problems; (2) adopts some form of central CO<sub>2</sub><sup>e</sup> allowance banking facility that can intervene in the market to prevent huge price fluctuations, such as price crashes or spikes; and (3) involves some procedural safeguards to prevent powerful signatory countries from subverting the structure of the market for their own ends (for example, by allowance hoarding). Such assumptions may take us further from the reality of existing schemes, and also from the likely shape of the post-2012 climate agreement, but they enable us to interrogate the deepest intrinsic and instrumental objections that might be made of emissions trading.

### Evading greenhouse responsibilities

As we have seen, emissions trading schemes distribute annual allowances representing the share of the atmospheric sink that each user may exploit if the international community as a whole is to prevent dangerous climate change. When emissions trading participants are each assigned a unique emissions budget and equivalent number of tradable emissions allowances free of charge, as in the Kyoto ETM, allowances will flow from those who require fewer allowances than they hold at present to balance their budgets to those who require more allowances to do so. We can call this a ‘cap-differentiated’ emissions trading scheme. As an example of how this works, over 500 million allowances have changed hands hitherto amongst countries with emissions targets under the Kyoto Protocol, most of which being sold by Economies in Transition and bought by countries such as Japan and Spain on course to overshoot their budgets (*Point Carbon* 2009b, p. 4). The guiding philosophy of such trades is that, although the heaviest emitters should take the lead in mitigating climate change, this does not mean that they need reduce emissions within their own territories if there are other more cost effective ways for the collective emissions budget to be balanced. Hepburn and Stern (2008, p. 266) provide a typical statement of this instrumental approach to the normative evaluation of climate mitigation policy:

it is generally agreed that richer countries should take responsibility for greater reductions. [...] Taking responsibility implies paying for the emission reductions – it is less relevant whether the emission reductions occur within a particular national territory.

The question arises, however, whether it is ethically defensible to introduce, though emissions trading schemes, the opportunity for users to profit from climate change without exhibiting the behavioural or attitudinal changes

that are necessary for its successful long-term management. Although the emissions trading literature has tended to assume that this form of policy intervention should be judged exclusively on efficiency grounds, it is vulnerable to two responsibility-based objections. At the core of both is the thought that emissions trading schemes fail to treat all atmospheric users with equal dignity and respect.

First, it is argued that emissions trading schemes undermine the duty of agents to make strenuous efforts to avoid damaging the environment. Allowing users to evade their responsibilities by purchasing allowances is not only incompatible with them being treated as autonomous agents who should accept, rather than finesse, the full range of their social and environmental responsibilities. It also encourages users to treat each other as mere instruments in their fulfilment of environmental duties.

Second, emissions trading is vulnerable to the objection that at least some types of agent, typically those located in the developing world, should not be placed in a situation where they are financially incentivized into reducing their emissions in order to cover the increasing or non-diminishing emissions of other agents. The former might usefully be called 'greenhouse undershooters', that is, agents whose past, present and projected future emissions could be universalized amongst similar types of agent without prompting the onset of dangerous climate change. In a fully *global* emissions scheme, many greenhouse undershooters will face a situation where they could not reasonably resist selling allowances under their control (whether acquired freely or through some other means) to 'greenhouse overshooters' whose emissions histories and pathways could not possibly be universalized without prompting the onset of dangerous climate change. The problem is that undershooters located in developing countries will in many cases be deprived of the realistic option of resisting such trades due to their poverty even if they would prefer to emit more CO<sub>2</sub> or retire the allowances in their possession as a protest against the greenhouse profligacy of richer agents.

While critics in the developing world have appealed to both of these lines of thought in opposing the spread of emissions trading (Grubb *et al.* 1999, pp. 94–96), the responsibility objection in general terms has achieved limited treatment by political theorists. Michael Sandel (Sandel 2005, p. 94) captures the essence of the first objection when he argues that the inequity of emissions trading lies in the fact it replaces what should appropriately be an atmospheric *fine* with an atmospheric *fee* thereby removing the moral stigma normally associated with antisocial behaviour or the option of 'the community conveying its judgment that the polluter has done something wrong' (Sandel 2005, pp. 94–95). The example Sandel (2005, p. 94) gives to clarify the point is the following:

Suppose there were a \$100 fine for throwing a beer into the Grand Canyon, and a wealthy hitch hiker decided to pay \$100 for the convenience. Would there be

nothing wrong in his treating the fine as if it were simply an expensive dumping charge?

The idea, applied at the global level, is that agents should not be permitted to use their superior wealth to buy their way out of their obligation to treat the atmosphere with respect.

