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> Many economists who work in the area of social choice theory and welfare economics are quite unfamiliar with contemporary philosophical thinking on distributive justice…I do not…believe that the economist's way of thinking has produced, or will ever produce, important new insights into what distributive justice is. The key new concepts in the last thirty years…have all come from the philosophical way thinking
>
> Roemer (1996, p3)

1. Introduction

In a world where greenhouse gas emissions must be reduced, what is the fair way to allocate rights to the limited available emissions?[1] For many, the answer is that a fair allocation is an **equal per capita allocation**. From at least as far back as 1988, it has been proposed that emissions rights be allocated *between* nations on an equal per capita basis (Feiveson et al, 1988). That is, it has been proposed that nations move to a situation where the quantity of emissions rights allocated to a nation in a given year is calculated by dividing the rights to the permitted global emissions for that year by the global population in that year (or an agreed base year) and then multiplying the quotient by the nation's population in that year (or the agreed base year). This is the approach advocated by the well-known *Contraction and Convergence* proposal (Meyer, 2000) discussed in Section 9.1.

And from at least as far back as 1991, it has been proposed that emissions rights be allocated on an equal per capita basis *within* nations (Carley et al, 1991, p39).[2] That is, it has been proposed that some or all of the rights to a nation's permitted emissions in a given year should be allocated equally to all adult individuals within that nation. Various emissions trading schemes that allocate rights in this manner have since been proposed and these so-called *personal carbon trading* schemes have been the focus of some interest within the UK.[3]

But how might one explore whether an equal per capita allocation (henceforth, **EPCA**) is, in fact, fair? One approach is to see whether support for such an allocation exists within the literature on distributive justice, that branch of the philosophical literature concerned to provide a specification and justification of what constitutes a fair distribution of resources within society. However, as Gardiner (2004, p555) notes, "Very few moral philosophers have written on climate change". Instead, most writings on the moral dimensions of climate change – including those which advocate EPCA – have been by "non-philosophers".[4]

This paper sets out the arguments made for EPCA by non-philosophers and then examines whether there is anything within the justice literature to support such arguments or that provides alternative justifications for EPCA. Of course, justice remains a contested concept, Miller (2002, p6) summarizing the current situation as being "one of…fairly radical disagreement as to which theory of justice is actually correct". And in recognition of its contested nature, the paper

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[1] Rahmstorf (2005) identifies three types of scepticism with regard to climate change: *trend* scepticism (doubt that a rise in global average temperature has occurred), *attribution* scepticism (acceptance of warming but doubt that it is caused by human activity) and *impact* scepticism (acceptance that there is warming and that it is human-induced but doubt that warming is harmful and a belief that it may even be beneficial). This paper rejects these three forms of scepticism and holds that further warming must be limited by reducing greenhouse gas emissions.

[2] Of the paper's three authors, it was Hillman who proposed this allocation.

[3] Fleming (1996, 2005) has played a key role in developing the person carbon trading idea. For further information on the idea see Starkey and Anderson (2005). The UK government has recently completed a pre-feasibility study of personal carbon trading (Defra, 2008).

[4] However, one philosopher who has discussed justifications for EPCA is some depth is Peter Singer (2002, pp26-50).

surveys three leading approaches to justice, right-libertarianism, egalitarian liberalism[5] and left-libertarianism,[6] to determine the level of support within each for EPCA.[7]

The paper proceeds as follows. **Section 2** sets out the classification of greenhouse gas emissions used in the paper, and clarifies what is meant by EPCA within nations. **Section 3** then briefly sets out the principal justifications for EPCA offered by non-philosophers, namely that the atmosphere or the sinks for greenhouse gas emissions are a "commons". The paper then turns philosophical with **Section 4** describing the key elements of right-libertarianism. This description enables an exploration in **Section 5** of what exactly is meant by the term "commons" introduced in Section 3. **Section 6** then returns to right-libertarianism, exploring what support it offers for EPCA *within* nations. **Section 7** moves on to egalitarian liberalism, setting out its key elements and, again, exploring the support offered for EPCA within nations. **Section 8** does the same for left-libertarianism. Up to this point, the paper has focused upon justifications for EPCA within nations. However, we live in a multi-nation world in which the historical emissions of nations have varied greatly and, in light of this variation, **Section 9** explores what philosophical justification there might be for EPCA *between* nations. **Section 10** concludes.

Having set out what is covered in the paper, it is perhaps useful to clarify what is not. Whilst personal carbon trading schemes are mentioned in Section 2, and whilst Section 9.1 outlines the principles behind Contraction and Convergence, in neither case are details of implementation discussed. That is to say, the paper is concerned not with the implementation of EPCA but with the prior question of whether there is a coherent case for such an implementation.

The paper has been written so as to be as accessible as possible to those without a background in political philosophy. In the paper, I quote extensively from philosophical writings so as to give a flavour of the literature and because I think that arguments are often best presented using an author's own words. Those with some background in political philosophy can either skip or speed through the explanations of the three philosophical approaches in Sections 4, 7 and 8 and focus on their application to the issue of the allocation of emissions rights. As has been mentioned, few philosophers have, to date, written on climate change and I would be pleased if this paper motivated further philosophical exploration of the issues raised.

2. Assumptions, classifications and clarifications

For simplicity, this paper limits itself to a discussion of the largest source of greenhouse gas emissions, the combustion of fossil fuel.[8] And to enable a discussion of EPCA within nations, a distinction is drawn between *direct* and *indirect* emissions.[9] These two types of emissions are

[5] More precisely, this paper focuses on a dominant strand within egalitarian liberalism that has been referred to as "luck egalitarianism" (Anderson, 1999, p289). For criticisms of this approach by other egalitarian liberals see, for example, Anderson (1999), Hurley (2003) and Scheffler (2005). For a recent defence, see Arneson (2004).

[6] In its support for full self-ownership and with its emphasis on initial acquisition (see Section 4), left-libertarianism differs from egalitarian liberalism. However, in a recent paper, three leading left-libertarians describe the approach as a "plausible form" of egalitarian liberalism (Vallentyne et al, 2005, p201).

[7] The list omits two well-known approaches to justice, utilitarianism and communitarianism. Utilitarianism is omitted as, in contrast to the three approaches surveyed here, it does not figure prominently in contemporary debates on justice (Kymlicka, 2000, p53). And though communitarianism figures prominently, it too is omitted for, despite raising important objections to egalitarian liberal approaches, it is not clear that it has anything distinctive to say with regard to the fair allocation of emissions rights.

[8] For example, in 2004, greenhouse gas emissions from the combustion of fossil fuel accounted for almost 85% of total UK emissions (Baggott et al, 2006). And in 2000, around 60% of worldwide greenhouse gas emissions were from the combustion of fossil fuel (WRI, 2005, p51).

[9] The terms *direct emissions* and *indirect emissions* are used, for example, in Carbon Trust (2005). Sorrell (2002) similarly refers to the direct and indirect allocation of emissions rights.

illustrated in Fig 1, a simplified schematic of emissions arising from fossil fuel combustion within a nation.

An individual or organization emits *directly* when they themselves combust fossil fuel and the greenhouse gases are released to atmosphere.[10] The bracketed numbers in the equation below and in the remainder of this section refer to the box numbers in Fig 1 which illustrates that

Total emissions

= individual *direct* emissions (1) + organizational *direct* emissions (2,3)

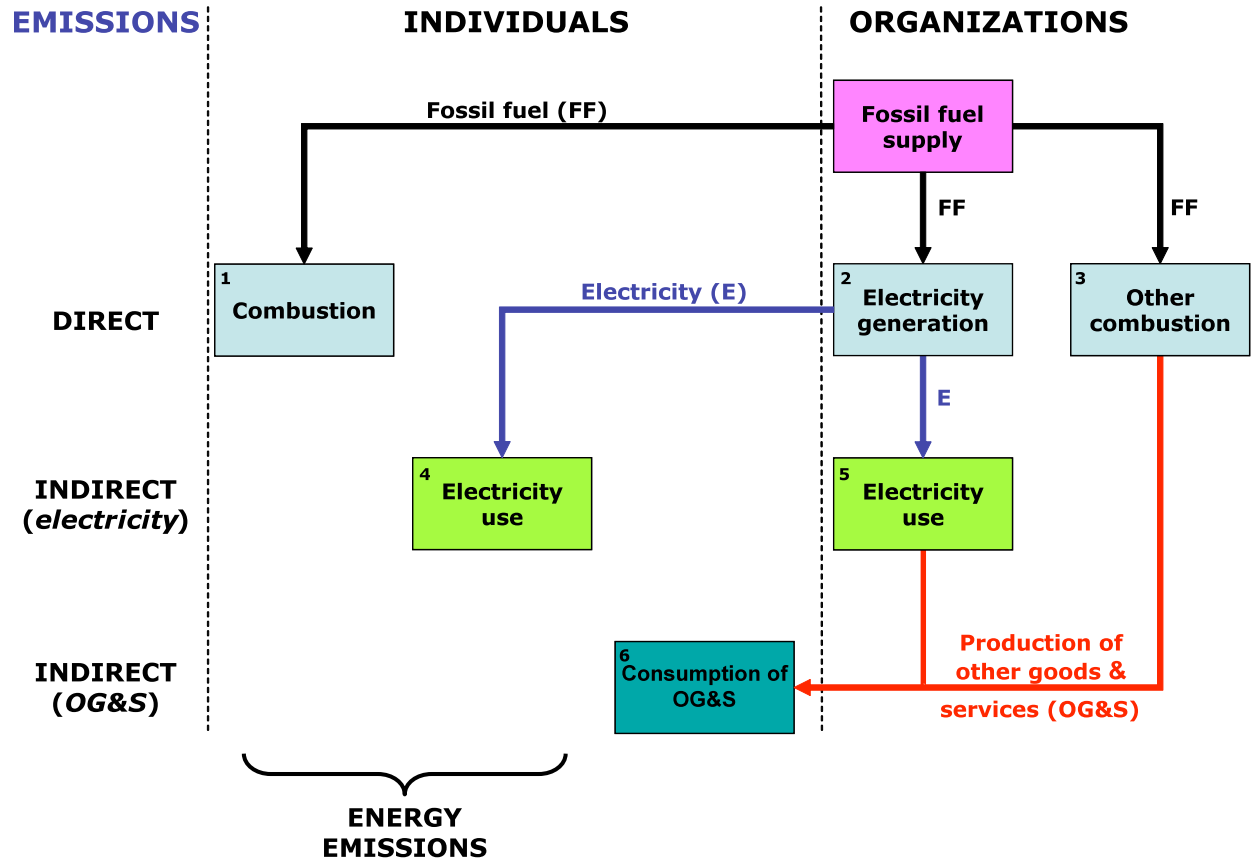

Figure 1: categorization of emissions

An individual combusts and emits *indirectly* when they consume goods or services, the provision of which involved the combustion of fossil fuel and release of greenhouse gases to atmosphere by one or more organizations. Similarly, an organization combusts and emits indirectly whenever they consume goods or services, the provision of which involved the combustion of fossil fuel and release of greenhouse gases to atmosphere by one or more other organizations. The point to emphasize here is that one entity's direct emissions are another's indirect emissions. Take, for example, an electricity generator that combusts coal to produce electricity. The generator's direct emissions (2) are, at the same time, the indirect emissions of the individuals and organizations that purchase its electricity (4,5).

[10] A gas becomes an emission only if it is released to atmosphere as opposed to, say, being placed in saline aquifer via carbon capture and storage. For a definition of "emissions" see the United Nations Framework Convention on Climate Change, Article 1 (UNFCCC, 1992).

Individuals emit both directly and indirectly. It is customary for individuals to refer to their use of fuel[11] and electricity as their "energy use", and the *direct* emissions from an individual's fossil fuel use (1) plus the *indirect* emissions from their electricity use (4) together constitute what I refer to as their *energy emissions*.

However, individuals' indirect emissions arise not only from their electricity use. In addition to using electricity and fossil fuel, individuals of course consume other goods and services (OG&S) which are produced by organizations that themselves use fossil fuel and electricity. And as Fig 1 illustrates, the indirect electricity emissions (5) and direct emissions (3) of organizations other than electricity generators together constitute individuals' indirect emissions from the consumption of these other goods and services – that is, their *OG&S emissions* (6). Hence

Total emissions

= individual *direct* emissions (1) + individual *indirect* emissions (4,6)

= individual *energy* emissions (1,4) + individual *OG&S* emissions (6)

This division of individuals' emissions into energy and OG&S emissions allows us to distinguish between various proposals under which emissions rights are allocated to individuals. Fleming (1996, 2005) proposes a personal carbon trading scheme under which emissions rights covering individual energy emissions are allocated to adult individuals on an equal per capita basis. Alternatively, Hillman (2004) proposes a personal carbon trading scheme under which emissions rights covering both individual energy emissions and those OG&S emissions arising from individuals' travel on public transport are allocated to adult individuals on a roughly equal per capita basis.[12] And both Ayres (1997, 1998) and the Irish environmental NGO, Feasta (2006) propose personal carbon trading schemes under which emissions rights covering *total* energy emissions (i.e. individuals' energy emissions plus *all* of their OG&S emissions) are allocated to adult individuals on an equal per capita basis.

In contrast, Barnes (2001) has proposed a scheme under which rights covering total emissions are auctioned to fossil fuel producers, with the auction revenue distributed amongst adult individuals on an equal per capita basis.[13] In other words, it is not emissions rights themselves that are allocated on an equal per capita basis but the revenue from the sale of those rights.[14] I regard schemes under which revenue from the sale of emissions rights is allocated on an equal per capita basis as broadly equivalent to those under which emissions rights themselves are allocated on this basis. And note that one can envisage personal carbon trading schemes under which individuals are allocated on an equal per capita basis both emissions rights covering energy

[11] Most fuel used by individuals will be fossil fuel but some may use, for example, wood.

[12] Hillman holds that parents should receive additional emissions rights to reflect the increased energy use in households with children. Whether parents should receive additional rights is discussed in Section 7.3.

[13] Alternatively Barnes has suggested that parents receive an additional share of revenue for each child. If total auction revenue is R, total adults are A, and total children are C, Barnes' alternative proposal is that each adult receives R/(A+C), with parents receiving the same again for each child. Note that this contrasts with Hillman's proposal. The average additional energy consumption per child in households with children is less than the average adult energy consumption in childless households. Thus, if emissions rights covering energy use are ER, Hillman proposes that all adults receive rights >[ER/(A+C)] with parents receiving additional rights <[ER/(A+C)] for each child.

[14] Given that it is adults who purchase the vast majority of energy, other goods and services, it would seem reasonable to allocate only to them (the revenue from the sale of) emissions rights covering energy and OG&S (i.e. total) emissions.

emissions and the revenue from the auction (to organizations) of the rights covering OG&S emissions (see Starkey and Anderson, 2005).[15]

Given this equivalence between allocating emissions rights and auction revenue, when I discuss justifications for EPCA within nations, I am referring to the justification for an equal per capita allocation of (1) rights covering *total* emissions (2) revenue from the auction of rights covering *total* emissions or (3) a combination of rights and of revenue from the auction of the remaining rights, with total rights covering *total* emissions. However, for simplicity, in the remainder of the paper, the discussion is couched only in terms of the equal per capita allocation of (1). The reason for the focus on *total* emissions is made clear in Sections 5.2.1 and 7.8.

Having set out these preliminaries, I now briefly survey justifications for EPCA offered by non-philosophers.

3. Non-philosophers' justifications for EPCA

Some of the literature by non-philosophers advocating EPCA simply asserts the rightness of the allocation. For instance, in its report on energy and climate change, the Royal Commission on Environmental Pollution (RCEP, 2000, p2) provides no justification for its statement that

> every human is entitled to release into the atmosphere the same quantity of greenhouse gases.

Where a justification for EPCA is provided, it is usually that either the atmosphere or the world's greenhouse gas emissions sinks are a "commons". Examples of such justifications are set out below in Section 3.2 following a brief discussion of the atmosphere's role as a holding bay for greenhouse gases and to clarify the meaning of the term "sink".

3.1. The atmospheric holding bay and emissions sinks

3.1.1. The atmospheric holding bay

The three main greenhouse gases arising from human activity are carbon dioxide, methane and nitrous oxide. In 2000, and in terms of their contribution to warming, these gases constituted, respectively, 77%, 14% and 8% of emissions (WRI, 2005, pp4-5). Having been released into the atmosphere, carbon dioxide remains there for 5-200 years before being removed by sinks,[16] methane for 12 years and nitrous oxide for 114 years (Houghton et al, 2001, p38). Hence, the atmosphere can be said to act as a holding bay for these greenhouse gases prior to their removal.

3.1.2. Carbon dioxide sinks

The Intergovernmental Panel on Climate Change (IPCC) defines a sink as

> Any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas or aerosol from the atmosphere (Houghton et al, 2001, p796).

The two main processes that remove carbon dioxide (CO_2) from the atmosphere are photosynthesis by land-based plants and the dissolution of the gas into the oceans. (Let's call this the *gross removal* of CO_2 from the atmosphere). Over the several thousand years prior to the industrial revolution, almost exactly the same quantity of CO_2 as was removed from the

[15] For further information on these various schemes see Starkey and Anderson (2005) and Starkey (2007).

[16] According to Houghton et al (2001, p38), "No single lifetime can be defined for carbon dioxide because of the different rates of uptake by different removal processes".

atmosphere was returned – from the land mainly through respiration by plants and animals, and from the oceans by outgassing. Thus, the *net removal* of CO_2 from the atmosphere was approximately zero.[17]

Since the industrial revolution, human activity – mainly the combustion of fossil fuels and deforestation – has released increasing quantities of CO_2 into the atmosphere.[18] And since the industrial revolution, the land and oceans have become *net removers* of CO_2 from the atmosphere. With regard to land, although flows of CO_2 to the atmosphere have increased as the result of emissions from deforestation, they has been more than offset by flows in the opposite direction resulting from

> changes in land management practices and fertilisation effects of increased atmospheric CO_2 and nitrogen (N) deposition, leading to increased vegetation and soil carbon (Houghton et al, 2001, p185).[19]

And with regard to oceans, the increase in emissions of CO_2 since the industrial revolution has increased the atmosphere-ocean difference in partial pressure of carbon dioxide (pCO_2) which has resulted in the oceans removing more CO_2 from the atmosphere than they release.[20] But although the land and oceans have become *net removers*, as they remove only a fraction of the CO_2 released into the atmosphere through human activity,[21] the atmospheric concentration of CO_2 continues to rise.[22]

In relation to CO_2, the term "sink" is not always used within the IPCC's reports in accordance with its definition. For whilst the IPCC defines a sink it terms of (1) gross removal, on occasion the term is used to refer to (2) the net removal of CO_2[23] and on occasion to (3) the system responsible for this net removal.[24] And note that the American Meteorological Society (AMS) uses the term in a slightly different way to the IPCC. The AMS defines a "carbon sink" as "A reservoir that receives carbon from another carbon reservoir" (AMS, 2000). Although similar to the IPCC definition, it is not identical, for whilst the IPCC definition refers to the processes responsible for the gross removal from the atmosphere, the AMS definition refers to the system that is the recipient of the gases removed. However, the AMS notes that the a carbon sink is

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[17] Prior to the industrial era, the concentration of CO_2 in the atmosphere was 280±10 parts per million by volume (ppmv) for several thousand years. Within the natural carbon cycle, the land system removes from and releases into the atmosphere around 120 gigatonnes of carbon (GtC) per annum. The figure for the oceans is around 90 GtC per annum (IPPC, 2001, p188).

[18] In 2004 annual global emissions of CO_2 from human activity were around 8GtC (WRI, 2008a).

[19] During the 1980s, 1990 and 2000-2005, the net annual flow of CO_2 from the atmosphere to land is estimated to have been, respectively, 0.3, 1.0 and 0.9 GtC (Solomon et al, 2007, p26).

[20] During the 1980s, 1990s and 2000-2005, the net annual flow of CO_2 from the atmosphere to the oceans is estimated to have been, respectively, 1.8, 2.2 and 2.2 GtC (Solomon et al, 2007, p26).

[21] The "airborne fraction", defined as the percentage of annual CO_2 released through human activity that remains in the atmosphere has been around 60% for the last five decades (Alexandrov et al, 2007).

[22] At the beginning of the industrial revolution, the atmospheric concentration of CO_2 was about 280 ppmv. In 2005 it was 379ppmv (Solomon et al, 2007, p 25).

[23] For example

> The difference between the net terrestrial flux and estimated land-use change emissions implies a residual land-atmosphere flux of 82 PgC (i.e. a terrestrial sink) over the same period (Houghton, 2001, p193).

The American Meteorological Society (AMS, 2000) defines a flux as "The rate of flow of some quantity…".

[24] For example

> The terrestrial system is currently acting as a global sink for carbon…despite large releases of carbon due to deforestation in some regions (Houghton, 2001, p193).

> Commonly used to denote a reservoir where the carbon amount increases because its total carbon received from all other reservoirs exceeds its total carbon transfer to the other reservoirs.

This usage equates to usage (3) within the IPPC's reports.

3.1.3. Sinks for methane and nitrous oxide

For methane, the main process that removes the gas from the atmosphere is its reaction with hydroxyl radicals in the tropospheric layer of the atmosphere and, for nitrous oxide, the main processes are photodissociation and reaction with electronically excited oxygen atoms in the stratospheric layer of the atmosphere (Houghton et al, 2001, ch 4). Unlike CO_2, methane and nitrous oxide are not cycled in and out of the atmosphere and hence no distinction is required between gross and net removal.

3.2. Two justifications

3.2.1. The atmosphere as commons

Baer (2002, p401) writes

> The central argument for equal per capita rights is that the atmosphere is a global commons, whose use and preservation are essential to human well being.[25]

In putting forward a similar argument, Barnes (2001) makes numerous references to the atmosphere's role as a holding bay, or, as he refers to it, the "carbon storage capacity" of the sky (pp21, 29, 41, 46). In Barnes' view, "The sky is nothing if not the ultimate commons" (p54) and it is the "equal and universal ownership" (p72) of this holding bay that gives all the right to emit equally into it. In other words, "to all according to their equal ownership" (p72).[26]

3.2.2. Emissions sinks as commons

Whilst most argue for EPCA on the basis that it is the *atmosphere* that is a commons, some argue for the allocation on the basis that the *sinks* for greenhouse gases are a commons. For example, Agarwal and Narain (1991, p13) write that

> sustainable development demands that human beings collectively do not produce more carbon dioxide and methane than the earth's environment can absorb. The question is how should this global common – the global carbon dioxide and methane sinks – be shared amongst the people of the world.
>
> Several studies on the global warming problem have argued, and we argue ourselves, that in a world that aspires to such lofty ideals like global justice, equity and sustainability, this vital global common should be shared equally on a per capita basis.

Although Agarwal and Narain make mention of sinks only for CO_2 and methane, I take it that they have in mind that the commons consists of sinks for *all* greenhouse gases. They appear to use the term to refer to the ability of the earth's environment to remove greenhouse gases from the atmosphere, a usage similar to the IPCC's usage (3) described in Section 3.1.2.