Robert Goodin, meanwhile, emphasizes the undesirable states of mind associated with allowing users to buy their way out of the duty not to despoil the environment (Goodin 1998, pp. 243–246). In allowing users to purchase emissions to ‘right the wrong’ of exceeding their fair share of the atmospheric sink, emissions trading creates temptation on the part of users to avoid, or at least delay, making their own sacrifices. This, for Goodin, is not only a violation of environmental responsibility. It also poses a significant barrier to the necessary structural change in the economies of developed and developing countries to make them less carbon dependent. Goodin’s thought is that emissions trading schemes communicate entirely the wrong message to heavy emitters who are encouraged to balance their emissions budgets through allowance purchase while avoiding any sort of moral censure or punishment for their overshoots. It is not just that buying emissions allowances can secure for an agent’s environmental transgressions, but that the logic of emissions trading is that participants who surrender allowances in line with their emissions have done nothing wrong to warrant forgiveness regardless of the size of their environmental footprint.

I return to the claim that the trading of environmental indulgences, such as emissions overshoots, should be prohibited because they are inappropriate objects of market transaction in the next section. But what should we make of objections focused on agential responsibility? First, it might be charged that Sandel, and to a certain extent Goodin, fetishizes the importance of agential responsibility in the sense that, even if emission trading schemes in some abstract sense undermine duties to behave responsibly or involve the treatment of other atmospheric users merely as means, this seems to be a price worth paying if the result is a more efficient response to climate change.

Second, an obvious counter response is that the agents covered by the scheme will still be forced to change their environmental behaviour beyond participating in the emissions allowance markets, so environmental responsibility is not completely undermined by emissions trading. There are two reasons for this. One is that these schemes are not designed to apply to all areas of human life so even if developed country users meet a substantial slice of their emissions obligations through trading over the coming decades, they will still have to undertake mitigation in exempted sectors. A more powerful response is that even a comprehensive trading scheme would not enable wealthy users to trade their way out of domestic mitigation activities since the price of emissions allowances will result in large overshoots becoming

literally unaffordable to offset as the number of allowances in the system is gradually reduced (Sagoff 1999, p. 315).

Third, we might question the relevance of the fee/fine distinction when applied to greenhouse emitting activities as opposed to other more localized instances of environmental pollution. Whereas discrete acts of pollution such as littering are appropriately viewed as unacceptable (and worthy of a fine) in every instance, drawing the line between acceptable and unacceptable greenhouse emissions activities is far more problematic. This is because at least some emissions activities are necessary for sustaining human life and others service a broad range of human values beyond subsistence. So the greenhouse and litter cases are dissimilar in the sense that in the former we seek an *optimal* level of pollution while in the latter we seek to *minimize* pollution on the grounds that any despoiling act, however small, constitutes an environmental wrong (Sagoff 1999, pp. 313–314, Goodin 1998, pp. 238–239). It would be absurd, then, to fine or morally stigmatize every human act that involved emitting greenhouse gas in the atmosphere. In a nutshell, we should reject the claim that overshooters do anything wrong, or use more than their fair share, in isolation of the activities of other agents.

When viewed next to its limitations, the environmental responsibility objection, though troubling, is hardly decisive. A precautionary step for theorists motivated by non-consequentialist and consequentialist convictions would be to support only those schemes that set a very demanding global cap and incorporate trading restrictions to prevent excessive vicarious mitigation or inadvertent breaches in atmospheric responsibility. In addition, clear signals could be sent to all atmospheric users about the moral wrongness of exceeding their fair share of the atmospheric sink regardless of their legal opportunities to offset through the market. This reflects the thought that each additional tonne of CO<sub>2</sub><sup>e</sup> emitted over a user's per capita, or alternatively generated, fair share of the atmospheric sink will result in an overshoot of the global ceiling if no other agent in the system steps in to reduce their emissions below the level to which they are entitled. As such, it is a form of exploitation of others even if subsequent activity on the emissions market separates it from a pure form of environmental pollution. Above all, atmospheric users should be reminded of their general duty to support activities to reduce global emissions that take place beyond the 'cap-and-trade' system and which are necessary for the survival of basic social institutions.

### **Wrongful commodification of the atmosphere**

Is there something ethically dubious about in trading emissions allowances over and above the way it enables users to finesse their responsibility to balance their emissions budgets through direct action? One objection that focuses on the objectionable qualities of the thing being traded, rather than the agents involved in the scheme, is that emissions trading inappropriately

commodifies the atmosphere. According to the useful definition proposed by Eric Mack, an object or activity is commodified when 'its value is perceived to be determined by what that object, or performance of that activity [...] will bring through impersonal exchange' (Mack 1989, p. 199, Radin 1996, p. xi). Following this definition, emissions trading appears to commodify the atmosphere by introducing a market in tradable emissions allowances each representing a similarly sized package of the atmospheric sink such that agents are encouraged to perceive the value of the atmospheric sink in terms of the price that each allowance can achieve on the open market. Purchasing an emissions allowance, that is, creates the impression amongst users that 'licenses to pollute' can now be acquired that were not available prior to the introduction of the scheme (Frey 1992, p. 408, Goodin 1998, p. 240, Lohmann 2006, pp. 77–80).