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[25] However, note that Baer has since changed his position. See Section 10.

[26] Although Barnes supports a right for all to emit equally, he does not propose operationalizing this by allocating emissions rights to adults but, as noted in Section 2, instead favours an upstream auction of emissions rights, with the revenue allocated to adults.

Having briefly outlined some examples of "commons arguments" for EPCA, I proceed in Section 5 to explore more fully the notion of a commons, as three differing uses of the term appear within the literature. In order to frame this exploration, Section 4 outlines the right-libertarian approach to justice.

4. Right-libertarianism

The discussion of right-libertarianism begins in Section 4.1 by introducing the thesis of "self ownership". From ownership of the self, Section 4.2 moves on to discuss how objects external to the self can come to be owned through the process of just appropriation. Section 4.3 then discusses right-libertarian views on just transfer and taxation whilst Section 4.4 discusses right-libertarian interpretations of the so-called "Lockean Proviso". Finally, Section 4.5 explains how, according to right-libertarianism, individuals can legitimately come to hold (substantially) unequal amounts of wealth.

4.1. Self-ownership

Libertarianism, as the name suggests, holds (in both it left and right manifestations) that all individuals have the right to *liberty*, liberty being understood as an absence of *interference* by others.

> Normative individualism – the separate importance of each individual's life, well-being or preference satisfaction – is thought to endorse enforceable moral claims held by all individuals against interferences that diminish their lives, well being or preference satisfaction. A moral claim against interference is basic to the liberty tradition (Mack and Gaus, 2004, p116).

For libertarians, to own an object is to have a right to liberty with regard to that object. For to say that A owns X (or, equivalently, that X is A's property) is to say that A is entitled to use or dispose of X as she sees fit, free from interference by others – provided that in doing so she respects the right to liberty of others with regard to the objects they own by not interfering with their use or disposal of those objects. So if A owns a stick, she may use it to knock apples off the tree in her garden, and her neighbour B has no right to interfere with her use of it, for example, by taking it for firewood without her consent. But A's use of her stick is constrained by B's right to liberty with regard to the objects he owns and so A cannot, without B's consent, use her stick to knock the blooms off the prize dahlias in B's garden.[27]

According to libertarians (both left and right), one of the things that individuals own is themselves: individuals, in other words, are "self owners". As Mack (2002a, p76) explains it, self-ownership is

> the thesis that each individual possesses original moral rights over her own body, faculties, talents and energies. Adherents of this thesis believe that it best captures our common perception of the moral inviolability of persons – an inviolability that is manifested in the wrongfulness of unprovoked acts of killing, maiming, imprisoning, enslaving, and extracting labor from others. They believe that the rights of self-ownership provide individuals with the moral immunities appropriate to beings whose lives and well-being are of separate and irreplaceable moral importance.

[27] Clearly, much rests on what counts as interference. For example, if my neighbour turns on a light in his house and thereby sends photons onto my property, does this constitute interference? See Lester (2000, ch 3) for a helpful discussion of interference or, as he terms it, "subjective imposed cost".

4.2. Just appropriation

For libertarians, both left and right, self-owning individuals can legitimately come to own objects external to the self through a process of "just appropriation". A useful starting point for a discussion of appropriation is the view of Locke ([1689] 1986, pp19-20).

> God, who hath given the world to men in common, hath also given them reason to make use of it to the best advantage of life and convenience…Though the earth and all inferior creatures be common to all men, yet every man has a "property" in his own "person". This nobody has any right to but himself. The "labour" of his body and the "work" of his hands, we may say, are properly his. Whatsoever then he removes out of the state that nature hath provided and left it in, he hath mixed his labour with it, and joined to it something that is his own, and thereby makes it his property. It being removed from the common state Nature placed it in, it hath by this labour something annexed to it that excludes the common right of other men. For this "labour" being the unquestionable property of the labourer, no man be can have a right to what that is joined to, at least where there is enough, and as good left in common for others.

Here, Locke sets out his view on three relevant issues:

1. the original ownership status of the world (originally owned in common)
2. how an individual can take parts of world into private ownership (mixing their self-owned labour with it) and
3. the constraints on how much of the world an individual can take into private ownership (leaving "enough and as good" for others)

These issues are discussed briefly below.

4.2.1. Original ownership

In marked contrast to Locke, contemporary libertarians, both left and right, firmly reject any notion that "in the beginning" the world was owned in common by humankind. As right-libertarian, Narveson (1999, p213), argues

> In the first place, no one can have any reason for thinking that the creator, if there is one, would necessarily "give" nature to mankind in general, rather than to some favoured group – the "Chosen people," say – or even to no one. In any case, we must reject theology for these purposes. Theology is not publicly provable from common sense and science; to use it at all discriminates against those with different religious views, or none…
>
> Once we understand that the world was not made by anybody, for anyone or any purpose in particular, then we must confront the fact that the world is just stuff, devoid of moral qualities and not [initially] owned by anyone let alone everyone.

Or as left-libertarian, Otsuka (2003, p22, n28), puts it

> In the absence of any such belief that the earth was previously owned by some being who transferred this right of ownership to humankind at the outset, it is reasonable to regard the earth as initially unowned.

4.2.2. Private ownership of nature

However, similarly to Locke, contemporary libertarians hold that one can take into ownership

> those elements of the environment over which one has exerted and continues intentionally to exert control (Narveson, 1999, p215).[28]

From the above, it can be seen that, whilst Locke required a theory of how to take into private ownership a world that was originally under *common ownership*, contemporary libertarians require a theory of how to take into private ownership a world in which there was originally *no ownership*. Discussing terminology, Risse (2004, p344) notes

> …the no ownership scenario requires a theory of *acquisition*, the crucial issue being how to create rights and duties constitutive of property in the first place. The common ownership scenario requires a theory of *privatization*, the crucial issue being how to derive rights and duties constituting private ownership from an already existing bundle constituting common ownership…I will speak of 'appropriation' when staying neutral between acquisition and privatization.

In the remainder of the paper, my use of terminology follows that of Risse.

4.2.3. The Lockean Proviso

Contemporary right and left-libertarians differ markedly in their interpretation of "enough and as good", a constraint that has come to be known as the Lockean Proviso. As the Proviso is relevant both to just acquisition and transfer, right-libertarian interpretations are discussed in Section 4.4 following a brief discussion of just transfer in Section 4.3, whilst left-libertarian interpretations are discussed in Section 8.

4.3. Just transfer and taxation

If an individual's acquisition of an unowned resource respects the Lockean Proviso, then, according to right-libertarians, she should be free to do with those resources as she chooses, – provided, of course, that her so doing does not interfere with others. This includes choosing to transfer them to others by way of exchange, gift or bequeathal. Any such Proviso-respecting voluntary transfer is deemed by right-libertarians to be just.

Unlike exchange, gift or bequeathal, the payment of tax is not ultimately a voluntary transfer as, in the last resort, the state can extract payment from an unwilling citizen by force. Individuals are therefore not free to do as they choose with the monies they pay in tax and, thus, right-libertarians regard taxation as state interference with individuals' rights over their ownership of objects external to the self. In addition, Nozick (1974) regards taxation as interfering with their self-ownership, arguing that "Taxation of earnings on labour is on a par with forced labour" (p169) as one is forced to work for a certain number of hours to earn the money to pay one's taxes. Thus, the state becomes

> a part owner of you; it gives them a property right in you. Just as having such partial control and power of decision, by right, over an animal or inanimate object would be to have a property right in it (p172).

For these sorts of reasons, right-libertarians are generally wary of taxation, with those who support limited taxation doing so only because they believe it necessary for the provision of certain public goods and the correction of certain market failures. (For more on this see Appendix 1.)

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4.4. The Lockean Proviso

The Proviso's requirement to leave "enough and as good" is a requirement that no-one be left worse off subsequent to another's act of acquisition. But worse off in what sense? Clearly, if I acquire a previously unowned resource X, then, in one sense, all others are worse off in that they themselves cannot now acquire X. However, for right-libertarians this is not the relevant sense of the term. For example, Narveson takes the view that because resource X that I am acquiring is unowned and is thus not anybody's property, then in acquiring X, I cannot be said to be interfering. According to Narveson (1999, p216), the only restriction the Lockean Proviso places on initial acquisition

> is that we not interfere with what others *already have*. The fact that [initial acquisitions] deprive the others of the opportunity to do with X any of the things that are incompatible with initial users' uses of X is irrelevant. There are innumerable mutually incompatible uses of anything. Someone's realizing one of them rather than any of the indefinitely many others that consequently go unrealized cannot, just as such, count as an interference with anyone's liberty. That would be like saying that I interfere with you by virtue of you not being me.

Other right-libertarians interpret the Proviso differently. Imagine Person A, living off resources R but without taking them into ownership. Others then come along and acquire R leaving Person A without access to them. Right-libertarians such as Nozick (1974) and Mack (2002b) interpret the Lockean Proviso as requiring that, subsequent to the acquisition of R, Person A should be left no worse off than she was prior to the acquisition. Now, if Person A can find some alternative unowned resources R* to live off that leave her as well or better off than when she was living off R, all well and good. But what if all resources have been acquired and so she has no access to unowned resources? To survive in this situation, propertyless Person A will likely have to work for persons with property.[29] However, if what she is paid for her labours allows her to obtain resources that leave her as well or better off than she was from her labours with respect to R, then, again, all well and good. However, if Person A ends up less well off after the acquisition of R by others, then according to Nozick (1974, p178) and Mack (2002b, p250) she should be compensated to the point where she is as well off as before the acquisition. By contrast, Narveson holds that even if Person A does end up worse off subsequent to the acquisition of R, as she owned nothing prior to their acquisition, there has been no interference *with regard to what she already owned* and so should she not be compensated.

Right-libertarians hold that in a free-market society (one in which no taxation is required) or a largely free-market society (one with limited taxation to provide certain public goods) it is likely that, as acquisition and transfer proceed, individuals will generally become better off and thus the Proviso (under either interpretation) will generally be satisfied.[30] Cohen (1995, p85) sums up the right-libertarian argument thus:

> When there is nothing left to appropriate, the situation of those who have appropriated nothing is to that extent worse than it would have been, but capitalist mechanisms of production and distribution ensure that they are more than adequately compensated for their loss of freedom of access to resources that are not privately owned.[31]

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[29] She could, of course, be maintained by charitable giving on the part of others.

[30] See Narveson (1999, p218-20, 225) for his discussion of Nozick and Mack's interpretation of the Proviso.

[31] Cohen is not a right-libertarian but an egalitarian liberal and his summary of the right-libertarian position appears within the context of his critique of this position.

In a similar vein, Mack (2002b, p247) argues

> The contention of friends of private property and free markets is that the systematic establishment and expansion of private property rights, of voluntary trading of private property, of associated forms of contractual relationship, and of the incentives and distinctive creative forces associated with market orders characteristically on net expand what is available for use by individuals who participate in those orders.[32]

4.5. Unequal wealth

Whilst right-libertarians take the view that market orders characteristically on net expand what is available for use by the individuals who participate in them, they also hold that what exactly individuals end up with

> will depend…on the capacities and skills that they respectively have, develop, and exercise and on how other individuals choose to exercise their capacities and skills in interaction with them. Since individuals differ significantly in the capacities and skills that they respectively have, develop, and exercise and in how other individuals choose to exercise their capacities and skills in interaction with them, the resulting entitlements of individuals will differ significantly (Mack, 2002a, p77).

In other words, the right-libertarian doctrine

> includes the proposition that…individuals may readily become entitled to substantially unequal extra-personal holdings. According to this proposition, under perfectly ordinary and morally acceptable circumstances, significant inequalities are apt to arise among the holdings of individuals and, if they arise by ordinary and morally acceptable means, these inequalities will be perfectly licit (Mack, 2002a, p76).

This discussion of right-libertarian paves the way for a discussion of the notion of "the commons" in the following section. The discussion in Section 5 draws mainly upon that in Section 4.2 but also (in Section 5.4) draws upon on the right-libertarian conclusion set out above that individuals can legitimately come to hold substantially unequal amounts of wealth.

5. The commons revisited

5.1. Three kind of commons

As noted in Section 3.2.2, the term "commons" is used in three differing ways within the literature. Two of the uses describe pre-appropriative states. For instance, when Locke uses the term he is referring to those parts of the originally *commonly-owned* world that have not been privatized and, thus, remain commonly owned. (Let's call a commons in this sense, C1). However, when contemporary philosophers use the term, they are referring to those parts of the originally *unowned* world that have not been acquired and, thus, remain unowned.[33] (Let's call a commons in this sense, C2). By contrast, the third use of the term refers to a post-appropriative

[32] See also Nozick (1974, p177).

[33] See, for example, Schmidtz (1997) and Mack (2002a, p102).

state, for when people talk of, for example, the Swiss Commons, they are referring to a form of jointly owned private property.[34]

The "atmosphere-as-commons" and "sinks-as-commons" arguments for EPCA outlined in Section 3.2 are explored below. Some of these "commons arguments" use, or appear to use the term "commons" in the C1 sense whilst others appear to use it in the C2 sense. I say "appear to use" as writers are not always explicit about the sense in which they are using the term. And this is not surprising for, as noted in Section 1, most of the writers making commons arguments for EPCA are "non-philosophers" and so will be unfamiliar with the philosophical literature regarding the original ownership status of the world.

5.2. The atmosphere as C1

5.2.1. Arguments 1 and 2

Under common ownership "everyone initially owns everything" (Wenar, 1998, p804) and, thus, everyone is initially a *joint and equal* owner of everything, including the atmosphere. And if the atmosphere has never been privatized, then everyone has continued to own it equally through to the present day. And if everyone today *equally* owns the atmosphere, then everyone has the right to emit *equally* into it. And this right to emit equally can be operationalized by implementing EPCA. The argument for the atmosphere being commonly owned (Argument 1) can be stated formally thus:

> *Premise 1*: In the beginning, the atmosphere was commonly owned
> *Premise 2*: Since the beginning, the atmosphere has not been privatized
> *Conclusion*: The atmosphere is today commonly owned i.e. is C1

And using the conclusion of Argument 1 as its first premise, the argument for EPCA (Argument 2) can be stated formally thus:

> *Premise 1*: The atmosphere is today commonly (jointly and equally) owned i.e. is C1
> *Premise 2*: Equal ownership of the atmosphere gives owners the right to emit equally into it
> *Conclusion*: EPCA should be implemented

Clearly, the right to emit equally in Premise 2 is a right relating to the *totality* of emissions and this is one of the reasons why, in Section 2, EPCA is defined as the equal per capita allocation of *total* emissions rights.[35]

5.2.2. Barnes and Argument 1

Barnes, quoted in Section 3.2.1, makes a version of Argument 1 (Argument 1.1) with the following Premise 2:

> *Premise 1*: In the beginning, the atmosphere was commonly owned
> *Premise 2*: The atmosphere is not something that can be privately owned
> *Conclusion*: The atmosphere is today commonly owned i.e. is C1

To justify Premise 1, Barnes (2001, p53) invokes theology.

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[34] These three uses are set out in Narveson (1999, p212).

[35] The previous discussion allows a clearer distinction to be drawn between a C1 and C3 commons. Although both are jointly owned, a C1 commons is owned equally by the global population without any appropriative action being required, whilst a C3 commons is owned by a small subset of the global population, is legitimately owned as the result of just appropriation or transfer and need not necessarily be owned equally.

> The sky is a gift from our common creator. It wasn't given to a government, and certainly not to private corporations. We, the meek, are its inheritors.

However, as noted in Section 4.2.1, contemporary libertarians do not accept such theological justifications. Whether there are any non-theological justifications for Premise 1 is explored in Section 5.4 but first Premise 2 is discussed. Barnes (pp46-7) seeks to justify this premise by citing Roman law which, he claims, holds that the atmosphere is not an entity susceptible to privatization. This claim in examined below.[36]

5.3. The atmosphere and Roman law

Roman law divided things (*res*) into various categories. Land was taken to be originally unowned (*res nullius*) and, through the process of acquisition, could become privately owned (*res privatae*), state owned (*res publicae*) or owned by a corporate body (*res universitatis*). However, in contrast to land, certain *res* were not regarded as susceptible to private ownership and were held to be commonly owned (*res communes*). As Rose (2003, p93) puts it

> *Res communes* encapsulates what might be called the Impossibility Argument against private property: The character of some resources makes them incapable of "capture" or any other act of exclusive appropriation.

A famous passage (Section II.1.1) from the Justinian Institutes[37] (Cooper, 1968, p70) states that the atmosphere is one of the things that are *res communes*.

> By the law of nature these things are common to mankind – *the air*, running water, the sea, and consequently the shores of the sea (emphasis added).

However, Roman law distinguished two aspects of the air: (1) *airspace*, that is, the space above the earth's surface, and (2) the *air molecules* which move around within airspace. According to Cooper (1968, p69, 71)

> The distinction between "air" and "airspace" was as clear in Roman law as it is today. The legal status of the air (or atmosphere) which men breathed was not the same as that of the space through which the air circulated…The Roman jurists of the classical period, as well as the compilers of the Justinian Digest and Institutes, usually distinguished between the words "aer," as the atmosphere we breathe, and "coelum," as the area (sky or airspace) in which the air circulates.

As noted in Section 3.2.1, Barnes' discussion of the atmosphere emphasizes its greenhouse gas storage capacity. And as it is *airspace* in which greenhouse gases are stored, I take Barnes to be arguing that it is airspace that is unsusceptible to private ownership and, thus, *res communes*. Thus formally stated, I take his argument (Argument 1.2) to be

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[36] Barnes can appear ambivalent about the sense in which the atmosphere is a commons for, though arguing that the atmosphere is C1 (Argument 1.1), at times he seems to suggest that it might be C2. For example, at one point (Barnes, 2001, p45) he writes "Who owns – or should own – the sky?" And at another (p62), he writes

> One day it hit me: The carbon storage capacity of the sky is a very valuable asset. But whose asset is it? I didn't see anyone around who owned it – who, as an owner, could limit usage and charge prices. Maybe we needed to find an owner, I thought. But who might this be?

Perhaps Barnes is ambivalent, or it maybe he holds that *morally* the atmosphere is equally owned by all, but that *legally* no arrangements are in place to reflect this and so only in a legal sense does an owner need to be found. Certainly, Meyer (2000, p55) is ambivalent as to whether the atmosphere is C1 or C2 – see Section 9.1.

[37] The "Institutes" was a work on Roman law commissioned by the Emperor Justinian and completed in 533 CE. See Cooper (1968, p61, n16).

Premise 1: In the beginning, airspace was commonly owned
Premise 2: Airspace is not something that can be privately owned
Conclusion: Airspace is today commonly owned i.e. is C1

Barnes' version of Argument 2 (Argument 2.2) would then go

Premise 1: Airspace is today commonly (jointly and equally) owned i.e. is C1
Premise 2: Equal ownership of airspace gives owners the right to emit equally into it
Conclusion: EPCA should be implemented

However, the Justinian Institutes do not, in fact, support Argument 1.2. For as Cooper (1968, p71) notes, when the Justinian Institutes state that the air is "common to mankind" it is not airspace but *air molecules* to which they are referring.

> "Coeleum" (airspace) was subject to *private and exclusive rights*. "Aer" (air) was common to all men. There was no confusion. One represented an area and the other the element used for breathing (emphasis added).

But as we shall see not all of airspace was regarded as subject to private and exclusive rights.

5.3.1. How much airspace can be privately owned?

Airspace was regarded as subject to private and exclusive rights because, as Cooper (1968, p57) explains

> Land and *usable* space…necessarily constitute a *single social unit*. Usable space is not an appurtenance to the land below but with such land forms the basic integrated sphere of human activity…(emphasis added)

Land and usable airspace constitute a single social unit precisely because ownership of airspace above an owned piece of land is necessary for the owner to make use of and enjoy their land. For example, to construct a house on my land and a fence around its perimeter requires building into airspace.[38] Hence, if some else could take ownership of this airspace, I could be prevented from doing anything on my land, even walking upon it. Or if the airspace above my land was unowned then my neighbour would be at liberty to hang numerous garish flags over my garden.[39] Or this neighbour, along with the neighbour on my other side could build a bridge across my garden and tap dance across it with impunity.[40]

But if ownership of the airspace above an owned piece of land is necessary, up to what height should this ownership extend? The English common law maxim of *cuius est solum eius est usque ad coelum* (literally *for whomsoever owns the soil, it is theirs up to the sky*) which developed in the sixteenth century held that an owner of a piece of land owned the airspace above that land out to the edge of the atmosphere. However, whilst the maxim developed out of Roman law, Roman law itself did not take this view, holding only that *usable* airspace was owned. Commenting on the maxim, Cooper (1968, p85) notes that

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[38] As Justice William Douglas once said in the Supreme Court of the Unite States (Gray, 2006, p7), a landowner must have

> exclusive control of the immediate reaches of the enveloping atmosphere [since otherwise] buildings could not be erected, trees could not be planted and even fences could not be run.

[39] Provided, of course, the flagpoles were sunk into the earth of her garden and didn't touch my garden fence.
[40] Again, provided no part of the bridge touched my garden fence.

> Roman law was never guilty of extravagant statements of private property rights…Roman law protected the needed rights of the landowner to the use and enjoyment of space above his lands…implying, though not stating, that these space rights constituted "dominium" (ownership) but without fixing definitely the height in space to which these rights extended.
>
> But nowhere in the original Roman texts has been found any statement that the owner of the surface also owned the space above "up to the skies" or "to infinity" (as the maxim is capable of being translated and interpreted). It is at this point that the maxim may be charged with having a non-Roman origin.

Right-libertarian Rothbard (1982, p85) takes the view that the maxim "never made any sense, and is therefore overdue in the dustbin of legal history". And he takes this view because, in order to make full use of one's land, it is not necessary to own the airspace above out to the edge of the atmosphere. What he therefore advocates (p85) is the "zone" theory, an approach which appears very similar to that taken by Roman law and

> which asserts that only the lower part of the airspace above one's land is owned; this zone is the limit of the owner's "effective possession." As Prosser defines it, "effective possession" is "so much of the space above him as is essential to the *complete use and enjoyment* of the land" (emphasis added).[41]

A similar position is taken within English law (Thompson, 2006). In 1974, Lord Wilberforce dismissed the *cuius est solum* maxim as

> so sweeping, unscientific and unpractical a doctrine [that it] is unlikely to appeal to the common law (p10).

And in 1978, Justice Griffiths noted that the maxim would lead to the absurdity that an action of trespass could be brought each time a satellite passed over a suburban garden (p11). Gray and Gray (2006, pp7-8) neatly summarize the position of English law thus.