As we saw above, the right (license) to pollute charge is a little misleading in that the innovation of emissions trading is not to divide the atmosphere into tradable shares over which the owners have full property rights, but rather to introduce a set of usufructuary rights to make use of pre-specified parcels of the atmospheric sink on the basis that the underlying ownership of the atmosphere (whether it be unowned or commonly owned) remain unmodified. The owners of emissions allowances have an unrestricted claim to any increase in value of the allowances in their possession but their ownership rights do not extend to the physical systems underpinning the market. Putting aside some of the deeper questions concerning the precise nature of the commodification involved, which itself will depend on the structure of each emission scheme, the commodification objection to the introduction of rights of usage over the atmosphere can be framed in two ways.

(1) it could be claimed that commodifying the atmosphere will be destructive to human well-being in the future by gradually eroding the distinction valuing beings rely upon between safe commodities (where an instrumental attitude is appropriate) and dangerous commodities (where an instrumental attitude is inappropriate). The idea here is that emissions trading is an instance of a much wider set of market practices that are unethical in the way they tend, in the longer term, to damage mental health, erode environmental concern, or jeopardize social solidarity. I return to this line of argument in the next section.

(2) Commodifying the atmosphere could be deemed unethical because of the way in which it expresses an inherently faulty understanding of the relationship between environmental and market valuation. In this version of the objection, emissions allowances are held to be false commodities in the sense that they do not fulfil all of the criteria to be recognized as a legitimate focus of market activity. Emissions trading is, here, no more justifiable than markets in human organs, infants or civic duties which possess qualities that render them 'market inalienable' in the sense that they should under no circumstances be bought, sold or gifted.<sup>3</sup>

Perhaps the most obvious way to develop the atmospheric version of the 'market inalienability' argument is to show that allowances of the type created by emissions trading schemes lack one or more of the formal properties that differentiate commodities from other sorts of goods or entities. The claim here is that emissions allowances lack at least one of four key properties shared by all legitimate commodities.<sup>4</sup> The first, and unifying, property of legitimate commodities, *objectification*, applies when the item in question can reasonably be viewed as merely a thing, or object, possessing only instrumental value to its owner. Possessing the status of an object, rather than a subject, would require that an emissions allowance can be manipulated (e.g. sold, gifted or retired) according to the will of its owner.

The second property, *fungibility*, obtains when an item can be replaced with another item without affecting its value to the holder. The issue here essentially is the replaceability amongst tokens of a particular type of commodity and further the free convertibility of tokens of one type of commodity into another. Unlike persons or other entities that should be viewed as unique, it is a matter of indifference to their owners whether they hold one commodity or another so long as they perform a desired function or can be traded with other commodities that perform this function. Commodities, that is, are to all intents and purposes mutually exchangeable with no modification of use or benefits conferred. In the context of emissions trading, fungibility follows from the fact that each token of a given allowance type, so long as they are properly accredited and in vintage, are treated by the markets as identical. This reflects that fact that it is essentially irrelevant for firms or regulators which particular allowance tokens are surrendered so long as the rules of the particular scheme are followed since each allowance represents 1 tonne of CO<sub>2</sub>-equivalent (1 tCO<sub>2</sub><sup>e</sup>) released into the atmosphere. To illustrate, over the course of 2008, EU ETS regulators issued 1.99 billion of the scheme's proprietary emissions allowances (EUAs) which were later surrendered by participants (and in addition a further 82 million allowances issued through the Kyoto flexibility mechanisms were also surrendered in this year) (European Commission 2009). While the fungibility of emissions allowances is not a simple matter of equivalence (each type of allowance fulfils an overlapping, but as yet non-identical, range of functions; and some allowances are graded differently depending on their origins) each type of allowance is nonetheless designed to be fully tradable both bilaterally and through international climate exchanges.

The third property, *commensurability*, means that the value of a commodity to actual and potential holders can be compared with other commodities on a common scale, whether cardinal or ordinal. The idea is that, to be bone fide commodities, emissions allowances must be able to be compared with other goods of value to the transactors. The property of commensurability, then, is a matter of comparing the exchange value of allowances within each trading scheme, between trading schemes, as well as in relation to goods

outside the emissions trading markets. To the extent that national and international regulators have constructed a functioning network of emissions trading schemes, and market participants have developed clear methodologies allowing the relative valuation of different allowances types and tokens, the property of commensurability seems readily applicable to emissions allowances.