> The definition of 'land' must also comprise some sector of the airspace above ground level, since the surface owner would otherwise constitute a trespasser in that airspace as soon as he sets foot on his land…The common law thus draws a pragmatic distinction between two different strata of airspace.
>
> *The lower stratum* The lower stratum of airspace comprises that portion of the immediately superjacent airspace whose effective control is necessary for the landowner's reasonable enjoyment of his land at ground level. This stratum is unlikely in most cases to extend beyond an altitude of much more than 150 or 200 metres above roof level, this being roughly the minimum permissible distance for normal overflight by any aircraft (see Rules of the Air Regulations 1996 (SI 1996/1393), Sch 1, r 5(1)(e))…
>
> *The higher stratum* It is clear that the maxim *cuius est solum*…has no relevance at all to the higher stratum of airspace which lies beyond any reasonable possibility of purposeful use by the landowner below.

[41] Rothbard is here quoting Prosser (1971, p70).

Let's call the height up to which ownership of airspace is necessary to ensure enjoyment of land, Height H. Given that airspace can be owned up to Height H, then clearly Premise 2 in Argument 1.2 does not hold. But on the other hand, given that Height H is only a few hundred metres about roof level and that the vast majority of airspace therefore clearly lies above Height H, it could be argued that Roman law would have regarded airspace above Height H as *res communes*.

However, whilst contemporary libertarians such as Rothbard accept that private ownership of airspace should extend only to Height H, they hold (as noted in Section 4.2.1) that, prior to acquisition, the world is not commonly owned (*res communes*) by unowned. Thus, for contemporary libertarians, Premise 1 in Argument 1.2 does not hold. I consider philosophical challenges to this contemporary libertarian view in Section 5.4 but before doing so I briefly discuss the other aspect of the atmosphere described under Roman law, air molecules.

5.3.2. Air molecules and Roman law

Consider the following version of Argument 2 (Argument 2.3).

> *Premise 1*: Air molecules are today commonly (jointly and equally) owned i.e. are C1
> *Premise 2*: Equal ownership of air molecules gives owners the right to emit equally into airspace
> *Conclusion*: EPCA should be implemented

Even assuming Premise 1 held and everyone owned air molecules equally, Premise 2 does not appear to hold for, as greenhouse gases are emitted into airspace, it is surely equal ownership by all of *airspace* rather than of *air molecules* that grants the right to emit equally into airspace. Furthermore, we cannot assume that Premise 1 does hold. For it to do, the following argument (Argument 1.3) would have to be valid.

> *Premise 1*: In the beginning, air molecules were commonly owned
> *Premise 2*: Air molecules are not something that can be privately owned
> *Conclusion*: Air molecules are today commonly owned i.e. is C1

Whilst, in Roman times, air molecules might not have been regarded as susceptible to private ownership, in the modern era they can certainly be taken into private ownership, for example by compressing them into metal cylinders for use in industrial processes and diving. Thus, in the modern era, Premise 2 does not hold. And, of course, contemporary libertarians have exactly the same objections to Premise 1 in Argument 1.3 as they do to the premise in all other versions of Argument 1. Thus, I now turn to challenges to the contemporary libertarian position that, in the beginning, the world was originally unowned.

5.4. Original ownership and the burden of proof

Nozick (1974) takes the view that nature was originally unowned. However, Cohen (1995, p94) responds that Nozick's view is nothing more than a "blithe assumption". Mack (2002b, p240) responds that

> Despite Cohen's description of Nozick's belief as a "blithe assumption"…surely the default position about "raw worldly resources"…is simply that they are unowned. In the absence of credible positive arguments for some form of original proprietorship over nature, the assumption that raw worldly resources are originally unowned is not blithe at all.

Mack's position would appear to be that the view of nature as originally unowned is the common sense view, the view that is the most obvious or plausible. This view therefore constitutes the default position and anyone proposing an alternative needs to produce "credible positive arguments". However, Wenar (1998, p804) questions the libertarian view that the burden of proof lies with proponents of common original ownership.

> Modern theorists…might think that the universal-ownership construals of the starting state cannot be motivated without an appeal to quaint theological premises. Or at least the burden should be on the proponent of universal-ownership to say why it should be thought that everyone initially owns everything, rather than that everyone initially owns nothing.
>
> Yet is it so obvious that this second assumption needs less justification than the first? None of the possible states of nature is, after all a rights-vacuum. In the no-ownership scenarios each person has the natural right to create property rights in herself – is this less contentious than that each person should be vested with property rights from the start? Moreover, the no-ownership variants give each inhabitant of the state of nature the right of using (even using up) what others may want or need, while the common-ownership states give each equal say in determining the disposition of the resources that all might use. When phrased in these terms – in terms of "equal freedom" versus "equal voice" – it seems less likely that no-ownership can win by default.

Wenar is here arguing from a natural rights perspective and, thus, his arguments apply only to natural rights approaches to libertarianism.[42] However, by no means all libertarians are natural rights theorists.[43] And, furthermore, those who are could respond to Wenar by arguing that original self-ownership is indeed less contentious than original common ownership of the world. They could argue that, given human nature, a natural right of self-ownership is entirely plausible whereas, in the absence of the world being gifted by God to humanity, it is (far more) plausible to regard it as initially belonging to no-one (being vested with no property rights from the start) rather than initially belonging equally to everyone (being vested with property rights in all of nature from the start).

Right-libertarians might further respond that, though Wenar's objects that no-ownership variants give individuals "the right of using (even using up) what others might want", such a right is perfectly legitimate from their perspective though, of course, constrained by the requirements of the Lockean Proviso (see Section 4.4.). Moreover, left-libertarians might question Wenar's contention that no-ownership leads to inequality. For example, Vallentyne (2005) argues that no-ownership with a suitable interpretation of the Lockean Proviso will lead to egalitarian ownership of resources (See Section 8). And Vallentyne also questions whether, in practice,

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[42] Wenar (2007) summarizes the natural rights perspective as follows.

> All natural rights theories fix upon features that humans have by their nature, and which make respect for certain rights appropriate. The theories differ over precisely which attributes of humans give rise to rights, although non-religious theories tend to fix upon the same sorts of attributes described in more or less metaphysical or moralized terms: rationality, free will, autonomy, the ability to regulate one's life in accordance with one's chosen conception of the good life.

[43] Mack and Gaus (2004, p116) set out "a dozen doctrinal elements that unify the liberty tradition" but note that

> Behind the doctrinal unity lies a diversity of deeper philosophical strategies – for example, deontological, contractarian, or consequentialist strategies – for vindicating some set of versions of these normative doctrinal elements.

common ownership leads to "equal voice". If everything is owned by everyone, then, in theory, if one person wishes to privatize a particular bit of nature, the consent of everyone else is required – and so, *in theory*, they have equal voice. But although, in theory, this may be so, Vallentyne (2005) argues that, *in practice*, logistical considerations will make obtaining the consent of all "impossible, extremely difficult, or expensive".[44]

This is surely not the last word on the matter, and, no doubt, Wenar and others have responses to counter the arguments set out above. However, that said, it does seem the case that the majority of contemporary philosophers hold the world to be originally unowned rather than originally owned in common.

5.5. The atmosphere as C2

In contrast to Barnes, Müller's justification for EPCA does not depend upon him hold the atmosphere to be C1. Müller (1999, pp7-8) writes

> It is not difficult to see what would be involved in giving a moral justification for the per capita proposal. All we need to do is to treat our quota distribution problem as something akin to the process of establishing individual property rights for a common good, namely the atmosphere as repository of anthropogenic emissions. Assuming that individual people – as opposed to, say, nation states – are taken to be the rightful claimants, the per capita proposal will be justified by arguing on egalitarian grounds that everyone has an equal claim on this common good.

Müller's talk of "establishing" individual property rights in the "common good" that is the atmosphere suggests that he takes the view that property rights in the atmosphere have yet to be established and that the atmosphere is therefore unowned i.e. C2. And given Müller's focus on the atmosphere as a "repository" for emissions – that is, on *airspace* – I take Müller to be making the following argument (Argument 3).

> *Premise 1*: In the beginning, airspace was unowned
> *Premise 2*: Since the beginning, airspace has not been acquired
> *Conclusion*: Airspace is today unowned i.e. is C2[45]

And, thus, I take Müller's argument for EPCA to be as follows (Argument 4):

> *Premise 1*: Airspace is today unowned i.e. is C2
> *Premise 2*: On "egalitarian grounds" everyone has an "equal claim" to (emit into) airspace
> *Conclusion*: EPCA should be implemented

Note that, whilst, in Argument 2, the right to emit equally into airspace follows from it being *commonly owned*, this is not so in Argument 4. The right to emit equally follows instead from an *equal claim* on *unowned* airspace. I return to the notion of an equal claim in Section 5.7.[46]

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[44] Locke ([1689] 1986, p20) similarly notes that "If such a consent as that was necessary, man had starved, notwithstanding the plenty God had given him".

[45] If airspace above owned land is owned up Height H, then only airspace above Height H is C2.

[46] When he states that individuals have an equal claim to the atmosphere, Müller appears to mean that individuals should be able to establish an equal quantity of "individual property rights" in airspace. Assuming ownership of land bestows ownership of airspace up to Height H, then, given that the areas of land owned by individuals differ considerably in size, they will own different volumes of airspace below Height H. So, presumably, acquisition above Height H would have to be such that it resulted in each individual owning the same quantity of total air space (i.e. airspace below Height H + airspace above Height H). But how exactly would this be achieved? Would individuals

5.5.1. Brief thoughts on the state

Given that the 1919 *Paris Convention for the Regulation of Aerial Navigation* recognized the full sovereignty of states over the airspace above their land and territorial sea (Shaw, 2003), it might be argued that that airspace above Height H is not unowned (i.e. C2) but is, instead, owned by the state. But, if the state does own airspace, then, of course, airspace cannot be a commons either in the C1 or C2 sense. And hence proponents of EPCA cannot make a commons argument for this allocation! Alternatively, if it is argued that nation states simply manage airspace on behalf of their citizens who are its joint and equal owners (i.e. that airspace is C1), then, as has been discussed, the proponent of EPCA is faced with the challenge of showing Argument 1 to be valid.[47]

5.6. Sinks as C1 and C2

We now move from "atmosphere-as-commons" arguments for EPCA to "sinks-as-commons" arguments. As noted, the majority of philosophers reject the notion of original common ownership and just as this would lead them to reject the notion of the atmosphere as C1, so it would lead them to reject the notion of sinks as C1. And it seems that when non-philosophers argue that sinks are a commons, they are implicitly arguing that they are so not in the C1 but in the C2 sense.

Argwal and Narain, quoted in Section 3.2.2, state elsewhere in their paper that they regard sinks as part of the "common heritage of humankind" (1991, p7). This is a gender-neutral version of the term "common heritage of mankind" which entered the domain of international law in 1967. In 1970, a UN General Assembly Declaration declared the sea-bed and the ocean floor to be a common heritage of mankind, a declaration which paved the way for the deep sea-bed and the ocean floor beyond the limits of national jurisdiction to be declared a common heritage of mankind under the *Law of the Sea Convention* concluded in 1982. And in 1979, the *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* declared the moon and its resources to be a common heritage of mankind (Baslar, 1998, ppxix-xx). Baslar notes (pxx) that various attempts have been made to have other resources including the atmosphere (though, seemingly, not sinks) declared a common heritage of mankind, but goes on to report (p116) that in 1988, the UN General Assembly

> refrained from using the common *heritage* of mankind language in the case of the atmosphere when they adopted a resolution declaring that "climate change is a common *concern* of mankind" (emphasis added).

However, even had the atmosphere, or, for that matter, sinks been declared a common heritage of mankind this would not necessarily have clarified the issue of original ownership because, according to Baslar, differing interpretations have been placed on the term. For example, Vyver (1992 p 485) takes the view that the common heritage of mankind is "a contemporary version of the Roman Law concept of *res…communes"* whereas Baslar himself (1998, p39) rejects this interpretation, arguing that a "non-property" interpretation of the concept is appropriate. Thus, Argawal and Narain's use of common heritage language does not in itself clarify whether their view is of sinks as C1 or C2. However, in the passage quoted in Section 3.2.2, the authors note that

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be expected to engage in some specific act of initial acquisition with regard to a particular chunk of airspace? If so, what would such an act be and how would the particular chunk acquired be demarcated? The notion of individual acquisition of airspace does seem somewhat strange. Schmidtz (1997, pp43-4) appears to take a similar view when he writes that there is "no foreseeable prospect of being able to privatize the air…[as] it is difficult to parcel out…".

[47] I thank Kevin Anderson for forcing me to clarify my thinking with regard to the state.

> The question is how should this global common – the global carbon and methane sinks – be shared amongst the people of the world?

Given that the authors are asking how sinks *should* be shared out, it would appear that they regard them as not yet shared out and hence as C2.[48] And, likewise, Grubb (1995, p483) appears to regard sinks as C2.

> The allocation of emissions rights addresses the fundamental question: having discovered that the global commons – in this case, the assimilative capacity of the atmosphere – is a limited and hitherto unclaimed resource, how should it be divided…?

Strictly speaking, the phrase "assimilative capacity of the atmosphere" refers only to the atmospheric processes that destroy methane and nitrous oxide (see Section 3.1.3). However, though Grubb refers only to the sinks for these two gases, I interpret him here as holding that the global commons consists of the sinks for all greenhouse gases. And by using the term "unclaimed", he appears to hold that sinks are unowned i.e. C2. Thus the implicit argument (Argument 5) that appears to be made by Argwal and Narain and by Grubb can be stated formally thus:

> *Premise 1*: In the beginning, sinks were unowned
> *Premise 2*: Since the beginning, sinks have not been acquired
> *Conclusion*: Sinks are today unowned i.e. are C2

And if sinks are C2, an equal claim to sinks is required as a justification for EPCA. Thus, I take Argwal and Narain's implicit argument for EPCA (Argument 6) to go as follows.

> *Premise 1*: Sinks are today unowned i.e. are C2
> *Premise 2*: On "egalitarian grounds" everyone has an "equal claim" to these sinks
> *Premise 3*: An equal claim of all to sinks i.e. to the processes that remove greenhouse gases from airspace, gives all a right to emit equally into airspace
> *Conclusion*: EPCA should be implemented[49]

5.7. Conclusion

The holding bay properties of airspace and the processes that remove greenhouse gases from airspace are part of what we might call nature's greenhouse gas removal system. And whilst those who argue for EPCA on the basis of the atmosphere or sinks being a commons are

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[48] If sinks were C1, everyone would already have an equal share.

[49] Müller suggests that an equal claim to the airspace is a claim to establish equal property rights in airspace. Similarly, it might be suggested that an equal claim to sinks is a claim to establish equal property rights in sinks.

As noted in Section 3, the processes that result in the gross removal of greenhouse gases from the atmosphere involve the atmosphere, land and oceans. And with regard to the atmosphere, these "sink processes" involve chemical reactions between greenhouse gases emitted into it and other molecules already present. Hence, whereas the relevant aspect of the atmosphere with regard to "atmosphere-as-commons" arguments for EPCA is airspace, the relevant aspect with respect to "sinks-as-commons" arguments is, I think, air molecules.

Now, either individual property rights to sink processes are established by establishing property rights to the objects that are the basis of those processes i.e. the land, air molecules and the oceans or independently of establishing such property rights. The first alternative presumably commits the proponent of an equal claim to sinks to arguing that each individual should own equal portions of the land, atmosphere and oceans. I am not aware of proponent of EPCA who has made this case. Furthermore, if ownership of land bestows ownership of its sink capacity, then, as the vast majority of the world's land is currently owned, land sinks could not today be a commons in the C2 sense. With regard to the second alternative, I find it very difficult to make any sense of the notion of establishing a property right to a sink process independently of establishing a property right to its basis.

highlighting one particular aspect of the system, they are perhaps arguing that the system as a whole is a commons.

Now if the greenhouse gas removal system is a commons in the C1 sense then an equal claim to the system follows from it being equally owned. However, as discussed, there is little philosophical support for such equal ownership. Of course, equal ownership cannot be the basis of an equal claim to the greenhouse gas removal system if it is a commons in the C2 sense but such a claim would arise if everyone had the right to combust an equal quantity of fossil fuel – and, thus, to release an equal quantity of emissions. But as we shall see in Sections 6 to 8, none of the three approaches to justice discussed in this paper – right-libertarianism, egalitarian liberalism and left-libertarianism – straightforwardly endorse the right of all to combust equally.

6. Right-libertarianism and the allocation of emissions rights

Right-libertarians may well regard airspace about Height H as currently unowned. However, it seems to me that a right-libertarian approach to emissions allocation does not require the private ownership of airspace or, for that matter, sinks (though for some brief and speculative thoughts on private ownership of sinks, see Appendix 2). Instead, it seems that the right-libertarian approach can most easily be framed in terms of ownership of fossil fuel, something straightforwardly amenable to private ownership.[50]

To explore this approach, imagine a one-country world[51] consisting of a right-libertarian society in which all property has been acquired by just acquisition and transfer and in which, as a result of individual differences in talents and abilities, (significant) inequalities in the holdings of wealth have justly arisen. As a result, the purchase of fossil fuel and electricity generated from fossil fuel – and, thus, energy emissions – varies substantially (but legitimately) between individuals. In addition, the purchase of other goods and of services – and, thus, OG&S emissions – varies substantially (but legitimately) between individuals. One day, climate change is discovered and, as good right-libertarians, everyone accepts that, in order to prevent harm to both current and future generations from the impacts of climate change, atmospheric concentrations of greenhouse gases need to be stabilized at a level not that much greater than at present.[52,53] This requires a substantial reduction in greenhouse gas emissions which, in turn, requires a substantial reduction in the combustion of fossil fuel.

Given that each individual's total (energy + OG&S) emissions are legitimate, it seems likely that a fair approach to emissions reduction within this right-libertarian world would be deemed to be one that required all individuals to reduce their emissions (and thus their direct and indirect combustion) by a given percentage i.e. a pure grandfathering solution.[54,55]

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[50] As noted in Section 2, for simplicity, this paper only considers emissions from the combustion of fossil fuel.

[51] As noted in Section 1, Sections 6 to 8 explore justifications for EPCA within a nation and a one-country world is a device for exploring such justifications.

[52] I take it that such harm would constitute interference – see Section 4.1.

[53] In fact, my impression is that, historically, right-libertarians have often been sceptical, sometimes vehemently so, about climate change.

[54] "Grandfathering" is the allocation of emissions rights to participants in an emissions trading scheme in proportion to their previous emissions.

[55] Appendix 1 discusses right-libertarian attitudes to the provision of public goods. An example of a public good much used in text books and elsewhere is that of clean air – see, for example, Begg et al (2005, p282) and Casal (1999, p364). Similarly, an atmosphere with a concentration of greenhouse gases sufficiently low to offer a high probability of avoiding dangerous climate change is a public good. From the discussion in Appendix 1, it can be seen that it would likely be a matter of some debate between right-libertarians as to whether the market could provide this public good or whether some sort of state intervention (for example a state-run emissions trading

6.1. The rectification of injustice in holdings

In his discussion of a just allocation of emissions rights between nations, Müller (1999, p8) remarks that

> most actual proponents of grandfathering are likely to embrace a theory of just acquisition and transfer of property rights – such as the one proposed by Robert Nozick.

However, those who truly embrace a right-libertarian theory of just initial acquisition and transfer could support a grandfathering regime, only if present-day holdings had – as in the right-libertarian world described above – arisen in strict accordance with this theory. But, given the world history, there will be few, if any, who would argue that this is the case. For, as Kymlicka (2002, p111) notes

> The historical answer is often that natural resources came to be someone's property by force. This is a rather embarrassing fact for those who hope Nozick's theory will defend existing inequalities.

The existence of historical injustices poses a problem for the right-libertarian. For whilst any inequalities resulting from a history of just acquisition and transfer would be *legitimate*, such inequalities would differ from today's *illegitimate* inequalities. How, then, should the right-libertarian proceed? In the absence of the first two elements of his theory of just holdings, namely just initial acquisition and transfer, Nozick (1974, p230-1) proposes that the third and final element, namely the rectification of injustice in holdings, should come into play. Ideally, this would involve estimating the distribution of holdings that would prevail today in the absence of all historical injustices and redistributing holdings accordingly. However, acknowledging the sheer impossibility of such a task, Nozick (1974, pp230-1) suggests that, as a one-off rectification, resources might be redistributed in accordance with Rawls' egalitarian liberal theory of justice. However, after this one-off rectification, right-libertarian justice would apply. As the following section shows, there is more support within egalitarian liberal theories of justice for EPCA, and, thus, perhaps the only occasion on which the right-libertarian might support EPCA is that of Nozick's Rawlsian redistribution!

7. Egalitarian liberalism

The discussion of egalitarian liberalism begins in Section 7.1 with an examination of the role of choice and chance within egalitarian liberal approaches to justice. Section 7.2 introduces the concept of "expensive tastes" and sets out the disagreement between Cohen and Dworkin over how those with such tastes should be treated. Expensive tastes are among the factors that influence an individual's use of both energy and certain other goods and, as Section 7.3 explains, the quantity of energy and certain other goods to which individuals would be entitled under Cohen's version of egalitarian liberal justice differs from that to which they would be entitled under Dworkin's version. However, the section concludes that, under both versions, individuals would be entitled to *unequal* quantities of energy and certain other goods. Section 7.4 goes on to explore the relationship under egalitarian liberal justice between an individuals' entitlement to energy and certain other goods and their entitlement to energy emissions and OG&S emissions, concluding that their entitlement to these emissions would also be *unequal*.

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scheme) would be required. Right-libertarian, Jan Lester (personal communication, April 2007) takes the view that state intervention would not be necessary as emissions rights could be allocated by private libertarian courts.

Up to this point, the discussion has focused upon entitlements to energy and emissions *under* egalitarian liberal justice. However, the real-world question for the egalitarian liberal policy-maker is what, today, *in the absence of* egalitarian liberal justice, would constitute a fair entitlement to emissions. Section 7.5 argues, roughly speaking, that in the absence of such justice, individuals' entitlement to emissions should *in theory* reflect their entitlement to energy under such justice. Thus, the section concludes that, in the absence of egalitarian liberal justice, a fair allocation of emissions rights (i.e. a fair entitlement to emissions)[56] would, in theory, be an *unequal* allocation. Section 7.6 goes on to explore the feasibility of implementing this unequal allocations and Section 7.7 argues that if it proves unfeasible, then, *in practice*, the fairest allocation would be EPCA. Section 7.8 concludes.

7.1. Introduction

For right- and left-libertarians, just initial acquisition plays a critical role in determining the just allocation of resources. However, egalitarian liberals do not, by and large, concern themselves with issues of initial acquisition as, for them, justice is concerned with

> The question of the fair division of the fruits of social cooperation…in the context of societies many generations removed from acts of original acquisition (Vallentyne et al, 2005, p213-4).

As their name suggests, *egalitarian* liberals hold that the division of these fruits of social cooperation should result in *equality* between individuals. But as Dworkin (1981b, p185) remarks

> Equality is a popular but mysterious political ideal. People can become equal (or at least more equal) in one way with the consequence that they become unequal (or more unequal) in others. If people have equal income, for example, they will almost certainly differ in the amount of satisfaction they find in their lives. It does not follow, of course, that equality is worthless as an ideal. But it is necessary to state, more exactly than is commonly done, what form of equality is finally important.