The fourth property, *money equivalence*, means that a commodity can be arranged in terms of one continuous variable where that continuous variable is generally an internationally accepted currency (dollar, euro, sterling). This requires that the exchange value of allowances can be placed on a cardinal scale in order for deals to be executed on the open market. While different types of emissions allowance are attributed different monetary values on international carbon exchanges (as well as bilateral and brokered deals) a single allowance of each type can easily be translated into any major international currency, with most exchanges quoting contracts for each in euros or dollars. According to data from carbon market analyst Point Carbon, the average price obtained by sellers per EUA (the most frequently traded allowance type) over the course of 2009 was €13 (*Point Carbon* 2010, p. 4).

Although emissions trading schemes such as the EU ETS have created commodities exhibiting fungibility, commensurability and money equivalence, which are essentially empirical conditions, the property of objectification is far more problematically applied in this context since it is unclear to what extent emission allowances are mere objects, possessing no intrinsic value. Why, then, might emissions allowances be viewed as being the source, rather than objects, of value? One response is that when an emissions undershooter sells an allowance to an emissions overshooter they do not merely sell a piece of the atmosphere (or, more accurately, a permit that corresponds to a temporary right of usage of the atmospheric sink) but also an 'environmental indulgence' which is not the appropriate focus of either market activity or a gift relationship (Goodin 1998, p. 242). 'Environmental indulgences' are created when a moral agent transfers a token corresponding to a fulfilled duty to live within their rightful environmental limits to another agent so that the latter can cover some wrongdoing arising from their decision not to live within their rightful environmental limits. The ethical mistake arising from such transactions is to suppose that a fulfilled ethical obligation can be assigned a monetary exchange value without violating its underlying value and meaning. In Kantian terms, emissions trading, as with the illicit trade in other goods infused with intrinsic value such as parental love or platonic friendship, mistakenly puts a price on that which is 'above all price' or 'priceless', namely, a decent and ethical mode of life in harmony with the natural environment.<sup>5</sup>

Despite its initial seductiveness, at least for liberals motivated by the tension between attributing a market price to something while insisting that it also be treated with dignity and respect, the extension of market inalienability arguments to climatic justice is actually quite problematic. First, so long as



participants in emissions trading schemes are encouraged to live up to their environmental obligations in other aspects of their lives, it might be questioned why we should be so concerned about seemingly minor infractions of market inalienability posed by their activities as sellers or buyers on the emissions markets. It might be held, that is, that in creating false commodities we act wrongly in one respect but justifiably *all things considered* so long as emissions trading is indeed one of the few effective weapons in preserving the atmospheric sink.

Second, there seems to be nothing mysterious about an agent (whether it be a country, individual or firm) simultaneously apprehending the market price and intrinsic value of the atmospheric sink. As with many other goods, it is possible to act on financial incentives for their preservation, use or transfer without ceasing to view the intrinsic value of the good or activity in question (Mack 1989, p. 209). There are undoubtedly components of a good life which are problematic in this regard, but it is unclear why usufructuary rights over the atmospheric sink should be placed amongst this rather special set of goods. A similarly compatibilist response can be directed towards the 'environmental indulgence' objection, which assumes that participants in emissions trading markets cannot take turns as sellers and buyers of allowances while at the same time also applauding the forbearance of undershooters, and regretting the excess of overshooters. So as long as it is possible for participants to apprehend the market in tradable emissions allowances as a way of expressing their regard for the intrinsic value of the atmospheric sink, and regulators reinforce this regard in the way the market is structured and publicized amongst citizens, there seems no fundamental commodification-based objection to emissions trading.

Taken together, these two counter-responses suggest that, while emissions trading may yet be shown to be unethical because of its economic inefficiency or corrosive effects on environmental responsibility, the market exchange of emissions allowances does not strike a convincing analogy with other more commonly discussed, and plausible, examples of market inalienability such as human trafficking or markets in human tissue. The wrongdoing associated with the buying or selling atmospheric allowances, if it exists, will be far more subtly discerned and located in the ethical position of the agents engaging in the market rather than the items they are encouraged to trade. As such, the policy implications of the commodification objection seem limited to informational measures that clarify for users the very limited nature of the use-rights generated by emissions schemes; and further research on the environmental application of market inalienability arguments.

### **Incentivizing atmospheric (dis)regard**

Suppose we remain unconvinced that emission trading is intrinsically unethical due to the way it commodifies the atmosphere or panders to irresponsible

users of the atmosphere. A third objection maintains that policymakers should resist the efficiency gains promised by emissions trading because the price incentives introduced will have the counter-productive longer-term consequence of undermining the intrinsic (or 'internally'<sup>6</sup>) valuable and motivated motivations of citizens to shoulder the costs of environmental protection beyond those associated with participation in the initial scheme. This might be called the environmental 'crowding-out effect' (Frey 1997, pp. 57–65). The crux of this view is that financial incentives, and particularly those associated with the trading of environmental allowances, corrode environmental morale over time by inculcating amongst participants the norm that there is nothing blameworthy in emitting any amount of an environmental pollutant so long as they have the wherewithal to offset their polluting activities through activity on the relevant market. In this way, emissions trading schemes are even more destructive to the preservation of environmental morale than other forms of environmental policy intervention (carbon taxes, subsidies or fines) since emissions trading is not compatible with the notion that those who comply with the rules by purchasing additional allowances to balance their budgets have done anything wrong in emitting more CO<sub>2</sub><sup>e</sup> than others. The logic of the atmospheric 'crowding-out' effect is that two corrosive norms will spread amongst the relevant participants. First, if an agent holds a sufficient quantity of accredited emissions allowances to balance their emissions budget then this level of emissions is morally unproblematic. Second, so long as each agent fulfils its legal obligations under the climate trading scheme, any further activity based on intrinsic commitments to protect the environment is superfluous since these commitments are either unnecessary or unwelcome in interfering with competitive price formation. The spread of both norms, it is argued, means that policies introducing financial rewards to reduce pollution will prove counter-productive to the health of the environment in the long run (Frey 1997, p. 62, Kelman 1981, p. 59).

The 'crowding-out' objection to market-based policy initiatives such as emissions trading has attracted fairly limited scrutiny despite the large literature in social psychology and behavioural economics devoted to the link between financial incentives and intrinsic motivation. Where they have addressed the ethical issues raised by the incentives/motivation controversy, philosophers (e.g. Walsh 2001) have tended to extend the 'crowding out effect' to broader questions of social justice without adequate scrutiny of the claim that incentives undermine intrinsic valuation. The source for the claim that financial rewards decrease intrinsic motivation and performance emanates from an influential series of experiments by behavioural economists and social psychologists in the 1970s and 1980s where subjects were exposed to financial rewards for their performance of a task (typically, a word puzzle in the case of student subjects; or drawing exercises in the case of the Stanford experiments on nursery school children) reported initially as enjoyable by the relevant subjects. In the Stanford experiments, for example, children

at play were initially observed to establish their interest in a drawing activity. The children observed spending the most time on the exercise were then split into two groups: one group received a 'good player' reward while the other received no award. In a subsequent free-play period, the former group spent less time drawing than the latter (Lepper *et al.* 1973). In other versions of the experiment, rewards were offered to various categories of agent, both with or without prior warning, and in many the agents concerned exhibited a similar loss of intrinsic motivation in the activity post-reward; exhibited poorer performance in the relevant activity; and also, when asked, reported a decline in task satisfaction as compared with the relevant control groups (Lepper and Greene 1978, pp. 109–150). Deci *et al.* (1999) survey several dozen studies that report similar effects across a range of subjects, environments, and type of reward.

Inspired by these findings, environmental policy specialists and theorists began to investigate the effect of financial incentives on environmental evaluation and found a certain amount of empirical evidence, as well as theoretical support, for environmental 'crowding out' (Kelman 1981, pp. 312ff., Frey 1992, pp. 404–408, Bazin *et al.* 2004). However, much as this pioneering research on the incompatibility of incentives and intrinsic valuation may be attractive to radical critics of 'market environmentalism', there are significant limits to the idea that environmental 'crowding-out' renders emissions trading an illegitimate choice of policy. First, regarding the social psychological strand of the debate, there are problems associated with drawing any social or policy conclusions from the incentive/motivation studies. The 'crowding-out' effect observed amongst individual subjects in experimental conditions is far from easily applied to market-based interventions such as emissions trading since the system of incentives and motivations is far more complex and generally applies to *firms* and *countries* in non laboratory circumstances and not *individual persons* operating in controlled conditions.