So what exactly is it that egalitarian liberals hold is "finally important" to equalize between individuals? Or, to rephrase the question in the language of political philosophy, what is it that they hold to be the appropriate *equalisandum*? There is widespread agreement that it is not *resources*.

> The norm of equality of resources stipulates that to achieve equality…everybody [should receive] a share of goods that is exactly identical to everyone else's and that exhausts all available resources to be distributed. A straightforward objection to equality of resources so understood is that if Smith and Jones have similar tastes and abilities except that Smith has a severe handicap remediable with the help of expensive crutches, then if the two are accorded equal resources, Smith must spend the bulk of his resources on crutches whereas Jones can use his resource share to fulfil his aims to a far greater extent. It seems forced to claim that any notion of equality of condition that is worth caring about prevails between Smith and Jones (Arneson, 1989, p77-8).

For Arneson, Smith and Jones receiving the same quantity of resources is unsatisfactory as it results in Smith experiencing less *welfare* than Jones. So is the form of equality that is finally important between individuals, equality of welfare? In fact, most egalitarian liberals also reject

[56] The phrases "entitlement to emissions" and "allocation of emissions rights" are used interchangeably in Section 7.

welfare as the appropriate equalisandum, Arneson (p83-4) setting out his reasons for doing so as follows.

> Equality of welfare is a poor ideal. Individuals can arrive at different welfare levels due to choices they make for which they alone should be held responsible. A simple example would be to imagine two persons of identical tastes and abilities who are assigned equal resources by an agency charged to maintain distributive equality. The two then engage in high-stakes gambling, from which one emerges rich (with high expectation of welfare) and the other poor (with low welfare expectation). In [this] example…it would be inappropriate to insist on equality of welfare when welfare inequality arises through voluntary choice of the person who gets less welfare.

Here Arneson rejects equalizing welfare when welfare inequalities arise as the result of *choice*. But what if they arise not as the result of choice but of *chance*? Individuals' physical capacities (for example, Smith's handicap and Jones able-bodiedness), their mental capacities and the social circumstances into which they are born are matters of chance – the result, as Rawls (1971, p74) puts it, of the "natural lottery". And egalitarian liberals argue that inequalities arising from differences in such capacities and circumstances are unjust. Thus, if Alice experiences less welfare than Bob as the result of being born with less natural capacities and into a less wealthy and supportive family, then this inequality is unjust and Alice is entitled to extra resources to lessen, and if possible, eliminate the welfare inequality. However, if Alice experiences less welfare than Bob as the result of choosing to gamble, then the inequality is not unjust and Alice is not entitled to extra resources to lessen or remove it.

Hence, Arneson cannot support *resources* as the appropriate equalisandum, as equalizing resources fails to address welfare inequalities that arise as a matter of chance and he cannot support *welfare* as the appropriate equalisandum as equalizing welfare inappropriately eliminates welfare inequalities that arise as a matter of choice. Thus, Arneson proposes that what, in fact, should be equalized between individuals is their *opportunity for welfare*. Under this proposal, all individuals receive a quantity of resources that, given their capacities and circumstances, provides them with an opportunity to achieve a particular level of welfare. However, it is their personal choices with regard to these resources (for instance, whether or not to gamble with them) that determines the level of welfare actually achieved.[57] A similar view is taken by Cohen (1989) who advocates the equalisandum of *access to advantage*.[58]

However, Cohen's view on the role played by choice in the fair allocation of resources differs significantly from that of Dworkin. And as this difference is relevant to the allocation of emissions rights under egalitarian liberal justice, it is briefly discussed below.

7.2. Cohen and Dworkin on expensive tastes

The difference between Cohen and Dworkin centres around so-called *expensive tastes*. In his discussion of such tastes, Dworkin (1981a, p229) introduces Louis who

[57] Note that Arneson (1999) has moved away from endorsing *opportunity for welfare* as the appropriate equalisandum. Nevertheless, it is useful to set out the reasons for his original endorsement. First, they are based on clear objections to *resources* and *welfare* as the appropriate equalisanda. Second, they provide a useful route to introducing Cohen's views in Section 7.2. And third, opportunity for welfare is discussed by some left-libertarians, for example, Otsuka (2003) in Section 8.1 and Vallentyne (2005).

[58] In his paper, Cohen usefully sets out the differences between opportunity for welfare and access to advantage.

> sets out deliberately to cultivate some taste or ambition he does not now have, but which will be expensive in the sense that once it has been cultivated he will not have as much welfare on the chosen conception as he had before unless he acquires more wealth. These new tastes may be tastes in food and drink: Arrow's well-known example of tastes for plovers' eggs and pre-phylloxera claret. Or they may (more plausibly) be tastes for sports, such as skiing, from which one derives pleasure only after acquiring a skill; or, in the same vein, for opera; or for a life dedicated to creative art or exploring or politics.

Thus, an expensive taste (e.g. for plovers' eggs and pre-phylloxera claret) is one that requires more money to provide the level of welfare resulting from more standard or ordinary tastes (e.g. for hens' eggs and beer).[59] Cohen (1989, p923) contrasts Louis' *chosen* expensive taste with that of Paul, whose expensive taste is *unchosen*.

> Paul loves photography, while Fred loves fishing…Prices are such the Fred pursues his pastime with ease while Paul cannot afford to. Paul's life is a lot less pleasant as a result: it might even be true that it has less meaning than Fred's does. I think the egalitarian thing to do is to subsidize Paul's photography…Paul can afford to go fishing as readily as Fred can. Paul's problem is that he hates fishing and, so I am permissibly assuming, could not have helped hating it – it does not suit his natural inclinations. He has a genuinely involuntary expensive taste and I think a commitment to equality implies that he should be helped in the way that people like Paul are helped by subsidized leisure facilities.

Cohen (p923) continues

> I distinguish among expensive tastes according to whether or not their bearer can reasonably be held responsible for them. There are those which he could not have helped forming and/or could not now unform, and then there are those for which, by contrast, he can be held responsible, because he could have forestalled them and/or because he could now unlearn them. Notice that I do not say that a person who deliberately develops an expensive taste deserves criticism. I say no such severe thing because there are all kinds of reasons why a person might want to develop an expensive taste, and it is each person's business whether he does so or not. But it is also nobody else's business to pick up the tab for him if he does. Egalitarians have good reason not to minister to deliberately cultivated expensive tastes, and equality of welfare must, therefore, be rejected.

However, Dworkin (2000, p289) takes a very different view to Cohen, arguing that the distinction between chosen and unchosen expensive tastes

> which Cohen claims to be fundamental, is illusory. Louis…cultivated refined tastes, because, given his royal Bourbon heritage, he thought such tastes appropriate to him: he had, we might say, a taste for refined tastes. But that background taste out of which he acted, is no more "traceable" to choice that the photographer's taste for photography.

[59] Dworkin explains that it is not irrational for Louis to adopt an expensive taste for even though, when measured on *society's* conception of welfare, his welfare diminishes, when measured on his own *differing* conception of welfare, his welfare increases.

> It would not help if Cohen were to describe Louis's operative taste as "second order", and then propose a principle that compensated for uncultivated first-order but not second-order tastes. Cohen's "cut" between choice and luck is meant to be a deep one, and in whatever way he supposes that his photographer would suffer if he could not afford expensive lenses, so Louis would have to suffer if he found to his dismay, that he continued to enjoy TV dinners…So equality of opportunity for welfare or advantage, as Cohen understands it, is not after all a distinct political ideal. It collapses back into the simply equality of welfare he wants to abandon. If we are not responsible for the upshot of any of our "expensive" tastes, on the grounds that we did not choose those tastes, then we are not responsible for any of them, and the community is obliged, according to his principle, to see that we suffer no comparative financial disadvantage in virtue of any of them.

Dworkin is here arguing that, as *all* expensive tastes are ultimately unchosen, Cohen is committed to providing extra resources to *everyone* with an expensive taste such that they can experience levels of welfare equal to those experienced by individuals with ordinary tastes. But Dworkin (2004, p347) rejects such a course of action, summarizing his "entire argument" as one

> that people should bear the consequences of their choices even when these choices are made out of tastes they have in no way chosen or cultivated.

This means that *no-one* with expensive tastes – whether their tastes are in a first order sense chosen or unchosen – should be entitled to the additional resources that would provide them with the opportunity to equalize their welfare with those with ordinary tastes. Dworkin (2000, p290) argues his case thus.

> Cohen's argument is actually an argument for simple equality of welfare, and that argument depends on drawing the chance/choice distinction differently from the way I do. My distinction tracks ordinary people's ethical experience. Ordinary people in their ordinary lives, take consequential responsibility for their own personalities. We know that when we make decisions, grand and small, that will shape our lives, we must struggle against or accommodate or submerge or otherwise come to terms with our inclinations, dispositions, habits, and raw desires, and that we do this in the service of our judgements and convictions of various kinds, including moral convictions about what is fair to others and ethical judgements about what kind of life would be appropriate or successful for us. We do not think that we have chosen these various judgements and convictions from a menu of equally eligible alternatives, the way we might choose a shirt from a drawer or dishes from a menu. True, it is up to us what we read, or listen to, or whether to study or ponder, and for how long and in what circumstances. But it is not up to us what, having done what we have done in this way, we conclude. We nevertheless do not count the fact that we have reached some particular moral or ethical conclusion as a matter of good or bad luck. That would be to treat ourselves as dissociated from our personalities rather than identified with them – to treat ourselves as victims bombarded by random mental radiation. We think of ourselves differently – as moral and ethical agents who have struggled our way to the convictions we now find inescapable. It would strike us as bizarre for someone to say that he should be pitied, or compensated by his fellow citizens, because he had the bad luck to have decided that he should help his friends in need, or that Mozart is more intriguing than hip-hop, or that a life well lived includes foreign travel.

According to Wolff (2007, p131) the debate between Cohen and Dworkin "remains unsettled".[60] It is not here my intention to argue for one viewpoint over the other but simply to flag up the implications of each for the allocation of emissions rights.

7.3. Entitlements to energy and other goods under egalitarian liberal justice

Expensive tastes are among the factors that influence an individual's use of energy and certain other goods. This section examines some of these factors and assesses what a fair entitlement to energy and these certain other goods would be under both Cohen and Dworkin's versions of egalitarian liberal justice.

7.3.1. Susceptibility to the cold

Bodily comfort is an important component of welfare. And how much a person feels the cold will influence the amount of heating and the quantity of warm clothing they require to maintain bodily comfort. As Cohen (1989, p920) explains

> People vary in the amount of discomfort which given low temperatures cause them, and, consequently, in the volume of resources which they need to alleviate their discomfort. Some people need costly heavy sweaters and a great deal of fuel to achieve an average level of thermal well-being. With respect to warmth they have what Dworkin calls expensive tastes: they need unusually large doses of resources to achieve an ordinary level of welfare.

I think that Cohen is here mistaken to refer to susceptibility to the cold as an expensive taste. Dworkin (2000, p286) distinguishes between

> a person's *personality*, understood in a broad sense to include his character, convictions, preferences, motives, tastes and ambitions, on the one hand, and his *personal resources* of health, strength and talent on the other (emphasis added).[61]

With regard to this distinction, a person's tastes (expensive or otherwise) are part of their *personality* whereas the extent to which they feel the cold is as feature of their *personal resources*.[62] And in common with other egalitarian liberals, Dworkin (2000, p286) holds that

> a political community should aim to erase or mitigate differences between people in their personal resources.

Hence, it would seem that under both Cohen and Dworkin's versions of egalitarian liberal justice, those who feel the cold would be entitled to additional energy and warm clothing so as to provide them with the opportunity to equalize their welfare with those who don't feel the cold to such a degree. I refer here to susceptibility to the cold an *expensive bodily condition* and, whilst the claim that those with this condition should be entitled to additional energy and warm clothing might seem uncontroversial, it is helpful to make explicit the assumptions that lie behind it.

It is an oft-repeated truth that what individuals ultimately desire is not energy but the services (heating, lighting, kettle boiling and so forth) that energy can provide. With regard to heating, let's say that a unit of service is the raising of a dwelling's temperature by one degree Celsius.

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[60] Their most recent exchange is Cohen (2004) followed by Dworkin (2004).

[61] Dworkin refers to the equalisandum he endorses as "resources". However, for Dworkin these include *personal* resources and so, for him, the phrase "equality of resources" has a different meaning to that it has when used by Arneson in Section 7.1 who is referring to equality of *extra-personal* resources only.

[62] Dworkin (2004, p346) elsewhere defines an individual's personal resources as "their physical state and other capacities or handicaps". Susceptibility to the cold is certainly an aspect of a person's physical state.

The amount of energy required to deliver a unit of service (i.e. the energy efficiency of delivery) depends upon two factors: the rate of heat loss from the dwelling and the system of heating used. Thus, a house with loft insulation, cavity-wall insulation and double glazing will lose heat (much) less quickly than a comparable house with no loft insulation, un-insulated solid walls and single glazing. And, thus, less energy will be required to deliver a unit of service. For a house with a given heat loss, a gas central heating will use less energy delivering a unit of service than electric heating using electricity generated from a conventional gas-fired power station. Such an electric heating system is only around 30% efficient whilst a modern central heating system with a gas condensing boiler has an efficiency of 80% or more.[63] Therefore, between two and three times as much gas will be used delivering a unit of service via such electric heating (which explains why such heating is more expensive to run).

As well as requiring warmer clothes, an individual who feels the cold will need to keep her house warmer, and will thus consume a greater number of units of heating service, than an individual who doesn't. However, if this latter individual lives in a dwelling that is heated by gas-generated electricity and that experiences significant heat loss, it is entirely possible that he could consume more energy than the former, if the former lives in a well insulated property with gas central heating.[64] Hence, in claiming that, under egalitarian liberal justice, those who feel the cold would be entitled to a greater quantity of energy, I am assuming – for reasons set out in the following paragraph – that, unlike today, individuals would deliver heating services at similar energy efficiency.

In the UK today, a number of poor home-owning households are not able to afford the insulation and double glazing required to reduce heat loss in their homes. And neither can they afford the installation costs of replacing their electric heating with a less energy-intensive and cheaper-to-run gas central heating system. Furthermore, other poor households have no choice but to rent a property with significant heat loss and/or electric heating. Hence, these households end up using greater amounts of energy for heating. Egalitarian liberals hold that those who are poor are so, in large part, as a result of the capacities and starting place in society they received in the natural lottery. And as they hold that individuals should not be poor simply as a consequence of the natural lottery, it is likely that, under egalitarian liberal justice, those who are currently poor would become entitled to (considerably) greater wealth. Hence, under such justice, these individuals could afford to purchase (or rent) dwellings that delivered heating services more efficiently.

7.3.2. Living arrangements

In developed countries, individuals not in a relationship generally live alone if they can afford to do so. And, as Table 1 shows, to heat and power their homes, individuals living alone use, on average, more than half the energy used by couples who share a dwelling and have no children living with them. (The issue of children is discussed below in Section 7.3.4.)

Some individuals live alone because they have a strong natural inclination to do so. In other words they do so as the result of an unchosen expensive taste. And other individuals live alone because, although they have a strong natural inclination to be in a relationship, they just haven't managed to find the right person.

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[63] A gas-fired power station is roughly 40% efficient and there is a roughly 10% loss of electricity during transmission and distribution.

[64] Energy consumed = energy consumed per service x units of service consumed. So even if the latter individual consumes a lower number of services, their total energy consumption can be greater if they consume services more inefficiently i.e. if the energy they consume per service is sufficiently higher.

Period	Average weekly residential energy expenditure of non-retired households (£)		A as % of B
	One person (A)	*One man and One women (B)*	
2006	11.30	17.80	63%
2005/6	10.30	15.30	67%
2004/5	8.80	14.40	61%
2003/4	9.00	14.00	64%
2002/3	8.90	13.20	67%
2001/2	9.00	13.30	68%

Table 1: Weekly residential energy expenditure[65]

Given that the inclination to be single or in a relationship is a matter of chance, as is the failure of a relationship-seeker to find a suitable partner, it seems that Cohen would support providing single individuals with an entitlement to additional residential energy and thus an opportunity to equalize their welfare with those living in a couple.[66] However, as Dworkin requires individuals to bear the consequences of their tastes, he would not, I think, support such an entitlement.

7.3.3. Location of dwelling

Areas of a country vary in terms of average temperature and how urban or rural they are. Individuals living in a colder area of a country will require additional heating (i.e. additional units of heating service) and additional warm clothes to achieve a given level of bodily comfort. And assuming that individuals can deliver a unit of heating service at similar efficiency, then those who live in colder areas will require more energy for heating.

Individuals living in the countryside need, on average, to travel greater distances in order to live their lives. For example, in the UK, the average distance *travelled* by individuals living rurally is 35% greater than the national average. And the average distance *driven* by individuals living rurally is 49% greater than the national average (Gray, 2001, p8). As Gray (p7) notes

> Rural households rely more on the car, own more cars, make more journeys over longer distances and spend more per week on motoring than those from more densely populated localities. Greater reliance on the car in rural areas is likely to be partly a function of people living further away from basic shops and services and having less access to public transport.

With regard to motoring, let's call driving one kilometre a unit of service. If each unit of service was delivered at the same efficiency, then, given their greater mileage, rural dwellers would, on average, require a greater quantity of motor fuel to live their lives (i.e. to experience a comparable level of welfare to that of more urban dwellers). Or as Gray (p11) puts it

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[65] Data in Table 1 provided by the Expenditure and Food Survey team of the Office of National Statistics, March 2008. For example, the data for 2005-6 is disaggregated data from Dunn and Gibbins (2007), Table A25 *Expenditure by household composition, 2005–06* (p122). The data in Table 1 is not equivalized.

[66] The results of chance have been described as "brute luck" (Dworkin, 1981b). Similarly to Arneson, Cohen holds that brute luck inequalities should, where possible, be eliminated (see Section 7.1). As he puts it (Cohen, 1989, p931)

> …a large part of the fundamental egalitarian aim is to extinguish the influence of brute luck on distribution…Brute luck is an enemy of just equality, and, since effects of genuine choice contrast with brute luck, genuine choice excuses otherwise unacceptable inequalities.

Unchosen expensive tastes are examples of brute luck, as is the ability to find a suitable partner.

> Given the greater reliance on the car, it may have been expected that rural households would spend considerably more on transport than those in more densely populated areas.

However, he notes that

> the greater weekly mileage of motorists in less densely populated areas is offset by better fuel consumption on less congested roads.

In other words, rural dwellers can, on average, deliver a unit of service more efficiently than urban dwellers. Nevertheless, according to Gray (p11) their increased service efficiency does not entirely offset their increased mileage as

> People living in the least densely populated local authorities…accounting for 21% of the UK's population, spend more on motoring and slightly more on overall travel costs than those in more densely populated areas.

Given their greater average mileage, rural dwellers may get through more car tyres in a given period and may need to replace their vehicles more frequently. Thus, it can be seen that living in a cold and/or rural area can be expensive in terms of energy and certain other goods. Furthermore, it would seem that this expense can result from unchosen first-order tastes. For example

1. Some people have a strong unchosen taste to move out to the country.

2. Some people have a strong unchosen taste to work in particular occupations, for example agriculture and forestry, which are likely to require them to live in more rural areas.

3. A person may have gone into a particular occupation as the result of an unchosen taste and, after a period of unemployment as a result of her previous employer going bust, may feel she should accept a job offer that would take her and her family to a colder area of the country.

4. A person may feel that he should move to the country to look after his aged parents.[67]

5. A person may be born into a community in a cold, rural area where community ties and tradition are such that he cannot envisage living any life other than one in that community.

It seems that Cohen would support providing individuals (such as those in the above examples) who, as the result of an unchosen taste, live rurally and/or in a cold region with an entitlement to additional energy and certain other goods such as warm clothing and car tyres. However, given his view that individuals should bear the consequences of their tastes, Dworkin, I think, would not.

7.3.4. Children

Burley (1998, p138) argues that

> Given the high costs associated with having children, it is clear that the preference for offspring amounts to what Dworkin calls an expensive taste.

[67] In the passage from Dworkin (2000) quoted in Section 7.2, Dworkin suggests that the decision to help others (he refers specifically to friends in need) results from an unchosen taste for doing so.

Furthermore, Burley (p140) observes that "individuals to do not deliberately develop the preference for children".

> We could argue that the preference for children is instinctual. Indeed it would be spurious to deny wholly that there is such a thing as a procreative instinct. Alternatively we could argue that the preference for children is deeply ingrained in individuals during childhood by a series of socialization processes. Or we could highlight the pressures on people in their adulthood from family and society at large to explain why individuals are not responsible for their preference for children. Perhaps the most persuasive vein of argument would be that the preference for children is involuntary due to the combination of nature and nurture (p139).

Now, *if*, as Burley suggests, the preference for children is an unchosen expensive taste, then Cohen, in contrast to Dworkin, would favour providing additional resources to parents. But I say *if* because, whilst the preference for children may be *unchosen*, we might question Burley's assumption that it is *expensive*. As support for her case, Burley (p138, n34) quotes research from 1989 estimating the cost of raising a child to the age of 18 as around $100,000 for an American middle-class family. And moving forward seventeen years, research indicates that in 2006 the average cost of raising a child in the UK to the age of 21 was £186,000 (Smithers, 2007). However, the fact that it is expensive to raise children is not enough to show the preference for children is an expensive taste.

Consider a couple that has expenditure E in the year prior to the birth their first child (Year 1). Note that we are here considering the couple's entitlement to resources under egalitarian liberal justice, and I assume that under such justice individuals are generally relatively well off. Thus, I assume that expenditure E allows the couple a comfortable life. The couple's expenditure remains constant in the year following the birth of their child (Year 2) and allows them to provide the child with high level of welfare.[68] In this case, the claim that the preference for children is an expensive taste is the claim that the couple will derive less welfare from expenditure E in Year 2 than in Year 1. It is surely the case that, generally speaking, when a couple decides to have a child, they do so in the expectation that, following the birth, their welfare will not decrease and may increase.[69] And, this expectation that their welfare will be equal to or greater than that pre-childbirth would not (necessarily) seem to depend upon expectations of higher expenditure post-childbirth. Indeed, presumably higher expenditure is not possible for all couples post-childbirth. Thus, it seems plausible to suggest that, at least in some instances, the preference for children is not an expensive taste.[70]

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[68] Their expenditure might remain constant as a result of the couple's income (and savings) remaining constant in Years 1 and 2. For instance, it may be that only the man that worked in both years (receiving no pay increase in Year 2). Or the couple's expenditure could remain constant at the same time as their income falling. For instance, say that both partners were in employment before their baby was born but planned that the mother would stay at home in the year after the baby's birth. They recognized that in Year 2 their income would likely drop, for whilst the father's salary might rise slightly, this rise would more be more than offset by the difference between the mother's salary in Year 1 and her maternity pay in Year 2. Hence, the couple saved in Year 1 so as to be able to draw upon these savings and keep their expenditure in Year 2 at the Year 1 level.

[69] According to Dworkin, welfare can be defined either as (1) success in fulfilling one's preferences, goals, and ambition or (2) one's desirable conscious states or emotions. Let's say a couple starts out with a preference for not having children (yet). Then, some years later, they decide to have children. Under the first definition, their welfare presumably remains constant as in both cases the couple are fulfilling their preference. However, under the second, it is possible that their welfare increases i.e. that their conscious states and emotions become more intensely desirable.

[70] If a couple's preference is for a (very) large number of children, then it is more likely to be expensive.

Type of energy use	Household type	Weekly energy expenditure of UK households (£)					
		First quintile	Second quintile	Third quintile	Fourth quintile	Fifth quintile	Total
2006							
Residential	Children	15.70	20.60	20.60	22.20	26.40	22.70
	No Children	15.30	15.50	16.00	17.10	21.20	17.80
Transport	Children	9.30	19.90	20.20	27.20	32.10	25.60
	No Children	*9.80*	15.10	18.50	23.30	31.20	22.80
Total	Children	25.00	40.50	40.80	49.40	58.50	48.30
	No Children	*25.10*	30.60	34.50	40.40	52.40	40.70
2005-6							
Residential	Children	10.80	14.00	14.20	15.70	19.90	16.30
	No Children	*11.20*	13.90	14.00	13.90	17.30	14.70
Transport	Children	10.60	13.10	18.10	23.20	30.90	23.10
	No Children	9.80	13.20	17.60	21.70	27.20	20.50
Total	Children	21.40	27.10	32.30	38.90	50.90	39.40
	No Children	21.00	27.10	31.60	35.60	44.50	35.30
2004-5							
Residential	Children	10.50	12.40	13.30	15.00	18.50	15.20
	No Children	*11.40*	*13.00*	*13.70*	13.20	16.10	14.00
Transport	Children	11.00	13.10	17.50	22.20	29.80	22.20
	No Children	10.30	*13.50*	16.80	20.60	26.10	19.70
Total	Children	21.40	25.50	30.80	37.20	48.30	37.40
	No Children	*21.70*	*26.50*	30.40	33.80	42.20	33.70
2003/4							
Residential	Children	10.50	12.80	12.80	14.50	17.90	14.80
	No Children	*11.80*	11.80	12.70	12.50	15.20	13.20
Transport	Children	10.80	12.40	17.30	21.30	29.00	21.50
	No Children	9.90	12.50	16.50	19.70	25.50	19.00
Total	Children	21.30	25.20	30.10	35.80	46.90	36.30
	No Children	*21.70*	24.30	29.30	32.20	40.60	32.30
2002-3							
Residential	Children	10.90	12.80	12.80	14.70	18.10	14.90
	No Children	*11.80*	11.80	12.70	12.50	15.20	13.20
Transport	Children	10.60	13.30	16.40	20.70	27.90	20.70
	No Children	9.60	12.70	16.00	20.20	25.90	19.20
Total	Children	21.50	26.10	29.20	35.40	46.00	35.60
	No Children	21.40	24.50	28.80	32.70	41.10	32.50
2001-2							
Residential	Children	11.10	13.00	12.60	14.20	18.30	14.90
	No Children	10.60	12.20	12.40	12.50	15.80	13.30
Transport	Children	9.50	13.50	16.00	20.90	26.70	20.30
	No Children	8.70	11.70	16.50	20.10	25.00	19.00
Total	Children	20.50	26.50	28.70	35.10	45.00	35.20
	No Children	19.30	23.80	28.90	32.60	40.80	32.20

Note:

The first quintile is least wealthy 20% of population and fifth quintile, the wealthiest.

Figures in italics represent those instances where energy consumption in households without children is greater than in comparable households with children.

Table 2: A comparison of energy use in households with and without children

Here is another way of expressing the argument. I assume that under egalitarian liberal justice, childless couples' wealth will allow not only subsistence expenditure but a reasonable level of non-subsistence expenditure. Assuming that couples' expenditure remains constant, it seems plausible to suggest that when, post-childbirth, a proportion of their non-subsistence expenditure goes on their child, there will be some couples that won't experience a drop in welfare compared to the pre-childbirth period in which all their non-subsistence expenditure was spent upon themselves.

Table 2 compares energy expenditure in the UK of two-adult households with children and two-adult households without and, almost without exception, those households with children spend more on energy than those without.[71] So whilst the preference for children may not be an expensive taste *overall*,[72] it may be expensive in terms of *energy*.[73]

However, consider the following scenario. A couple plan to have children but have yet to do so. They have a love of theatre, live music and fine dining, pleasures in which they indulge as often as they can afford. They also have a penchant for travel and so most weekends they are out in their camper van exploring various parts of the country. And during their holidays they either drive their camper van abroad or fly to lands further afield and hire a camper van when they reach their destination.

Having got the travel bug out of their system, the couple have two children in quick succession. Their expenditure remains at the same level as that prior to the birth of their first child.[74] Obviously, there is a financial cost to having children. Just before the birth of their first child, the couple move to a larger house with larger mortgage payments. And, in addition, there is the cost of the children's' food, clothing, toys, ballet/karate/music lessons and so on. However, the couple are happy to cut back on going to the theatre and to live music, on fine dining, on their weekend travel and on holidays abroad. The result is that with constant expenditure, the couple are able to provide a high level of welfare for their children and the welfare they themselves experience is as great, if not greater, than prior to the children coming along. In other words, for this particular couple, their preference for children has not proved to be an expensive taste overall.

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[71] Data in Table 2 provided by the Expenditure and Food Survey team of the Office of National Statistics, April 2008. For example, the data for 2005-6 is disaggregated data from Dunn and Gibbins (2007), Table 3.6 *Expenditure of two adult households with children by gross income quintile group* 2005-6 (p45) and Table 3.8 *Expenditure of one man one woman non-retired households by gross income quintile group* 2005-6 (p49). Note that the individuals in a minority of the households in Table 3.8 will not be living as a couple. In these households, expenditure on energy may be higher as, for example, the individuals may make separate shopping trips by car whilst couples may go shopping together in the same car or one member of the couple will go shopping for both. The data in Table 2 is not equivalized.

[72] If the preference for children in not expensive overall, Cohen would not support parents receiving additional resources. It is worth noting that Casal (1999) argues that, even if children constitute a public good, parents should not receive additional resources on this basis.

[73] Let's take welfare to consist of desirable conscious states or emotions (see Footnote 69). And under this definition, let's assume that a couple experiences W units of welfare pre-childbirth and 1.4W units of welfare post-childbirth. Pre-childbirth, the couple use E units of energy and, post-childbirth, 1.3 units of energy. Thus, post-childbirth, less energy is used per unit of welfare. Of course, welfare cannot (straightforwardly) be quantified like this, but the purpose of this example is to suggest that, given this particular definition of welfare, the fact that a couple uses more energy post-childbirth does not *necessarily* mean that their preference for children is expensive in terms of energy.

[74] When the children are young the mother stays at home. A combination of a slight increase in the father's salary, the mother's maternity pay and the couple drawing on their pre-childbirth savings keeps their expenditure constant. When the children are older the mother goes back to work part-time and her salary plus the fathers increased salary keep expenditure constant.

With regard to energy use, the couple's new house requires more energy to heat, and the number of local trips they make by car increases as a result of, for example, ferrying the kids to and from ballet/karate/music lessons. However, the couple engage in far less weekend travel in the camper van than before they had children. Furthermore, the family's holidays are spent in their home country rather than abroad and involve much less driving than the couple's holidays prior to having children. And due to this substantial decrease in miles driven, the couple's overall energy use proves to be slightly less than that prior to the birth of their children.[75] The aim of this not entirely implausible scenario is to suggest that there may be occasions where, as well as being non-expensive overall, the preference for children is non-expensive in terms of energy use. The preference for children is discussed further in Section 7.5.4.

7.3.5. Conclusion

One way of thinking about a fair egalitarian liberal entitlement to energy and to certain other goods such as warm clothing is to assume that everyone starts out with an equal entitlement (let's call it the "equal starting point entitlement"). This equal staring point entitlement is then adjusted for the relevant factors affecting energy use. For example, if an individual were susceptible to the cold, then Cohen would adjust their starting point entitlement to energy and warm clothes upwards (which would, of course, result in those who weren't susceptible to the cold having their entitlements adjusted downwards). And, if an individual lived alone or lived in a cold and/or rural region of the country, then Cohen would, again, adjust their starting entitlement upwards. In addition, if they lived in a cold region they would have their entitlement to warm clothes adjusted upwards and if they lived rurally they may have their entitlement to car tyres adjusted upwards.[76] By contrast, the above discussion suggests that, only if an individual was susceptible to the cold, would Dworkin adjust their starting point entitlement (to energy and warm clothes) upwards.[77] Hence, whilst under both Cohen and Dworkin's conception of egalitarian liberal justice, individuals would, in theory, be entitled to unequal quantities of energy and certain other goods, given Cohen's view on expensive tastes, the inequalities in entitlement would be greater under his conception.

With regard to energy entitlements, imagine Clive who feels the cold and lives alone in a small rural village in a cold part of a country. This village does not have a bus or train service and so Clive has to rely entirely on private transport. In contrast, Dolores doesn't feel the cold, and, anyway, lives with her partner in a town in a warmer part of the country. The town is blessed with abundant pubic transport and so Dolores does not have to rely solely on private transport. It is conceivable that both Clive and Dolores' circumstances arise as a matter of chance (i.e. from an unchosen susceptibility to the cold and unchosen tastes) and if this were so, then, under Cohen's conception of egalitarian liberal justice, Clive would be entitled to a (significantly) greater quantity of energy than Dolores.

However, Clive and Dolores can be seen as being towards opposite ends of the spectrum of energy entitlements and the differences in entitlement between many individuals, even under

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[75] And as a result of their ceasing to take long haul flights what we might call the couple's indirect energy use (i.e. their indirect combustion that results in OG&S emissions) is substantially less. (Indirect combustion is defined in Section 2.)

[76] I do not here include having children as a reason for parents having their starting point entitlement to energy adjusted upwards. This is because the preference for children is a more complex issue than the other tastes discussed here and is, thus, discussed separately in Section 7.54.

[77] There may be other aspects of an individual's physical condition that, under justice, Dworkin-style, would lead to an upward adjustment of their initial starting point entitlement. Clearly, if someone was having dialysis at home, then their residential energy use would increase. However, at the same time, the constraints of dialysis may mean they are able to travel less than most other individuals. So it is not clear that, overall, renal failure would lead to an increased entitlement to energy. However, there may be other conditions that do.

Cohen's conception of justice, would not likely be so great. Hence, to use a term sufficiently fuzzy to encapsulate both Cohen and Dworkin's views on expensive tastes, we can say that whilst, under egalitarian liberal justice, individual entitlements to energy will be unequal, in general they are likely to be *reasonably equal*.[78] And with this suitably fuzzy terminology in place, Section 7.4 is able to examine the link under egalitarian liberal justice between entitlements to energy and entitlements to emissions.

7.4. Entitlement to emissions under egalitarian liberal justice

Under egalitarian liberal justice, an individual's entitlement to energy will be an entitlement either to fossil-fuel or non-fossil-fuel (i.e. renewable or nuclear) energy. And, clearly, to have an entitlement to fossil-fuel energy (i.e. fossil fuel or fossil-fuel-generated electricity) *is* to have an entitlement to energy emissions. Under an emissions reduction regime, the quantity of fossil fuel available for combustion must decrease year-on-year. Imagine an emissions reduction regime under which, in any given year, the fossil-fuel energy derived from the available fossil fuel is allocated in such a way that each individual's entitlement to total (i.e. fossil + non-fossil) energy consists of the same proportion of fossil-fuel energy. In such a situation each individual's entitlement to *energy emissions* would be proportional to their entitlement to *energy*.[79] However, there is, of course, no reason why such a situation should occur.

For instance, and to return to the previous example, it is, in theory, possible to imagine the energy system of the country inhabited by Clive and Dolores being configured in such a way that Clive's entitlement to energy consists entirely of an entitlement to *renewable* energy whereas Dolores' consists entirely of an entitlement to *fossil-fuel* energy. In this situation, although Clive would, under egalitarian liberal justice (either Cohen- or Dworkin-style), be entitled to a greater quantity of *energy*, Dolores would be entitled to a greater quantity of *energy emissions*.

7.4.1. Some simplifying assumptions

Currently within the UK, nuclear-generated electricity and most renewably-generated electricity enters the grid and becomes part of the general mix. And in many countries where biodiesel is used, it is not sold separately from fossil-fuel diesel but blended with it. Hence, I take a situation where each individual's energy use consists of the same proportion of (non-)fossil-fuel energy as a reasonable approximation of that today. And I therefore assume in the remainder of Section 7 that an individuals' entitlement to energy emissions is proportional to their entitlement to energy. Thus, like their entitlements to energy, their entitlements to energy emissions will not be exactly equal but will be *reasonably equal*.

As noted in Section 7.3, individuals who are entitled to additional energy may also be entitled to additional quantities of other goods such as warm clothes and car tyres. And for simplicity, I assume in the remainder of Section 7 that an entitlement to such goods is proportional to an entitlement to energy. And assuming that in the production of, for example, clothes and car tyres both (1) the efficiency of the production process and (2) the proportion of energy used in production that derives from fossil fuel are constant between producers, then those entitled to additional warm clothes and car tyres will be entitled to additional OG&S emissions.[80] Hence, I

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[78] I am grateful to Ian Duff for requiring me to clarify this point.

[79] Energy emissions [A] = emissions per unit of energy [B] x units of energy used to deliver a unit of service [C] x units of service consumed [D]. An individual's energy use is equal to [C] x [D]. The assumption here is that, for all individuals, [B] is a constant and, thus, that [A] is proportional to [C] x [D].

[80] OG&S emissions [A] = emissions per unit of energy [B] x units of energy used to produce a unit of a good [C] x units of good consumed [D]. I have argued that, under egalitarian liberal justice, those who feel the cold or live in colder regions will require a greater quantity of warm clothing. Conversely, I assume those who don't feel the cold or live in warmer regions will require a greater quantity of lightweight clothing. Thus, I assume that those individuals who feel the cold or live in colder regions will require a greater *mass* of clothing overall. If a unit of

assume that, under egalitarian liberal justice, an individuals' (reasonably equal) entitlement to OG&S emissions would, along with their (reasonably equal) entitlement to energy emissions, be proportional to their (reasonably equal) entitlement to energy.

7.5. Entitlements to emissions in the absence of justice: the theory

7.5.1. First approximation of the argument

Given the above assumptions, then *under* egalitarian liberal justice, an individual's fair entitlement to energy *is* a fair entitlement to energy emissions. However, today, *in the absence of* egalitarian liberal justice, a fair i.e. a reasonably equal entitlement to energy does not prevail. Instead, the (significantly) unequal distribution of wealth within society means that the least wealthy can afford to purchase a (far) smaller quantity of energy than the most wealthy. And hence, today, in the absence of egalitarian liberal justice, the egalitarian liberal who wishes to allocate energy emissions rights fairly must superimpose a fair allocation of emissions rights onto an unfair distribution of wealth and energy.

So what might this fair allocation be? Given the assumptions of Section 7.4.1, I think that, as a first approximation, a plausible answer is that, in the absence of egalitarian liberal justice, the egalitarian liberal would regard a fair allocation of emissions rights to individuals as one that reflected their entitlement to energy under egalitarian liberal justice. To clarify, imagine that, in the absence of such justice, each individual has an equal starting point entitlement to energy and OG&S emissions i.e. the starting point allocation consists of EPCA. Then, if under egalitarian liberal justice, an individual would have their starting point entitlement to *energy* adjusted upwards/downwards, they would, in the absence of such justice, have their starting point entitlement to *energy and OG&S emissions* similarly adjusted upwards/downwards. Below a qualification is made to this first approximation of the argument and in Section 7.5.4 a possible second qualification is discussed.

7.5.2. Adjusted EPCA

Henceforth I refer to this adjusted equal starting point allocation of emissions rights as "adjusted EPCA". And, for the following reasons, I think that the egalitarian liberal would, as a first approximation, hold adjusted EPCA to be fair.

With regard to *energy* emissions rights, I believe they would hold it to be so as, for those who are allocated more (or less) rights than their equal starting-point allocation, their greater (or lesser) allocation will reflect the fact that, under egalitarian liberal justice, they would be entitled to a greater (or lesser) quantity of energy and thus, of energy emissions. And, similarly, I believe they would hold it to be so with regard to *OG&S* emissions, as, for those who are allocated more (or less) OG&S emissions rights than in their equal starting-point allocation, their greater (or lesser) allocation will reflect the fact that, under egalitarian liberal justice, they would be entitled to a greater (or lesser) quantity of certain other goods and, thus, of OG&S emissions.

This notion that, in the absence of egalitarian liberal justice, the allocation of emissions rights should reflect the allocation of energy that would arise under such justice is, I believe, implicit in the views that have been expressed to me during my research into personal carbon trading, both by individuals active in the climate change field and by members of the public. Indeed it is these views that I here couch in philosophical terms. Given their influence, these views are discussed in Appendix 3.

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clothing is defined as, say, a kilogramme of material, then these individuals will be entitled to a greater number of units of clothing [D]. And if, for simplicity, it is assumed that, for all clothing materials, both [B] and [C] are constant, they will be entitled to a greater quantity of OG&S emissions [A].

7.5.3. A qualification

Thus far, I have argued that, in the absence of egalitarian justice, an individual's starting point allocation of emissions rights should be adjusted in the same way that their starting point allocation of energy would be adjusted under egalitarian liberal justice. However, here I introduce a qualification. To explain this qualification, I begin by considering a scenario under which individuals do *not* have their equal starting point allocation of emissions rights adjusted i.e. the allocation is EPCA. And under this scenario, not only are individuals' energy and OG&S emissions proportional to their energy use, but their energy use and, thus, their emissions are proportional to their income.

In Fig 2, AB represents the population ordered by level of emissions – and, thus, income. CD represents the *energy* emissions profile of that population in Year 1, the year prior to the introduction of an emissions reduction regime. The lowest emitter emits AC, the highest emitter emits BD, and total emissions are CDBA. In Year 2, an emissions trading scheme is introduced under which individuals are allocated and must surrender emissions rights to cover their energy and OG&S emissions.[81] Emissions rights are allocated to individuals on an equal per capita basis (EPCA). Thus, the allocation of rights covering *energy* emissions is EFBA, these rights permitting a quantity of energy emissions slightly less than emissions in Year 1 (i.e. CDBA>EFBA).

For simplicity, it is assumed that individuals AH emit at the same level in Year 2 as in Year 1 and, thus, have a total surplus of EGC emissions rights. An equal per capita allocation of rights is one that permits everyone to emit at an *average* level and, thus, individuals AH are *below-average* emitters. Individuals HB wish to emit at the same level as they did in Year 1 but, even though they purchase all EGC emissions rights from individuals AH, they are unable to do so as EGC is necessarily smaller than GDF. Hence, their emissions fall to HGIB, a reduction of GDI.[82] Nevertheless, their emissions are still greater than those permitted by their initial allocation of rights and, hence, they are *above-average* emitters. Having sold their surplus emissions rights, AH (those on lower income) are better off in Year 2 that in Year 1 (by amount EGC) and, conversely, having had to purchase emissions rights and reduce their emissions in Year 2, HB (those on higher income) are worse of than in Year 1.[83]

Amongst the UK population as a whole, OG&S emissions are approximately one and a half times the size of energy emissions (Starkey and Anderson, 2005). For simplicity, it is assumed that the same applies for each individual and, thus, in Fig 3, JK is the profile of OG&S emissions in Year 1 with total OG&S emissions equal to JKBA. In Year 2, emissions rights covering OG&S emissions are allocated on an equal per capita basis (LMBA) with the quantity of OG&S emissions permitted begin slightly less than emissions in Year 1 (i.e. JKBA>LMBA).

For simplicity, it is again assumed that individuals AH emit at the same level in Year 2 as in Year 1 and, thus, have a total surplus of LNJ emissions rights. Individuals HB wish to emit at the same level as they did in Year 1 but, even though they purchase all LNJ emissions rights from individuals AH, they are unable to do so as NOM is necessarily smaller than LNJ. Hence their emissions fall to NOBH, a reduction of NKO. Having sold their surplus emissions rights, AH are again better off in Year 2 than in Year 1 (by amount LNJ), and conversely, having had to purchase emissions rights and reduce their emissions in Year 2, HB are again worse off than in

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[81] As noted in Section 2, the discussion in the paper is couched in terms of individuals being allocated rights covering total emissions. Though the scheme mentioned above does this, it is not, in fact, feasible in practice (Starkey and Anderson, 2005). However, assuming it to be so is the clearest way to make the argument that follows.

[82] CDBA – EFBA = GDI.

[83] If below-average emitters emitted at a higher level than in Year 1 and their surplus was, thus, less than EGC, then above-average emitters would have to reduce their emissions by a greater amount than GDI.

Year 1. Hence, when *total* emissions are proportional to income and when emissions right are allocated on a equal per capita basis, *all* those on low income are better off – by a total of EGC +LNJ.