Second, it can be questioned whether the 'crowding-out effect' is a uniquely troubling, and hence decisive, objection to emissions trading since all four of the key approaches to environmental policy (direct regulation, government expenditure, voluntary agreements, and economic instruments) introduce financial incentives of one kind or another to encourage users to reduce their emissions. Direct regulation of user emissions or energy efficiency standards, for example, offers users the incentive to avoid prosecution; voluntary agreements offer users the incentives to avoid direct regulation; subsidies offer users the incentive to make investments in low carbon technologies at a lower cost than currently available through the free market; and carbon taxes offer users the incentive to pay a set fee for each tonne of CO<sub>2</sub><sup>e</sup> they emit into the atmosphere rather than face a strict emissions ceiling. In fact, all of the existing and proposed replacements to the Kyoto climate architecture appeal to a mix of these four generic policy mechanisms, albeit with contrasting emphases of the role and importance of each element, so the

'crowding-out' objection seems to arise for all current approaches to climate policy.

Third, there are conditions that must be met for 'crowding-out' effects to occur (e.g. Frey 1997, pp. 25–34, Cameron and Pierce 2002, pp. 32–33). Some of these conditions do not appear to obtain in climate policymaking and others, when they are present, are subject to counter-measures to reduce their final impact. The most obvious activating conditions of 'crowding-out' in this context are the following: (1) the presence of a certain sort of agent whose behaviour and attitudes will be manipulated by the scheme – the participants must be the sort of agent that can entertain intrinsic environmental values; (2) the appropriate agents must possess a pre-existing concern for environmental preservation since those lacking in this concern will not experience any adverse internal psychological effects at the hands of emissions trading; (3) the level of behavioural or attitudinal change implied by the scheme is shaped by the size of the financial rewards available and the strength of the environmental commitment of its participants. All three conditions can be weakened, if not eliminated completely, in the construction of a global emissions trading scheme. Condition (1), for example, can be avoided to a large extent so long as the trading scheme covers firms rather than individual citizens, since the ethical life of these agents is less complex and generally lacking in intrinsic values that might be subverted. Condition (2) is subject to more pragmatic resolution since it might be countered that environmentally unconcerned agents will at least be encouraged to modify their actual behaviour by emissions trading so that they bear something like the true social costs of the CO<sub>2</sub><sup>e</sup> they continue to emit. There is also the distinct possibility that intrinsic respect for the natural environment might be enhanced by emissions trading since it communicates to hitherto unconcerned agents the costs of a previously neglected form of pollution without appealing to controversial social norms, policies or ethical arguments.<sup>7</sup> Condition (3) can be weakened if the financial benefits of trading are balanced against their potential crowding-out effect by taking steps to acknowledge and reinforce the intrinsic motivations of participants to protect the atmosphere regardless of financial incentive are acknowledged and the regulators offer additional opportunities to users to offset their emissions or retire the allowances under their control so as not to benefit from the overshoots of others.

The solid evidence for the 'crowding out effect' amassed by social psychologists and behavioural economists outside the environmental arena indicates that policymakers and environmental ethicists ignore the relationships amongst financial incentives and internal motivations at their peril. But far more evidence than is currently available would be required to justify the abandonment of emissions trading, particularly in light of the problems associated with rival policy mechanisms. Beyond the specific policy suggestions offered above to dampen the risk of atmospheric 'crowding-out', the message of the above discussion is that the 'incentivizing disregard' objection does not

warrant any wholesale structural changes be made to emissions trading schemes. Nevertheless, since the operational scope of the ‘crowding-out’, ‘crowding-in’ and ‘crowding-neutral’ effects is to a large extent an empirical (rather than theoretical) question, further research is no doubt warranted into the effects of participation of emissions trading over the way in which different categories of agent value the atmosphere and other goods. In anticipation of this research, the key precautionary suggestion for policymakers is that they should guard against ‘crowding-out’ effects by acknowledging the intrinsic values and valuations of participants and non-participants; and engage in real efforts to inculcate the environmental morale required to protect environmental components that are necessary conditions for a just liberal state.

### **Conclusions**

Drawing policy recommendations from such a cursory normative evaluation of emissions trading is fraught with difficulties. I have considered just three, to some extent interrelated, objections to emission trading. The analysis of each was far from exhaustive, and any policy implications are subject to complex problems associated with how we weigh the practical importance of intrinsic and instrumental evaluation. I have suggested, nevertheless, some modifications to the terms and scope of emissions trading schemes that address some of the most pressing ethical issues in a way that would not fundamentally compromise the market environmental logic at the heart of these schemes. Some will hold that the arguments presented should instead have lead to the outright rejection of emissions trading; others will no doubt dismiss the modifications offered as fetishizing ethical, and in particular non-consequential, considerations in a context where decisive, and cost effective, mitigation is urgently needed. What I hope cannot be doubted is that we are still at the very early stages of understanding what might have to be sacrificed if we are to protect the atmospheric sink from being overwhelmed.