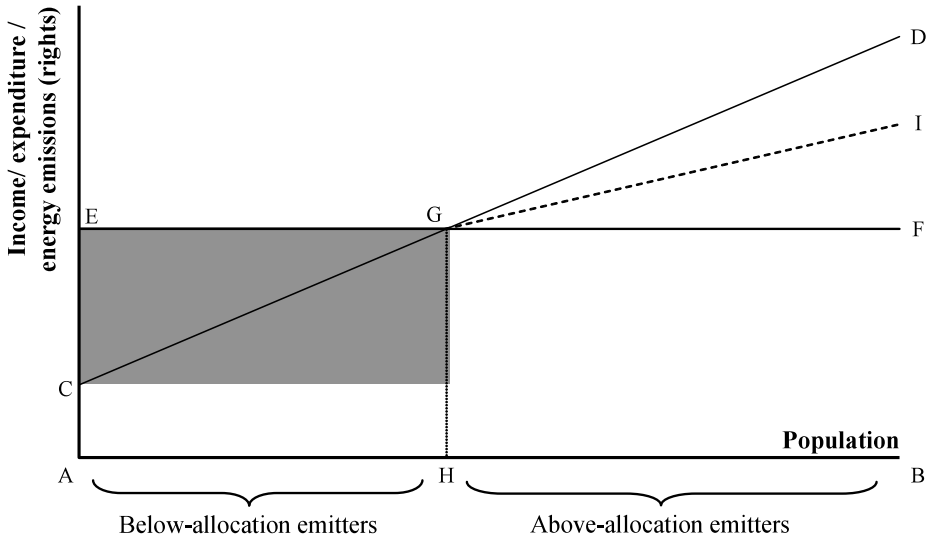

Figure 2: Energy emissions proportional to energy and income

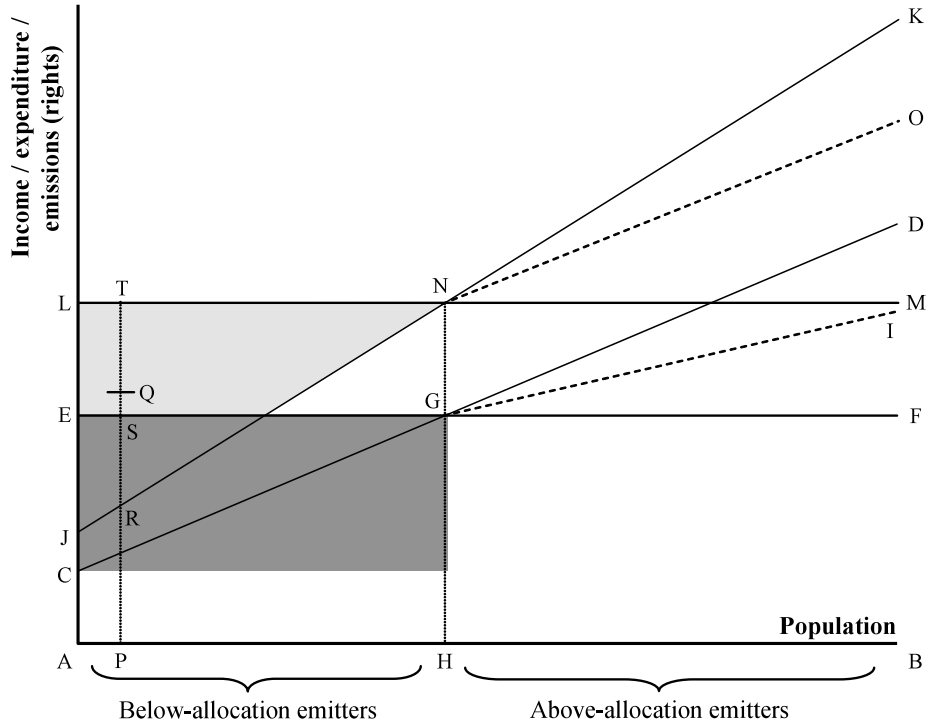

Figure 3: Total emissions proportional to energy and income

However, unlike in the above scenario, *energy* emissions in the real world are not proportional to income. According to Dresner and Ekins (2004), whilst, on average, household energy emissions in the UK rise through the income deciles, there is a wide variation in emissions within each decile. For example, in the lowest two income deciles, although around 70% of households have energy emissions below the national average (i.e. have *below-average* energy emissions), 30%

or so have *above-average* energy emissions.[84] A minority of this latter group have above-average energy emissions due to the high *transport* emissions arising from the travel requirements of rural living. However, in the majority of instances, the above-average energy emissions are due to high *residential* emissions resulting from occupation of a dwelling with significant heat loss and/or an electric heating system (see Section 7.3.1).

However, whilst Dresner and Ekins' research has established that a significant minority of low-income households currently have above-average *energy* emissions, what determines if a household will be better or worse off after the imposition of EPCA is whether the sum of their energy *and* OG&S emissions i.e. their *total* emissions are above or below average. To my knowledge, there is no detailed data available on the relationship between household income and OG&S emissions. However, it is likely that, in general, poorer households will spend less on other goods and services and will have below-average OG&S emissions. And if a poor household has above-average energy emissions, it will be spending a larger proportion of its income on energy and will thus have a smaller proportion to spend on other goods and on services. Hence its OG&S emissions may well be lower than a poor household with below-average energy emissions. And it may be that when this household's *below-average* OG&S emissions are combined with its *above-average* energy emissions the result is *below-average* total emissions. This is illustrated in Fig 3 in which household (or individual[85]) P has above-average energy emissions, PQ. However when combined with its below-average OG&S emissions, PR, its total emissions are below average i.e. PQ + PR < PS + PT. Hence, under EPCA, the percentage of poor households that have below-average *total* emissions, and are thus better off, may, if anything, be greater than the 70% or so with below-average *energy* emissions.

Nevertheless, under EPCA in the real world, there may be some poor households whose total emissions are above-average (i.e. > PS + PT) and who are, thus, worse off than prior the allocation of emissions rights. However, if the equal starting point allocation of the individuals in these households was adjusted upwards to account for their above-average total emissions, this would prevent them from being left worse off. However, is there an egalitarian liberal case for such an upward adjustment?

In Section 7.5.1, I argued that, as a first approximation, those individuals who would be entitled to additional energy under egalitarian liberal justice should be allocated additional emissions rights in its absence. In Section 7.3.1, I suggested that poor individuals who currently use additional energy for heating as a result of having to live in dwellings that deliver heating services *inefficiently* would, under egalitarian liberal justice, be able to occupy dwellings in which such services were delivered *efficiently*. And if *under* such justice there would be no inefficient service delivery, the clearly no one would be allocated additional energy to cover high use due to inefficient service delivery! And given this, then, *in the absence of* such justice, no-one – under the first approximation of the argument – would be entitled to additional energy emissions rights to cover their above-average total emissions resulting from their inefficient delivery of heating services. This suggests a qualification to the argument is required as I think that, in the absence of egalitarian liberal justice, the egalitarian liberal would support an upward adjustment to the starting point allocation of *all* poor individuals with above-average total emissions. For given that the poor would be better off under egalitarian liberal justice, it seems to me that the egalitarian liberal would hold that, in its absence, they should as a minimum, be left no worse off as a result of an egalitarian liberal approach to emissions reduction.

[84] Dresner and Ekins' analysis is in terms of households and here household emissions are, for simplicity, assumed to be proportional to individual emissions.
[85] See previous footnote.

If this is so, then I think that the Cohen-style egalitarian liberal would argue that, in the absence of egalitarian justice, an individual should have their starting point allocation of emissions rights adjusted upwards if they

1. (i) have a bodily condition and/or (ii) have an unchosen taste and/or (iii) experience an unchosen circumstance which would result in their equal starting point entitlement to energy under egalitarian justice being adjusted upwards; and/or
2. have above-average total emissions due to poverty

An example of (iii) is a person who has an unchosen taste to be in a relationship but lives alone as they have not found the right person (see Section 7.3.2). Note that an alternative way of expressing Condition 1 is to say that an individual should have their starting point allocation of emissions rights adjusted upwards if they have (i) a bodily condition and/or (ii) have an unchosen taste and/or (iii) experience an unchosen circumstance that is/are expensive in terms of energy.

In contrast, I think that the Dworkin-style egalitarian liberal would argue that, in the absence of egalitarian justice, an individual should have their starting point allocation of emissions rights adjusted upwards if they

1. (i) have a bodily condition which would result in their equal starting point entitlement to energy under egalitarian justice being adjusted upwards; and/or
2. have above-average total emissions due to poverty

Note that it is Condition 2 in both of these approaches to emissions rights allocation that constitutes the first qualification to the original argument. Note too that, with the addition of this qualification, those on low income are – under both the Cohen-style and Dworkin-style approaches to allocating emissions rights – better off or no worse off than prior to the allocation of rights, whilst those on high incomes are generally worse off. Hence, fittingly for egalitarian liberal approaches to the emissions rights allocation, in the absence of justice, the distribution of wealth in society is, in some small way, moved closer to that which would prevail under such justice.

Finally, note that an energy-efficient alternative to adjusting upwards the equal starting-point allocation of individuals who have above-average total emissions as that result of above-average residential emissions would be for the state to purchase insulation and more efficient heating systems for them. This would have the effect of reducing their energy emissions and, thus, their total emissions to a level at or below their starting point allocation.[86]

7.5.4. A second qualification?

It is important to note that (1) the bodily condition of feeling the cold (2) tastes for living alone, living in a cold area or living rurally and (3) the circumstance of living alone as the result of an unfulfilled preference for being in a relationship, are not only expensive in terms of energy but expensive overall. However, as argued in Section 7.3.4, the preference for children may, in contrast, be expensive in terms of energy at the same time as *not* being expensive overall.

Under egalitarian liberal justice, an individual's entitlement to energy and other goods would be operationalized via money. Let's imagine that under such justice everyone starts out with an equal starting point entitlement to money. Then, those individuals who have bodily conditions, have tastes and/or experience circumstances that are expensive overall would, under Cohen-style justice, be allocated additional money. However, if an individual's preference for children was

[86] This more energy-efficient alternative is explored by Dresner and Ekins (2004).

expensive in terms of energy but not expensive overall, they would not be allocated additional money. Instead, post-childbirth, parents would receive the same amount as pre-childbirth and would simply be expected to spend a greater portion of this amount on energy than they did pre-childbirth.

If a parent's preference for children is expensive in terms of energy but not expensive overall, the question arises as to whether, in the absence of egalitarian liberal justice, their allocation of emissions rights should be based on their preference's expensiveness in terms of energy or its non-expensiveness overall. I do not have a worked-out answer to this question. However, if it should be based on the latter, then a further qualification is required to the Cohen-style approach to emissions rights allocation. Specifically, I think the Cohen-style egalitarian liberal would argue that, in the absence of Cohen-style justice, an individual should have their starting point allocation of emissions rights adjusted upwards if they

1. (i) have a bodily condition and/or (ii) have an unchosen taste and/or (iii) experience unchosen circumstances which would result in their equal starting point entitlement to *energy* and, thus, in their equal starting point entitlement to *money* under egalitarian justice being adjusted upwards; and/or
2. have above-average total emissions due to poverty

An alternative formulation of Condition 1 is to say that an individual should have their starting point allocation of emissions rights adjusted upwards if they have (i) a bodily condition and/or (ii) have an unchosen taste and/or (ii) experience unchosen circumstances that is/are both expensive in terms of energy and expensive overall.

7.5.5. Alternatives to the adjusted EPCA?

Say that, instead of adjusted EPCA, the allocation of emissions rights was (1) inversely proportional to income or (2) on an equal per capita basis but only the poorest third of the population. Under these allocations, those on a low (high) income would be better (worse) off than under the under adjusted EPCA[87] and, thus, the distribution of wealth under these allocations would be closer to that which would prevail under egalitarian liberal justice than would the distribution of wealth under adjusted EPCA. However, the fact that these allocations would have this outcome does not, I think, make them fairer, from an egalitarian liberal perspective, than adjusted EPCA. If an allocation of rights became fairer the closer it moved the distribution of wealth towards that which would occur under egalitarian liberal justice, then rights allocation would simply be a round about means of egalitarian liberal income redistribution. And I do not think that the egalitarian liberal would hold that, in the absence of egalitarian liberal justice, this should be the aim of emissions rights allocation. Hence, in the absence of egalitarian liberal justice, I think the egalitarian liberal would regard a fair allocation as one that (1) *both* reflected what individuals' entitlement to energy would be under egalitarian liberal justice *and* moved the distribution of wealth closer to or, at a minimum, did not move it further away from that would prevail under such justice, rather than one that (2) did *not* at all reflect individuals' entitlement to energy under egalitarian justice *but* that moved the distribution of wealth *closest* to that which would prevail under such justice. Thus, I think the egalitarian liberal would, *in theory*, regard adjusted EPCA as the fair allocation.

7.6. Entitlements to emissions in the absence of justice: the practice

But so much for the theory. What, *in practice*, are the prospects of being able to implement an adjusted EPCA? Adjusting individuals' equal starting point allocation of emissions rights (i.e.

[87] The poor would have a greater number of emissions rights to sell and the rich would have to purchase a greater number.

EPCA) for various factors affecting energy use[88] depends upon being able to measure those factors. Thus, the feasibility and affordability of doing so is briefly discussed below.

Susceptibility to cold: It may simply not be feasible to measure each member of the population for the degree to which they feel the cold and, even if it is, doing so would certainly be very expensive.

Living arrangements: It would be feasible to identify the living arrangements for each adult: e.g. living alone, living as a couple or living in a shared house.[89] However, to track the change in living arrangements as result of, for example, young adults leaving home, bereavement, couples moving in together and couples separating would present administrative challenges and may be costly.

Temperature: It would certainly be feasible to rate dwellings in terms of ambient temperature. However, this rating may need to be quite fine-grained as temperature can vary quite significantly within a small area.[90] Implementing such fine-grained rating and accounting for the large number of individuals who move house each year[91] and with more than one home[92] would likely be quite costly.

Travel: Whilst it is surely feasible to assess how rural/urban each of a country's dwellings is, this information alone would not accurately reveal how much motor fuel the occupants of those dwellings require for travel purposes. In Section 7.3.3 it was noted that rural dwellers on average drive further urban dwellers and, though they use less motor fuel per kilometre, they consume more fuel overall. However, whilst rural dwellers might on average use more motor fuel, some urban dwellers, for instance those faced with very long commutes, may use more fuel than the rural average.

In addition, the private travel and, thus, the motor fuel required to live one's life varies between rural dwellers. For example, one person might live and work in a small rural village with a local shop and an adequate bus service to the supermarket that is fairly nearby. Another might live in a small rural village that has no bus service and is some way from the nearest shop and supermarket and their place of work. As Gray (2001, p2) notes

> Rural areas are often presented as a single homogenous entity, but in reality, the diversity of the rural transport 'experience' cannot be overstated.

For these reasons, accurately determining an individual's motor fuel requirement so as to be able to adjust their starting point allocation of emissions rights would be by no means straightforward.

Children: As noted in Section 7.5.4, I am unclear as to whether parents' starting point allocation of emissions rights should be adjusted upward only if their preference for children is expensive in terms of energy *and* overall, or whether their preference being expensive *only* in terms of energy is sufficient. However, let's assume that expensiveness only in terms of energy is sufficient. Adjusting individual's starting point allocation of emissions rights would then require

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[88] As discussed, Cohen would adjust for more factors than Dworkin.

[89] Clearly the variety of living arrangements is greater than the two alternatives of living alone or in a couple discussed in Section 7.3.

[90] For example, a friend tells me that the temperature around her former house in a valley bottom was warmer by 2 or 3°C that the temperature around her parents' house half a mile away and up the valley side.

[91] In the UK in 2005-6, 2 million households moved 2.5 million times (DCLG, 2006, Table S250).

[92] In 2005-6, around 140,000 English households owned a second home in England (DCLG, 2006, Table S355).

distinguishing instances of preferences that were energy-expensive from those that were not. But even if this were possible, doing so would likely be extremely costly and, arguably, intrusive. Let's further assume that sampling suggests that parents' preference for children is generally energy-expensive but is not always so. Given this, an affordable approximation to determining the energy-expensiveness or otherwise of every parents' preference would be to treat all preferences as energy-expensive and make a blanket upward adjustment to the starting point allocation of *all* parents.

Alternatively, let's assume that an upward adjustment should depend upon a preference for children being expensive in terms of energy and overall, and that sampling shows that parents' preference is generally non-expensive overall but is expensive in some instances. Given the cost of distinguishing instances of preferences that are expensive overall from those that are not, an affordable approximation would be to treat all preferences as non-expensive overall and to *not* adjust upward the starting point allocation of *any* parents.

Energy required to heat a dwelling: It is certainly feasible to obtain this information. For example, since December 2007, those selling a dwelling in the UK have required an Energy Performance Certificate which sets out the energy consumption and the carbon emissions of the dwelling (HIP, 2007). Dresner and Ekins (2004) set out a 10-year plan for conducting an energy audit of all dwellings in the UK and such a scheme could include a calculation of the energy consumption of each property.[93]

7.7. Routes to EPCA

It is an empirical matter beyond the scope of this paper as to the feasibility and affordability of adjusting individuals' equal starting point allocation (i.e. EPCA) for the various factors affecting energy use. However, it seems to me that the egalitarian liberal would choose EPCA over adjusted EPCA only if, for each factor affecting energy use, one of the following three conditions is met.

1. It is not possible to adjust for that factor, or
2. It is possible to specifically adjust each individual's starting point allocation for that factor but doing so would be too expensive and/or intrusive and no adjustment is preferable to a "blanket adjustment" or
3. It is possible to affordably and non-intrusively adjust each individual's starting point allocation for that factor but preferable alternatives exist

With regard to Condition 1, it may, for example, simply not be possible to accurately measure and adjust for susceptibility to the cold. With regard to Condition 2, consider the preference for children. If an upwards adjustment depends upon the preference being expensive in terms of energy and overall and sampling shows that generally the preference is not expensive overall then, as discussed in Section 7.6, no upward adjustment for any parent is preferable to a blanket upward adjustment for all parents. With regard to Condition 3, it may, as discussed in Section 7.5.3, be preferable to, for example, purchase insulation and/or more efficient heating systems for low income households with above-average total emissions rather than adjusting their starting point allocation upwards.

[93] Under their plan, households would be incentivized to implement cost-effective energy-efficiency measures identified by the audit. Though costing around £6 billion to implement, such measure would save households around £20 billion.

So, in summary, if the egalitarian liberal were to choose EPCA, it would be because it was, in practice, *the closest affordable and acceptable allocation* to the (unequal but reasonably equal) allocation which is, in theory, the fairest.

7.8. Conclusion

Note that this "closest approximation" argument for EPCA is a very considerable distance removed from Argument 2 for EPCA (see Section 5.2.1) which is based on the premise that the atmosphere is jointly and equally owned i.e. a commons in the C1 sense. Under Argument 2, an individual's life circumstances, (for example, that they feel the cold or live in a cold, rural part of the country), are not morally relevant to the allocation of emissions rights, even in theory. However, under an egalitarian liberal approach to emissions rights allocation, an individual's life circumstances are, at least *in theory*, morally relevant[94] and EPCA is implemented only if, *in practice*, they cannot be accounted for within the policy process.

Note that under the closest approximation argument, it is *both* energy emissions rights *and* OG&S emissions rights that are allocated on an equal per capita basis. And this is one of the reasons why, in Section 2, EPCA was defined as the equal per capita allocation of *total* emissions rights. (For the other, see Section 5.2.1.)

Of course, if the supporter of EPCA wishes to advance an egalitarian liberal justification for this allocation, they must argue for the supremacy of egalitarian liberal approaches to justice over, for example, right-libertarian approaches that offer no support for EPCA. Thus, Appendix 4 briefly touches upon some of the arguments that rage between egalitarian liberals and right-libertarians.

8. Left-libertarianism

A paper by leading left-libertarians (Vallentyne et al, 2005, p201) notes that

> Over the past few decades, there has been increasing interest in left-libertarianism, which holds (roughly) that agents fully own themselves and that natural resources (land, minerals, air, and the like) belong to everyone in some egalitarian sense. Left-libertarianism agrees with the more familiar right-libertarianism about self-ownership, but radically disagrees with it about the power to acquire ownership of natural resources. Merely being the first person to claim, discover, or mix labor with an unappropriated natural resource does not – left-libertarianism insists – generate a full private property right in that natural resource. Left-libertarianism seems promising because it recognizes both strong individual rights of liberty and security and also grounds a strong demand for some kind of material equality. It seems, that is, to be a plausible a form of liberal egalitarianism.

As noted in Section 7.1, egalitarian liberals tend not to focus on issues of initial acquisition, their primary concern being the fair division of resources in societies that are many generations removed from such acquisition. However, left-libertarians do focus on initial acquisition as they

> regard the question of the conditions under which natural resources may be acquired as prior to the question of the division of the fruits of social cooperation….Or at least they think that the answer to the latter question must be sensitive to the question of the legitimacy of our claims on those resources that we use to produce these cooperative fruits. Any *complete* theory of justice in

[94] As noted above, Cohen and Dworkin differ as to which circumstances are morally relevant.

> holdings therefore must include an answer to the following question: What rights, if any, do individuals have to acquire property rights in previously unowned natural resources?
>
> Left-libertarians…insist…that the egalitarian principle of justice in acquisition that they endorse casts a shadow over the legitimacy of claims of ownership by all subsequent generations (pp213-4).

Risse (2004) sets out three possible approaches to left-libertarianism two of which involve original ownership of the world. However, in practice, leading left-libertarians endorse one or other version of approach under which there is no original ownership. The versions of two leading left-libertarians, Otsuka and Steiner, are examined below to see what support they might offer for EPCA.

8.1. Otsuka's left-libertarianism

As can be seen from the quotation in Section 4.2.1, Otsuka agrees with right-libertarians that the world was originally unowned. However, he disagrees with them as to what constitutes a fair way to take this world into private ownership.

> As a means of ensuring that nobody is placed at a disadvantage, Nozick's version of the Lockean proviso is too weak, since it allows a single individual in a state of nature to engage in an enriching acquisition of all the land there is if she compensates all others by hiring them and paying a wage that ensures that they end up no worse off that they would have been if they had continued to live the meagre hand-to-mouth existence of hunters and gatherers on non-private land…Such acquisitions would pre-empt others from making any acquisitions of their own that would improve their situation over that in which they live no better than a meagre hand to mouth existence. This acquisition is objectionable both because it condemns others to such a miserable existence and because it is manifestly unfair that a first grabber be allowed to monopolize all opportunities to improve one's lot through acquisition…
>
> …any principle of 'winner-takes-the-lion's-share' is prima facie less fair than a principle of acquisition which gives rise to a more equal distribution of resources (pp23-24).

This line of reasoning leads Otsuka to endorse the following principle.

> You may acquire previously unowned worldly resources if and only if you leave enough so that everyone else…can acquire an equally advantageous share of unowned worldly resources (p24)

For Otsuka, an equally advantageous share is that which gives all individuals an equal opportunity for welfare. As noted in Section 7.1, the equalisandum of opportunity for welfare is very similar to that endorsed by Cohen, and as argued in Section 7.5, in the absence of Cohen-style egalitarian liberal justice, individuals would in theory be entitled to an unequal allocation of emissions rights. The same would, thus, be true in the absence of Otsuka-style left-libertarian justice. And hence (as in Section 7.7) any endorsement of EPCA could only be on the basis that it was, *in practice*, the closest affordable and acceptable allocation to the (unequal but reasonably equal) allocation which was, *in theory*, the fairest.

8.2. Steiner's left-libertarianism

Like Otsuka, Steiner (1994) holds that the world was originally unowned but, unlike Otsuka, holds that individuals are entitled to an equal share of initially unowned things.

> …all persons are justly possessed of original rights to initially unowned things: that is, those things which are originally unowned (natural resources) and those things which have come to be unowned (through abandonment and death). It's true…that no specific person originally holds a title to any specific such thing. Nevertheless each is entitled to an equal portion over them (p268).

Steiner grounds his approach to justice in his theory of rights. He argues, roughly, that genuine disputes between parties are disputes over incompatible uses of a particular object (e.g. me using a piece of wood to repair my fence and you using it for firewood) and are to be decided by determining who has a property right over the object in question. To be able to systematically adjudicate disputes, property rights must be assigned to all objects. Steiner (1994, pp215-6) argues that this assignment must be neutral between competing moral codes and that the only such neutral assignment is one which allocates natural resources equally between all individuals. Steiner goes on to argue that individuals are entitled to the fruits of their labour on their equal portion of natural resources.

> Self-ownership is, then, a sufficient basis for creating unencumbered titles both to things produced solely from self-ownership *and* to things produced from this equal portion of unowned things. We each own the fruits of our labour inasmuch as all the factors entering into their production are either things already owned by us or initially unowned things amounting to no more than an equal portion of them.

In a world where everything has previously been appropriated, Steiner (p271) argues that

> each person's right to an equal portion of initially unowned things amounts to a right to an equal share of their total *value*.