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### **Notes**

1. The six main greenhouses gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), perfluoromethane (CF<sub>4</sub>), hydroflurocarbon (CHF<sub>3</sub>) and sulphur hexafluoride (SF<sub>6</sub>). While increased stocks of atmospheric CO<sub>2</sub> are responsible for the bulk of the atmospheric changes that have already occurred due to the growth in anthropogenic greenhouse emissions, the combined climatic impact of other gases is increasing rapidly.

2. Perhaps the clearest example of the toothlessness of the Kyoto Protocol concerns the case of Canada, whose Federal Court ruled, in October 2008, that the country's Kyoto obligations to reduce its greenhouse gas emissions below their 1990 levels do not have any judicial status in Canadian Law.
3. The argument assessed in the text is clearly linked to the idea of 'blocked exchange', according to which the commodification of some goods and activities should be prohibited by the state in order to prevent the corruption of their intrinsic value, examples being human beings and civic duties (Walzer 1983, pp. 100–103). For an elaboration of the concept of 'market inalienability', see Radin (1996, pp. 16–29).
4. The classification of commodities is adapted from Radin (1996, pp. 118–119). It is important to point out that neither Radin nor the other commodification theorists mentioned in the text discuss global climate change or the problem that market-based policies such as emissions trading raise problems of commodification.
5. According to Kant, 'In the realm of ends everything has either a price or a dignity. What has a price is such that something else can also be put in its place as its equivalent; by contrast, that which is elevated above all price, and admits of no equivalent, has a dignity' (Kant, [1785] 2002, p. 52).
6. Erik Mack usefully distinguishes between 'internally valuable and motivated activities' (such as acts whose value cannot be traced to its consequences for other values) and 'instrumentally valuable and motivated activities' (such as acts that are performed in order to realize some favoured outcome) (Mack 1989, pp. 212–213).
7. Frey (1997, p. 24) calls this the 'crowding-in' effect.

## References

- Banuri, T., Göran-Mäler, K., Grubb, M., Jacobson, H. K. and Yamin, F., 1996. Equity and social considerations. In: J. Bruce, H. Lee and E. Haites, eds. *Climate change 1995: economic and social dimensions of climate change*. Cambridge: Cambridge University Press, 79–124.
- Bazin, D., Ballet, J. and Touhri, D., 2004. Environmental responsibility versus taxation. *Ecological Economics*, 49 (2), 129–134.
- Betz, R. and Sato, M., 2006. Emissions trading: lessons learned from the 1st phase of the EU ETS and prospects for the 2nd phase. *Climate Policy*, 6, 351–359.
- Cameron, J. and Pierce, D. W., eds, 2002 *Rewards and intrinsic motivation: resolving the conflict*. Westport, CT: Bergin & Garvey.
- Deci, E. L., Koestner, R. and Ryan, R. N., 1999. A meta-analytical review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125 (6), 627–668.
- Dworkin, R., 1985 *A matter of principle*. Oxford: Clarendon.
- Ellerman, A. D. and Buchner, B. K., 2007. The European Union Emissions Trading Scheme: origins, allocation, and early results. *Review of Environmental Economics and Policy*, 1 (1), 66–87.
- European Commission, 2009. *Emissions trading: EU ETS emissions fell 3% in 2008*. Press Release. Available from: <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/794&format=HTML&aged=0&language=EN&guiLanguage=en/>.
- Frey, B. S., 1992. Pricing and regulating affect environmental ethics. *Environmental and Resource Economics*, 2 (4), 399–414.
- Frey, B. S., 1997. *Not just for the money*. Cheltenham: Edward Elgar.