Hence, Steiner (p272) proposes a global fund, distributed on an equal per capita basis. Into this fund owners of land pay an amount

> equal to the site's rental value, that is, equal to the rental value of the site alone, exclusive of any alterations in it wrought by labour.

Note that Steiner's approach does not equate to advocating the equalisandum of extra-personal resources discussed in Section 7.1.[95] For unowned things include *germ-line genetic information*, used by parents in the production of their children. This information has a value which varies between sets of parents, and parents must pay an amount equal to the value of their particular information into the global fund.[96]

In my view, Steiner's approach to justice will not result in equal consumption of fossil fuel and, thus equal emissions. Given the differences between individuals, the fruits of their labours are likely to unequal and if these unequal fruits are combined with an equal payout from the global fund, individuals will have differing incomes. Individuals' differing incomes combined with their differing circumstances (the extent to which they feel the cold, the temperature of where they

[95] See also Footnote 61.

[96] For more on this see Steiner (1994, pp248, 266-80).

live etc) will result in them purchasing differing quantities of energy and fossil fuel and emitting differing quantities of emissions. If, *under* Steiner's approach to justice, unequal incomes and differing circumstances lead to unequal energy use and emissions, then, *in theory*, there is no obvious route, *in the absence* of such justice, to an equal allocation of emissions rights. Hence, in the absence of such justice, any endorsement of EPCA would have to be on the basis that it was fairest *in practice*.

9. EPCA between nations

Thus far, discussion has focused on the fair allocation of emissions rights within a single nation. However, we live in a multi-nation world in which nations have combusted fossil fuel on an industrial scale for differing periods of time and at differing per capita levels. Given the substantial variations in historical combustion and emissions, this section examines whether a philosophical justification exists for EPCA *between* nations.

Section 9.1 describes an approach to implementing EPCA between nations known as *Contraction and Convergence* (C&C) which is contrasted in Section 9.2 with another well-known approach to emissions reduction known as *historical accountability*. Section 9.3 goes on to examine what, if any, justification for C&C exists from the perspective of egalitarian liberalism. C&C is assessed only from this perspective as (1) it is clear from Section 6 that there would be no support for EPCA between nations from right-libertarianism and as (2) left-libertarianism is taken to be sufficiently similar to egalitarian liberalism for a separate assessment from this perspective not to be required.

9.1. Contraction and Convergence

In outlining C&C, I refer to the permitted global emissions for a given year as the *global emissions budget*. The C&C proposal recognizes that to prevent dangerous climate change, a significant year-on-year reduction (or *contraction*) in the global emissions budget is required. But how should these budgets be allocated? The director of the Global Commons Institute, the UK NGO responsible for formulating the C&C proposal, sets out his views as follows (Meyer, 2000, p55).

> Under a quota system, a strict limit or legally binding cap on total emissions has to be agreed. The emissions permissible under this limit have then to be 'pre-distributed' on some basis. The difference between 'pre-distribution' and redistribution is important. As there are as yet no property rights to use the atmosphere, in order to trade such rights they have first to be created. This is the sequence known as cap-and-trade. Trading would certainly redistribute the rights but they first need to be distributed amongst the trading parties. This initial distribution is the 'pre-distribution'. The logic is that you cannot trade what you do not own, and ownership is impossible without limits.
>
> So on what basis should the total emissions quota be predistributed, given that global agreement to the quota system is necessary for it to work? Since the world's atmosphere belongs equally to everyone if it belongs to anyone at all, the only basis on which such an agreement seems possible is that there must – eventually at least – be an equal quota allocation to everyone in the world. These are not quotas of human-created wealth. They are of wealth received by humans from providence.

In the second paragraph, Meyer expresses some uncertainty as to whether the atmosphere is in fact owned, stating that "*if* it belongs to anyone at all" then it "belongs equally to everyone". However, he appears to come down in favour of the atmosphere belong equally to everyone i.e.

being a commons in the C1 sense. The most common meaning of term "providence", used by Meyer in the last sentence of the quoted passage, is "God". And if Meyer is using the term in this sense, then he would appear to be making Argument 1 for the atmosphere as C1 (see Section 5.2.1) and justifying the first premise of that argument by holding, like Locke, that in the beginning, original joint and equal ownership resulted from God gifting the world to humankind. And given that Meyer is making Argument 1 for the atmosphere as C1, it would appear that his argument for EPCA is Argument 2 (see also Section 5.2.1).

Note that, in the first paragraph of the quoted passage, Meyer argues that there are currently "no property rights to use the atmosphere". But, clearly, if everyone owns the atmosphere i.e. it is everyone's property, then everyone has property rights. Thus, I suspect that what Meyer has in mind here is not "property rights" but "emissions rights", his point being that, whilst the atmosphere might be equally owned, there is currently no emissions trading system in place to operationalize the right to emit equally that follows from the atmosphere being equally owned.

Having discussed *contraction* and various aspects of the quoted passage, I now discuss the *converge* element of C&C. Here I refer to the result of dividing the global emissions budget in a given year by the global population in an agreed base year[97] as the *global average per capita emission*. C&C advocates that the world should move to a situation in which each nation is allocated a quantity of emissions rights equal to the global average per capita emission multiplied by its population in the agreed base year. But note that, although C&C advocates EPCA *between* nations, it does not take a position on how the total emissions rights allocated to a particular nation should be allocated *within* that nation. Hence, although Meyer talks in the quoted passage of there being "an equal quota allocation to everyone in the world", C&C does not explicitly endorse EPCA *within* nations (Feasta, 2006, p6).

Currently, the level of average per capita emissions varies enormously between nations, with that of developed nations being way above the global average per capita emission and that of developing countries being below. Whilst C&C advocates a *convergence* to a situation where each nation receives rights equal to the global average per capita emission multiplied by its base year population, it is recognized that such a convergence cannot happen overnight but must be brought about over decades. Hence, under a C&C regime, the per capita emissions rights allocated to a developed nation would be reduced over a period of decades from its average per capita emissions in the year before the implementation of the regime to the (ever decreasing) global average per capita emission. And, conversely, the per capita emissions rights allocated to a developing nation would be increased from its average per capita emissions in the year before the implementation of the regime to the (ever decreasing) global average per capita emission.

Fig 4 illustrates the C&C process between a developed nation (A) and developing nation (B). For simplicity, it is assumed that their populations are equal and remain constant over time. Thus, the dashed line represents not only the global average per capita emission but also the global emissions budgets. And as emissions arise from combustion, it also represents the global fossil fuel combustion budgets permitted by the emissions reduction regime under C&C.

[97] As opposed to dividing the global emissions budget in a given year by the global population in that year (GCI, 2006). Some have argued that, if a base year is not used, countries will have an incentive to increase their populations so as to increase the size of their emissions rights allocation. Raymond (2006, p656) notes that

> While empirically debatable (would nations really promote pro-natal policies on such a relatively flimsy basis?), this criticism doggedly follows the equal per capita idea.

9.2. Historical accountability

As its name suggests, the historical accountability approach holds that a nation's past emissions should determine its future share of permitted global emissions. Grübler and Fujii (1991, p1408) set out the equity principle underlying their historical accountability approach as follows:

> Consider an ultimate limit to the total (cumulative) quantity of carbon that can be deposited in the atmosphere as a global resource or carbon credit available to humanity. How is this global credit to be distributed fairly among different generations and among different regions of the world? We postulate as an underlying equity criterion that: *everyone has an equal carbon emissions quota, irrespective of the country or generation to which one belongs* (emphasis in original).[98]

Grübler and Fujii proceed by applying their historical accountability approach to the period from 1800 (around the beginning of the industrial revolution) to 2100. They begin by selecting a concentration at which CO_2 within the atmosphere should be stabilized. Then, taking the global population for each year from 1800 to the present day and the predicted population for each year out to 2100, they calculate the single level of annual per capita emission (let's call it "emission X") that, if released by everyone who has been, is or will be alive during the period, would result in the chosen concentration in 2100. If the average per capita emission of a nation between 1800 and the present day is greater than X, then, between the present day and 2100, that nation is entitled to an average per capita emission that is below X by such an amount that its average per capita emission over the entire period from 1800 to 2100 is equal to X. Conversely, if the average per capita emission of a nation between 1800 and the present day is less than X, then, between the present day and 2100, the nation is entitled to an average per capita emission that is above X by such an amount that its average per capita emission over the entire period of 1800 to 2100 is equal to X.

To illustrate the difference between C&C and historical accountability, we can abstract from Grübler and Fujii's analysis and consider the following stylized scenario, illustrated in Fig 5. At time t, nations C and D have populations that are equal and that remain constant for 300 years. Fossil fuel combustion begins at t and in the following 200 years, the population of A emits at an average annual per capita level of 6 units and the population of B at 4 units. Over the period, the annual global average per capita emission is therefore 5 units, total emissions in each century are 5E and total emissions throughout the period 10E. At t+200, climate change is discovered and it is calculated that to reach, in 100 years' time, an atmospheric concentration of greenhouse gases that gives an acceptable probability of avoiding dangerous climate change, total emissions of 4E can be released, a contraction of E compared with each of the previous two centuries.

Under the historical accountability (HA) approach, emission X is 4.66 units, and so in the 100 years after the discovery of climate change, C is entitled to an average annual per capita emission of 2 units whilst D is entitled to 6 units. Note that, in Fig 5, the per capita emission entitlement curves for C and D in the third century are drawn so that, in accordance with Grübler and Fujii's approach, they converge at t+300 to emission X. In contrast, under C&C, the annual per capita emission entitlement of both countries converges at t+250 to 4 units falling to 3 units at t+300. Hence, under C&C, C's per capita average annual emission entitlement over the 100 years is 4.25 units (as opposed to 2 units under HA), whereas B's is 3.75 units (as opposed to 6 units under HA).[99]

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[98] Note that, in their paper, the authors offer no justification for their equity principle.

[99] This assumes that, under C&C, the reduction trajectory in the global average per capita emission is equivalent to a linear reduction from 5 units at t+200 to 3 units at t+300.

9.2.1. For and against historical accountability

In rejecting historical accountability, Grubb (1992, p316) argues that the approach would make current generations pay by virtue of their geographical location, for the activities of past generations who had no idea of potential costs of their action and no incentive to limit their emissions.

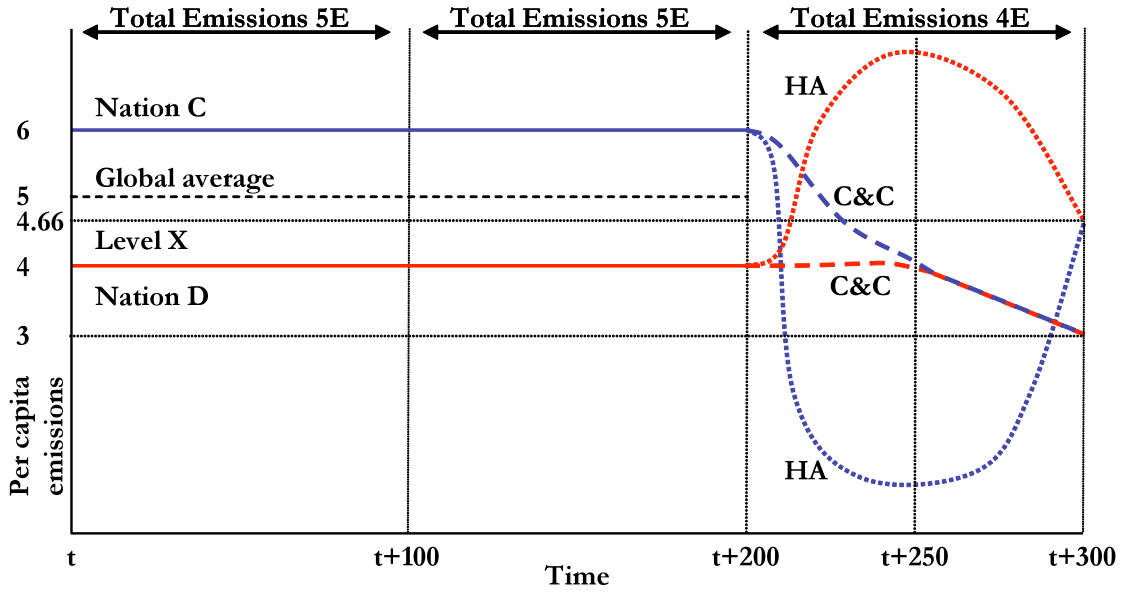

Figure 5: Contrasting C&C with historical accountability

Presumably, current generations in developed countries would be made to pay in the sense that they would be entitled to a smaller quantity of per capita emissions under historical accountability than under, say, C&C. This smaller entitlement, would, in the absence of emissions trading, require the combustion of a smaller quantity of fossil fuel, and, all other things being equal, provide less opportunity for economic development. Alternatively, if emissions trading were to take place, then, if developed countries wished to combust a greater quantity of fossil fuel than that permitted by their per capita emissions rights allocation, they would have to purchase emissions rights that they would have received for free under C&C.

The role played by fossil fuel in economic development is key to Neumeyer's response to Grubb. Neumeyer (2000, p189) accepts both that past generations were not *aware* of climate change and that the present generations are not *responsible* for the activities of past generations, but nevertheless argues that present generations should be held *accountable* for those activities.

> The fundamental counter-argument about not being held accountable for emissions undertaken by past generations is that the current developed countries readily accept the benefits from past emissions in the form of their high standard of living…There can be no doubt that the development of 'Northern' countries was eased, if not made feasible in the first place, by having had the possibility of burning large amounts of fossil fuel with the consequence of an accumulation of carbon dioxide in the atmosphere…

The role of fossil fuel combustion in facilitating development is an important factor in determining the fair allocation of emissions rights under egalitarian liberal justice and I return to it in the following section.

9.3. Philosophical justifications for EPCA between nations

The aim of Section 9 is to assess egalitarian liberal support for EPCA between nations. And as we have seen in Section 9.2, although historical accountability has

> An underlying equity criterion that: everyone has an equal carbon emissions quota, irrespective of the country or generation to which one belongs

in the years following the implementation of the historical accountability regime, nations have anything but an equal per capita emissions allocation (see Fig 5). Thus, when considering historical accountability and C&C, it is only in the years after convergence under the latter that EPCA between nations actually comes about. Thus this section assesses egalitarian liberal support for C&C.

9.3.1. Cosmopolitan and patriotic justice

To assess the support forthcoming from egalitarian liberalism, it is necessary to distinguish between its "cosmopolitan" and "patriotic" strands.[100] Moellendorf (2002, pp7-8) outlines the difference as follows.

> John Rawls has developed a theory of justice for domestic society that I find convincing in general terms. The theory is characterized by two principles of justice that require both respecting civil and democratic rights and limiting inequalities in the distribution of resources…The cosmopolitan view that I defend holds that the content of the above principles should apply globally. Rawls disagrees. He defends a theory of international justice that requires respect for a minimal set of human rights but requires neither constitutional democracy not limits on socioeconomic equality.

Jones (1999, p2) too provides a useful summary of the difference.

> John Rawls…has defended a status quo position on international justice, but…others (notably, Barry, Beitz and Thomas Pogge) have argued that Rawls's own premises lead to radical conclusions about the need for large-scale redistribution of wealth and resources to the world's worst-off people. My aim…is to reach certain definite conclusions concerning which side of this dispute has the more reasonable case, and the gist of my view is that distributive justice is best conceived in terms of human rights from which it follows both that nation-state borders lack any fundamental ethical standing and that the demands of global justice include various positive actions aimed at protecting the vital interests of everyone, regardless of their location, nationality, or citizenship.
>
> According to Joseph Carens, '[c]itizenship in Western liberal democracies is the modern equivalent of feudal privilege – an inherited status that greatly enhances one's life chances'.[101] This claim gets to the heart of this issue. Given the supposed moral arbitrariness of one's ancestry, place of birth, and citizenship, we need to ask why these characteristics should go so far towards determining the likelihood that someone will have either more wealth than they can use or less than they need to live a recognizably human existence.

[100] This latter term is from Arneson (2005).
[101] Jones is quoting Carens (1995, p332).

If one accepts that the egalitarian liberalism should be cosmopolitan in reach, the question arises as to what constitutes a fair entitlement to energy and fossil fuel under cosmopolitan justice.

9.3.2. Entitlements to energy and fossil fuel under cosmopolitan justice

In Section 7.3.3, it was argued that whereabouts in a particular country a person lives will be influenced by their unchosen tastes. In a world made up of multiple countries, one of the factors determining the particular country in which a person lives will be the degree of freedom of movement across national borders. If, at one extreme, all countries removed all immigration controls, then the world would be that person's oyster. However, if, at the other extreme, no country ever allowed anyone from outside to enter for anything more than a short visit, then the country in which that person was born would necessarily be the one in which they lived out their natural days. Thus, as the freedom of movement across borders increases, the country in which a person lives will increasingly become a matter of taste.

As noted in Section 7.3.1, bodily comfort is an important component of welfare, and individuals living in colder countries with require a greater amount of heating, and thus energy, to maintain their bodily comfort. (And those living in very warm countries may require additional energy for cooling.) Now if the country in which a person lives and where within that country they live was entirely a matter of unchosen taste, then, under a cosmopolitan approach to egalitarian liberal justice (henceforth "cosmopolitan justice"), Cohen would – but Dworkin would not – support those living in colder parts of the world receiving an entitlement to a greater quantity of energy for heating.

Under an emissions reduction regime, the *available global energy resource* in a given year would be the quantity of available non-fossil-fuel (i.e. renewable and nuclear) energy plus the quantity of fossil fuel permitted to be combusted (a quantity that would diminish year on year). Let's refer to the quotient obtained by dividing the available global energy resource in a given year by the global population in that year[102] as the *global average per capita energy entitlement.* Under Cohen-style cosmopolitan justice, a nation's total energy entitlement in the given year would be calculated by multiplying its population by the global average per capita energy entitlement *adjusted for factors affecting energy use* (henceforth the *adjusted global per capita energy entitlement*). So, for example, the per capita entitlement of a nation with a very low average temperature would consist of an upward-adjusted global average per capita energy entitlement.

As well as having differing average temperatures, nations enjoy differing per capita endowments of non-fossil-fuel resources. Hence, under the emissions reduction regime and Cohen-style cosmopolitan justice, the per capita allocation to nations of the fossil fuel permitted to be combusted globally in a given year would be determined by each nation's adjusted global per capita energy entitlement and its per capita non-fossil-fuel resource. Specifically, a nation's per capita fossil fuel allocation would be equal to its adjusted global per capita energy entitlement minus its per capita non-fossil-fuel resource.[103] And hence, under Cohen-style cosmopolitan justice, nations' per capita entitlement to fossil fuel and, thus, emissions would, in theory, be *unequal.*[104]

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[102] Or in an agreed base year.

[103] If the per capita non-fossil-fuel resource was the larger sum, then, presumably, the excess would, where possible, be allocated to other nations.

[104] Neumeyer (2002, p11) makes a similar argument, writing that

> Countries with, for example, colder climates or a lower availability of renewable resources can claim that they have higher fossil fuel requirements than comparable countries with warmer climates or higher availability of renewable resources…

Note that although, under Dworkin-style cosmopolitan justice, no adjustments to the global per capita average energy entitlement would be made, nations' per capita emissions entitlement would still be unequal due to their differing per capita non-fossil-fuel resources.

9.3.3. Entitlement to emissions in the absence of cosmopolitan justice

Clearly, today's world is not one in which anything approaching cosmopolitan justice has been implemented. With regard to determining the fair per capita allocation of emissions rights to a nation in the absence of such justice, a similar argument can be made to that in Section 7.5. That is, it can be argued that, in the absence of cosmopolitan justice, the fair per capita allocation of emissions rights to a nation is one proportional to the per capita allocation of fossil fuel the nation would be entitled to, were such justice to be implemented.[105]

Here we might interpret "were such justice to be implemented" in two ways. First, the phrase might mean "in the period after a just state of affairs had been achieved" (henceforth "under cosmopolitan justice"). Or second, it might mean "during the period of transition to cosmopolitan justice *and* under such justice". These two interpretations are discussed below.

9.3.4. *Interpretation 1*

Interpretations 1 and 2 are illustrated using developed nation A and developing nation B from Section 9.2. It turns out that A has a cold climate whilst B's climate is milder meaning that there is little requirement for either heating or cooling. Furthermore, A also has a smaller per capita endowment of non-fossil-fuel resources. Thus, under Cohen-style cosmopolitan justice, A would be entitled both to a greater per capita quantity of energy and fossil fuel. According to Interpretation 1, in the absence of such justice, A and B's entitlement to emissions is proportional to their entitlement to fossil fuel *under cosmopolitan justice* (UCJ). Thus, under the emissions reduction regime, rather than A and B's per capita emissions entitlements converging to the global average per capita emission as under C&C (Fig 4), they "converge" to differing levels relating to this differing entitlement to fossil fuel (Fig 6).[106] Henceforth, this profile (P) of emissions entitlement is referred to as P_{UCJ}.

9.3.5. Interpretation 2

Now consider what would happen if, today, at the same time as implementing the emissions reduction regime, a global programme to bring about a transition to cosmopolitan justice was (miraculously) implemented. Clearly, such a transition could not occur overnight but would require that developing countries were entitled, over some considerable time, to a much larger

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However, whilst countries with colder climates can claim they have higher *energy* requirements, if they also have large renewable resources, they would not necessarily have higher *fossil fuel* requirements. Drawing on Neumeyer's paper, the World Resources Institute (WRI, 2008b, p27) note that

> all other things equal, one might expect higher emission levels from a country with high heating and cooling needs…These kinds of *natural factors*, if not recognized and accounted for in certain policy domains, could result in "disproportionate or abnormal burdens." For reasons of equity or fairness, some Parties [to the UN Climate Change Convention] may wish that such factors be recognized in relevant policy decisions (emphasis added).

More generally, see the discussion of *natural factors* in Neumeyer (2002) and WRI (2008b).

[105] Whilst the argument is similar to that in Section 7.5, it is not the same as here entitlement to fossil fuel is *not* proportional to the entitlement to energy.

[106] As noted above, there would also be a differing entitlement to fossil fuel under Dworkin-style cosmopolitan justice.