- Goodin, R. E., 1998. Selling environmental indulgences. In: J. S. Dryzek and D. Schlosberg, eds. *Debating the earth*. Oxford: Oxford University Press, 237–254.
- Grubb, M., Vrolijk, C. and Brack, D. (1999). *The Kyoto Protocol: a guide and assessment*. London: Royal Institute of International Affairs.
- Hepburn, C. and Stern, N., 2008. A new global deal on climate change. *Oxford Review of Economic Policy*, 24 (2), 259–279.
- Intergovernmental Panel on Climate Change (IPCC), 2007. Summary for policy-makers. In: M. Parry, O. Canziani, J. P. Palutikof, P. van der Linden and C. Hanson, eds. *Climate change 2007: impacts, adaptation and vulnerability*. Cambridge: Cambridge University Press, 7–22.
- Kant, I., [1785] 2002. *Groundwork of the metaphysics of morals*. Ed. and trans. E. Ellen. New Haven, CT: Yale University Press.
- Kelman, S., 1981 *What price incentives? Economists and the environment*. Boston, MA: Auburn House.
- Lepper, M. R. and Greene, D., eds, 1978. *The hidden costs of reward*. Hillsdale, NJ: Lawrence Erlbaum.
- Lepper, M. R., Greene, D. and Nisbett, R. E., 1973. Undermining children's intrinsic interest with extrinsic reward: a test of the 'Overjustification' hypothesis. *Journal of Personality and Social Psychology*, 28, 129–137.
- Lohmann, L., 2006. Carbon trading: a critical conversation on climate change, privatisation and power, *Development Dialogue*, 48, 1–359 [online]; [cited 2008 Dec 7]. Available from: [http://www.dhf.uu.se/pdffiler/DD2006\\_48\\_carbon\\_trading/carbon\\_trading\\_web.pdf](http://www.dhf.uu.se/pdffiler/DD2006_48_carbon_trading/carbon_trading_web.pdf).
- Mack, E., 1989. Dominos and the fear of commodification. In: J. W. Chapman and J. R. Pennock, eds. *Markets and justice*. New York, NY: New York University Press, 198–225.
- McCann, R. J., 1996. Environmental commodities markets: 'cessy' versus 'ideal' worlds. *Contemporary Economic Policy*, 14 (3), 85–97.
- Metcalf, G. E., 2009. Market-based policy options to control U.S. greenhouse gas emissions. *Journal of Economic Perspectives*, 23 (2), 5–27.
- Point Carbon, 2006. *Carbon Market Europe*, 5 May, 2–3.
- Point Carbon, 2009a. *Carbon Market Europe*, 8 (7), 20 February 2009.
- Point Carbon, 2009b. *CDM and JI Monitor*, 8 July.
- Point Carbon, 2010. *Carbon Market Europe*, 9 (1) 8 January.
- Radin, M. J., 1996. *Contested commodities*. New Haven, CT: Harvard University Press.
- Sagoff, M., 1999. Controlling global climate: the debate over pollution trading. In: V. V. Gehring and W. A. Galston, eds. *Philosophical dimensions of public policy*. New Brunswick, NJ: Transaction, 311–318.
- Sandel, M., 2005. It's immoral to buy the right to pollute. In: *Public philosophy: essays on morality in politics*. Cambridge, MA: Harvard University Press, 93–96.
- Schneider, S. H. and Lane, J., 2007. An overview of 'dangerous' climate change. In: H. J. Schellnhuber, W. Cramer, N. Nakicenovic, T. Wigley and G. Yohe, eds. *Avoiding dangerous climate change*. Cambridge: Cambridge University Press, 7–23.
- Sheffler, S., 1994. *The rejection of consequentialism*, revd edition. Oxford: Clarendon.
- Sijm, J., Neuhoff, K. and Chen, Y., 2006. CO<sub>2</sub> cost pass-through and windfall profits in the power sector. *Climate Policy*, 6 (1), 49–72.
- Stern, N., 2007. *The economics of climate change*. Cambridge: Cambridge University Press.
- Tietenberg, T., 2005. The tradable permits approach to protecting commons. In: D. Helm, ed. *Climate change policy*. Oxford: Oxford University Press, 167–193.

- Tietenberg, T., 2006. *Emissions trading: principles and practice*. 2nd edition. Washington, DC: Resources for the Future.
- UK Committee on Climate Change (UKCCC), 2008. *Building a low-carbon economy: the UK's contribution to tackling climate change* [online]; [cited 2008 Dec 4]. Available from: <http://hmccc.s3.amazonaws.com/pdf/7993-Climate%20Change-ExecSumm-WEB-BMK.pdf/>.
- United Nations, 1995. *UN framework convention on climate change*. London: HMSO.
- United Nations, 1998. *Kyoto Protocol to the United Nations Framework Convention on Climate*; [cited 2010 Jan 18]. Available from: <http://unfccc.int/resource/docs/convkp/kpeng.pdf/>.
- United Nations, 2007. *Human development report 2007/2008: Fighting climate change: human solidarity in a divided world*. Basingstoke: Palgrave.
- United Nations, 2008. *National greenhouse gas inventory data for the period 1990–2006* [online]; [cited 2008 Nov 23]. Available from: <http://unfccc.int/resource/docs/2008/sbi/eng/12.pdf/>.
- United Nations, 2009. *Draft decision -/CP.15: Copenhagen Accord*; [cited 2010 Jan 18]. Available from: <http://unfccc.int/resource/docs/2009/cop15/eng/107.pdf/>.
- Walsh, A., 2001. Are market norms and intrinsic valuation mutually exclusive? *Australasian Journal of Philosophy*, 79(4), 523–543.
- Walzer, M., 1983. *Spheres of justice: a defence of pluralism and equality*. Oxford: Blackwell.