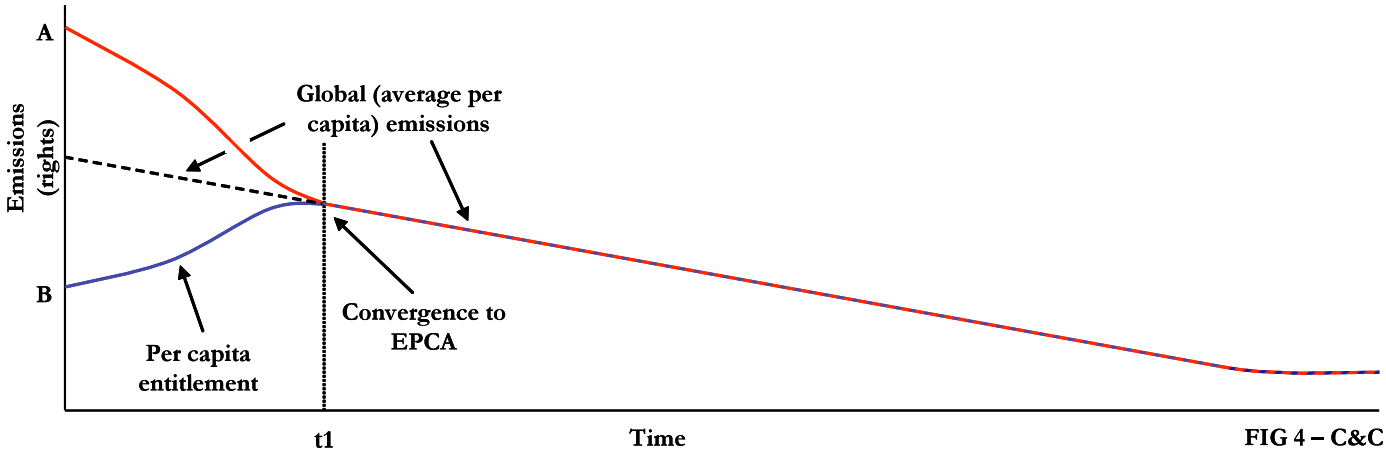

FIG 4 – C&C

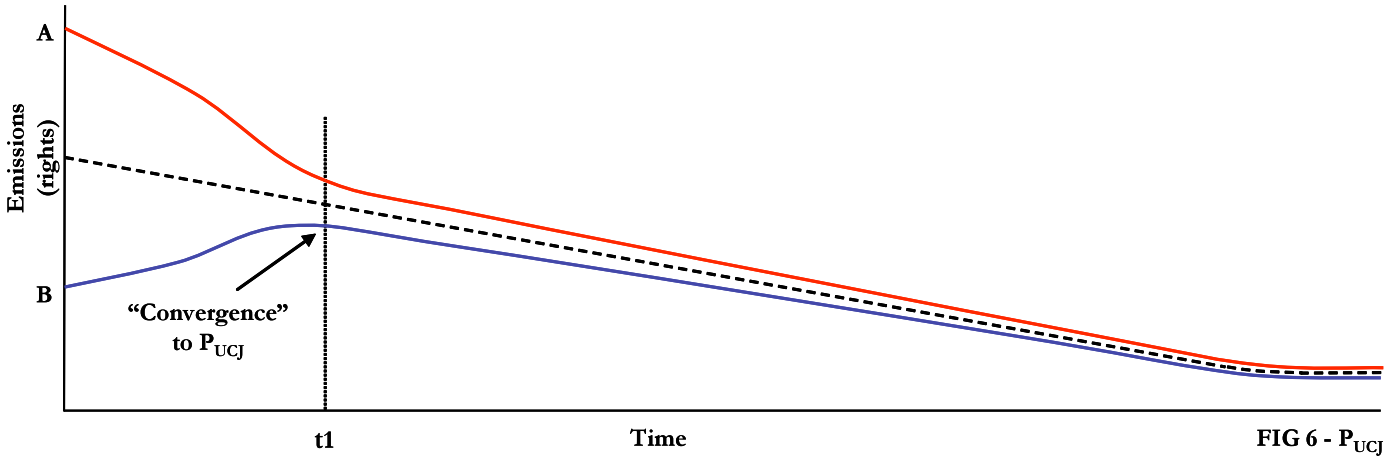

FIG 6 - P_{UCJ}

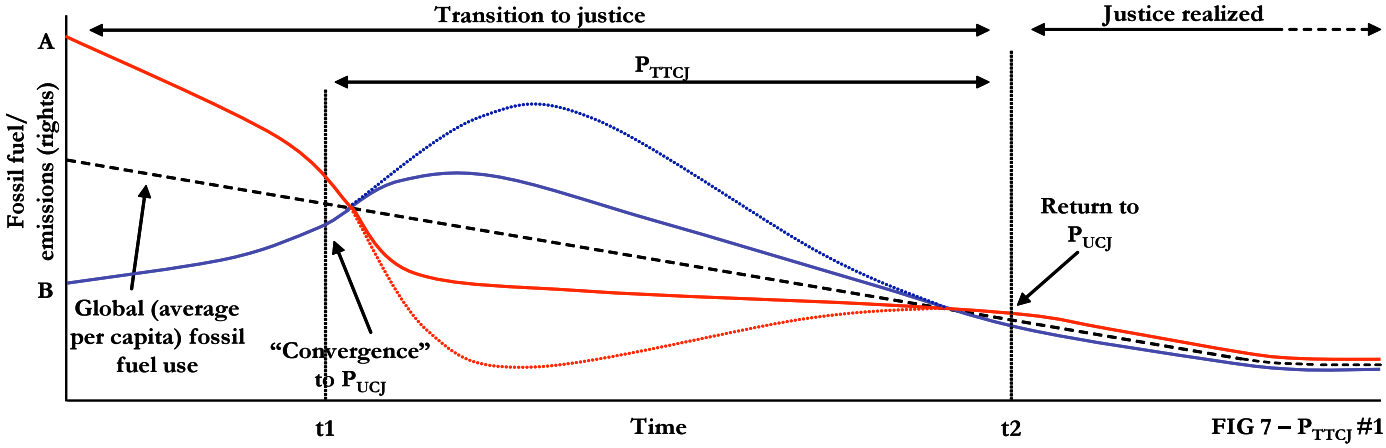

FIG 7 – P_{TTCJ} #1

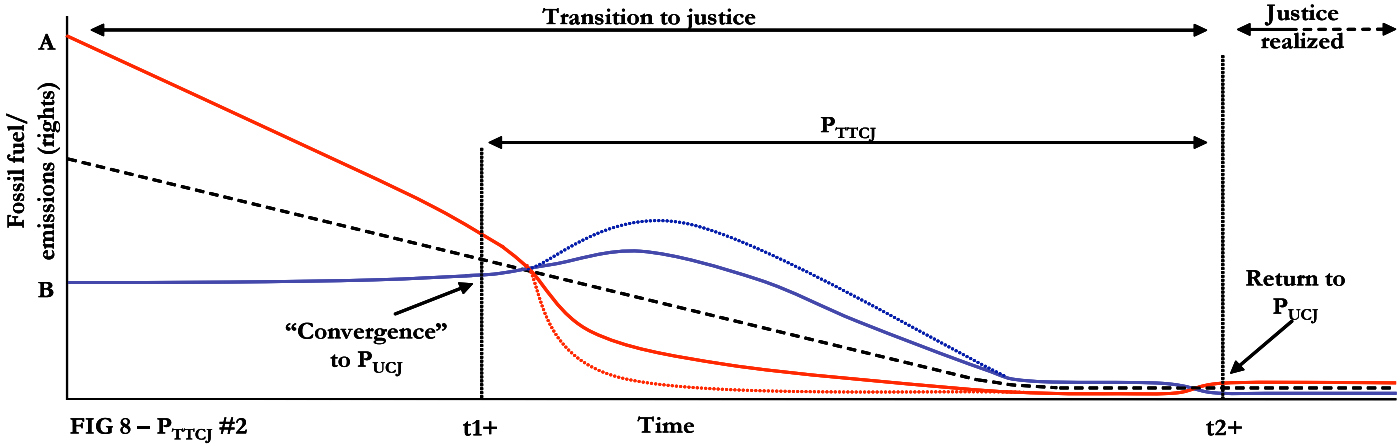

FIG 8 – P_{TTCJ} #2

quantity of resources than they would be able to obtain in the programme's absence.[107] This would include them being entitled to a (much) greater quantity of energy and of the fossil fuel permitted to be combusted under the emissions reduction regime.

The fossil fuel (and, thus, emissions) entitlements related to this transition are illustrated in Fig 7. Starting from today, B's per capita entitlement to fossil fuel (and, thus, emissions) increases and A's decreases until P_{UCJ} is reached at t1. However, in order to facilitate the transition to cosmopolitan justice, B's entitlement to fossil fuel (and, thus, emissions) continues to increase and A's to decrease such that the pattern of entitlement moves away from P_{UCJ}. And when the transition to cosmopolitan justice (TTCJ) is complete at t2, the profile returns to P_{UCJ}. (Note that the dashed line represents the global per capita average fossil fuel combustion and also the total amount of fossil fuel that can combusted under the emissions reduction regime.) Henceforth, I refer to the profile of entitlement to fossil fuel (and, thus, emissions) between t1 and t2 as P_{TTCJ}. The dotted lines between t1 and t2 represent an alternative version of P_{TTCJ} under which B is entitled to considerably more fossil fuel and, thus, emissions and A to considerably less.

According to Interpretation 2, in the absence of cosmopolitan justice, A and B's entitlements to emissions would be proportional to their entitlement to fossil fuel *during the transition to and under cosmopolitan justice*. Specifically their entitlements (a) from today to t1 would – as in Interpretation 1 – consist of a transition to P_{UCJ} (b) from t1 to t2 would consist of P_{TTCJ} and (c) from t2 onwards would – as in Interpretation 1 – consist of $P_{UCJ.}$ Thus under Interpretation 2, B is entitled to substantially greater emissions rights, and A substantially less, than under Interpretation 1.

In Fig 8 the period required for "convergence" is longer than in Fig 7 (i.e. from today until t1+) and the rate of reduction in emissions (and, thus, fossil fuel combustion) required under the emissions reduction regime is greater (i.e. a more steeply declining global fossil fuel combustion line).[108] Thus the scope for allocating additional fossil fuel to developing nations during the transition to cosmopolitan justice is reduced and this may result in an increased time (i.e. from today to t2+) being required to achieve the transition.[109,110] And thus, in the absence of cosmopolitan justice, the additional emissions rights allocated to B are significantly less than in Fig 7.

Note that the emissions entitlement profile in Fig 7 between t1 and t2 (P_{TTCJ}) looks something like that under historical accountability between t+200 and t+300 in Fig 3. In the two-country example of historical accountability in Section 9.2, Nation C, which had higher per capita emissions prior to the implementation of the regime (i.e. between t and t+200), is entitled to lower per capita emissions in the century following its implementation. And, conversely, Nation D, which had lower per capita emissions prior to the implementation of the regime, is entitled to higher per capita emissions following its implementation. Similarly, in the two-country example in Fig 7, Nation A, which has higher per capita emissions prior to the transition to cosmopolitan justice, is entitled to lower per capita emissions between t1 and t2, whilst Nation B which has lower per capita emissions prior to the transition, is entitled to higher per capita emissions.

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[107] These resources could be used for building hospitals, schools, water and sewerage systems or for undertaking whatever activities development was taken to consist of.

[108] A steeper curve flattening off at a lower level represents stabilizing the concentration of greenhouse gases in the atmosphere at a lower level. See, for example the so-called WRE scenarios (Houghton et al, 2001, p223-4).

[109] I thank Kevin Anderson suggesting that I consider the effects of a steeper emissions reduction curve.

[110] I take it that this choice of interpretations does not arise (at least to anything like the same extent) when considering implementing justice within nations, as the transfers of wealth necessary to bring about the transition to justice could, I imagine, be implemented fairly rapidly.

Neumeyer's remarks in Section 9.2.1 help to explain this similarity. Here Neumeyer points out that high levels of historical per capita fossil fuel combustion (and, thus, emissions) in certain countries have contributed to their high levels of development. Elsewhere in his paper, Neumeyer (2000, p188) argues for historical accountability "in order to give everybody equal opportunity to benefit from emissions". And given that Neumeyer wishes all to have an equal opportunity to benefit from emissions, presumably he would also wish for all to have an equal opportunity to benefit from the development that the source of these emissions, fossil fuel, helps enable. Given that, for Neumeyer, equal opportunity to benefit from emissions is brought about by allocating emissions rights in accordance with the principle of historical accountability, presumably he would hold that equal opportunity to benefit from the development enabled by fossil fuel is similarly achieved by allocating fossil fuel in accordance with the principle of historical accountability.

Just as the profiles of emissions entitlement between t+200 and t+300 in Fig 5 would follow from allocating fossil fuel so as to bring about a situation under which all have an equal opportunity to benefit from development, so the emission entitlement profiles between t1 and t2 in Fig 7 follow from allocating fossil fuel so as to bring about cosmopolitan justice. And the fact that (1) allocating fossil fuel so as to bring about a situation under which all have an equal opportunity to benefit from development is somewhat similar to (2) allocating fossil fuel so as to bring about cosmopolitan justice explains the similarity between the profiles in Figs 5 and 7.

9.3.6. A cosmopolitan argument for C&C?

It has been argued that, in the absence of cosmopolitan justice, the fair per capita allocation of emissions rights to a nation is one proportional to the per capita allocation of fossil fuel to which that nation would be entitled *were such justice to be implemented*. However, the above discussion suggests that the cosmopolitan egalitarian liberal must choose between the two interpretations of this phrase. I am unsure as to whether the cosmopolitan egalitarian liberal would regard it as fair to allocate in accordance with Interpretation 1 or 2, but they may perhaps choose to allocate in accordance with the latter as such an allocation would create the space for a transition to cosmopolitan justice were the governments of the world (miraculously) minded to undertake such a task![111]

However, let's say the cosmopolitan egalitarian liberal *in theory* thought it fair to allocate in accordance with Interpretation 1 i.e. P_{UCJ}. In this case, support for EPCA would be forthcoming only if *in practice* it was held to the closest feasible and affordable allocation to P_{UCJ}. In this case the fairest allocation *in practice* would be C&C, with its eventual convergence to EPCA.[112]

However, the work of Neumeyer (2002) and the World Resources Institute (WRI, 2008b) suggests that adjusting a nation's per capita emissions allocation for factors such as temperature and non-fossil-fuel endowment is feasible. And, whilst Section 7.6 argued that calculating the adjustment to the starting point emissions rights allocation of millions of individuals within a country for factors affecting energy use might carry a (very) considerable cost, calculating the single adjustment to a country's per capita allocation that accounts for factors such as temperature and non-fossil-fuel resources could likely be done at very low cost. In short, allocating rights so as to implement P_{UCJ} would appear to be feasible and affordable.

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[111] The notion of creating a space for development can be found in Baer et al (2007).

[112] Conversely, if the cosmopolitan egalitarian liberal *in theory* thought it fair to allocate in accordance with I2, then, given the discussion in 9.3.5, it may be that *in practice* the closest feasible and affordable allocation to that in accordance with I2, is the allocation under historical accountability.

In summary, for the egalitarian liberal to argue for EPCA between nations, they would need to argue for cosmopolitan as opposed to patriotic justice, for allocating in accordance with Interpretation 1 as opposed to Interpretation 2 and for the feasibility and affordability of C&C as opposed to the non-feasibility or non-affordability of $P_{UCJ.}$ But from the above discussion, it seems that even if the cosmopolitan egalitarian liberal were to favour Interpretation 1, it is unlikely that matters of feasibility or cost would cause them to choose C&C over P_{UCJ}.

10. Conclusion

A number of writers initially supportive of EPCA between nations have subsequently come to have reservations about the approach. Raymond (2006, p655) writes that

> The equal per capita argument has attracted a large amount of attention and support in the world of climate change policy. Numerous advocates and scholars (including the present author) have followed the Global Commons Institute…and India's Center for Science and Environment (CSE) in promoting the idea…

However, he notes (p655) that whilst EPCA can initially seem "ethically enticing for its simplicity and clarity"

> …the more one considers the equal per capita argument, the harder it is to shake certain reservations about the idea...Does a poor writer living in a garret in St. Petersburg, for example, have the same entitlement to the atmosphere as one living in San Diego, or do the cold Russian winters (heating being a major source of GHG emissions) merit additional consideration? What about the rancher living in eastern Montana, 40 miles from the nearest school or hospital, versus the resident of Tokyo? The problem is that once one begins unpacking the apparent equality of the per capita right, it becomes clear that it creates significant inequalities based on criteria—warm versus cold climate, rural versus urban dwelling—that look morally arbitrary (p656-7)

Similarly, Baer et al (2007, p90) reject the simplicity of C&C.

> Per capita approaches are strongly identified with the "Contraction and Convergence" approach. This is as it should be, for C&C was the first real "equity reference framework," and as such it has done a great deal to publicly establish the need for just global burden-sharing as an essential aspect of an emergency climate stabilization program. It has acquired, and deserves, a great deal of respect and support. (We used to be C&C supporters ourselves.) But the simplicity that is one of its great virtues is also one of its greatest weaknesses. More particularly, in its focus on equality of emissions rights, it loses sight of the *end* to which emissions rights can only be a *means* – sustainable human development for all, even in this a world that is profoundly constrained by the prior overuse of the now-scarce atmospheric commons. Our analysis has convinced us that, under stringent mitigation targets, C&C cannot deliver this essential *developmental equity*, and it is to respond to this requirement that we have been elaborating the GDRs [Greenhouse Development Rights] framework (emphasis in original).

When I came across the C&C proposal fifteen or so years ago, I had a strong sense that I'd discovered an absolutely fair approach to emissions reduction. However, as a result of my work

on personal carbon trading and of delving into the justice literature for this paper, I have come to the view that neither EPCA between nor within nations can be regarded as straightforwardly fair.

For EPCA to be the fairest of all allocations in theory, it would have to be the case either that (1) what in Section 5.7 I referred to as the greenhouse gas removal system is a commons in the sense of being jointly and equally owned (C1) or that (2) everyone is entitled to combust an equal quantity of fossil fuels. However, holding the greenhouse gas removal system to be C1 requires holding that the world was, in the beginning, jointly and equally owned[113] and, as we have seen, there is little contemporary philosophical support for this position. And as we have also seen, none of the three approaches to justice examined in this paper supports an equal entitlement to fossil fuel.

From the perspective of egalitarian liberalism and left-libertarianism, a *possible* justification for EPCA is that, whilst not the fairest of all allocations *in theory*, it is the fairest *in practice*. However, as argued in Section 9.3.6, this fairest-in-practice justification is unlikely to hold for EPCA between nations and, as noted in Section 7.7, it is an open question as to whether it holds for EPCA within nations. Thus, I end this paper concluding that the case for EPCA is somewhat less compelling than I once believed.

[113] In other words, Argument 1 in Section 5.2.1 with "greenhouse gas removal system" substituted for "atmosphere" would have to be valid.

Appendix 1: Right-libertarianism and taxation

Mack and Gaus (2004) set out a spectrum of four right-libertarian positions: (1) market anarchism (2) the minimal state (3) the taxing minimal state and (4) the small state and explain how the differing views these positions take on taxation arise from their differing views on how public goods can be provided.

Mack and Gaus discuss two categories of services to protect citizens' rights. First, there are police and legal services designed to protect the rights of individuals from infringement by other individuals within their nation. And second, there are national defence services designed to prevent the rights of the individuals of one nation from infringement by those of other nations. According to Mack and Gaus (p122), the former category is a *private* good whilst the latter is a *public* good.

Goods can be classified with regard to their rivalrousness and excludability. A good is *rivalrous* if its consumption diminishes its availability to others and is *excludable* if, in consuming it, the consumer can exclude others from doing so. Private goods, for example, a glass of milk, are those that are rivalrous and excludable whereas public goods, for example, moonlight, are those that are non-rivalrous and non-excludable (Kaul and Mendoza, 2003).

Both market anarchists and minimal statists believe that the private good of police and legal services and the public good of national defence can be provided by the market. Market anarchists hold that all public and private goods can and should be provided through competition in a free market operating purely on the basis of just acquisition and transfer. Any form of state is unnecessary and illegitimate. However, whilst market anarchists take the view that protection services can provided by competition amongst various protection agencies, minimal statists argue that the provision of these services is a natural monopoly best provided by a single private protection agency, an agency they deem to constitute a minimal state. However, just as under market anarchism, protection services are provided by voluntary exchange (just transfer). In other words, individuals choose to pay money for the services of the monopoly protection agency rather than the agency being funded through coercive taxation. Mack and Gaus (2004, p121-2) summarize the market anarchist and minimal statist positions thus.

> It is widely held that these special difficulties of marketing public goods cannot cost-effectively be overcome by voluntary means…and it is also widely held that public goods can cost-effectively be financed by coercive means. The latter idea is that individuals can be coerced into paying their share of the cost of public goods and this will result in each being a net beneficiary: the direct and indirect costs imposed upon each individual by requiring her to pay her share will be less than the benefits to her of having the relevant public good produced. These views amount to a qualification of the liberty tradition's general endorsement of markets and contractual relationships as the best devices for allocating resources to their most valuable uses…Government is justified largely on the grounds of market failure: although the market generally provides for both a free and prosperous society, it is not perfect…
>
> Market anarchists and minimal statists may challenge these widely held views. They may argue, first, that coercive state provision of public goods tends to over-supply them, so that it has its own off-setting inefficiencies...And, they may insist, market and contractual arrangements can be envisioned that will yield funding for public goods – especially rights protective public goods – that is not significantly suboptimal…Advocates of the minimal state that depict it as a natural monopoly

> seem better positioned to make this argument than are market anarchists. Such a minimal state will, to a considerable degree, be able tie its clients' purchase of non-public aspects of rights protection to their also paying for public aspects of rights protection. For instance, it will be able to say, 'We will sell you access to our courts for the settlement of criminal and civil disputes – which you need to purchase *from us* if you are to enjoy it – only if you also agree to buy national defence from us.' Of course the state's monopolist position poses its own problems: insofar as the state is a monopoly it tends to restrict supply and to make consumers pay more for its output than they would under market competition.

In contrast to market anarchists and minimal statists, taxing minimal statists argue that the public good of national defence can only be "financed by coercive means", that is through taxation. And Mack and Gaus (2004, p123) explain that

> If the arguments that support the Taxing Minimal State are extended to legitimize coercive takings for the production of other sorts of public goods (for example, the public good of mosquito abatement) or correct other types of market failure (say, the regulation of natural monopolies), then we have gone beyond the Minimal State to the Small State. The more types of goods and services that are accepted as significantly public and, hence, as justifiably financed through taxation, the larger the Small State becomes.

Appendix 2: Right-libertarianism and sinks

Imagine a two-person right-libertarian world inhabited by Philippa and Quentin. Through just acquisition, Philippa has come to own 90% of the land and sea whilst Quentin owns the other 10%.[114] One day Quentin discovers coal on his land which he is able to mine at the rate of 100 tonnes per year. And between them, Quentin and Philippa, both keen amateur climate scientists, calculate that the maximum annual quantity of coal that can be combusted without raising the concentration of CO_2 in the atmosphere is, by coincidence, 100 tonnes.[115,116] Quentin argues that given that this is so, he can, should he wish, combust the 100 tonnes of coal that each year he can mine, as doing so will cause no harm to Philippa. But Philippa objects. She points out to Quentin that, as a keen amateur climate scientist, he should realize that the combustion of this amount of fossil fuel will do no harm only because of the action of sinks. And as the sink processes for CO_2 depend upon the land and sea – of which she owns 90% – she owns 90% of the sinks. Hence without her permission, Quentin, who owns only 10% of sinks, can combust only ten of the 100 tonnes of coal that each year he can mine. Philippa, if so inclined, might grant Quentin permission access to her sinks for free or, alternatively, in exchange for some of Quentin's coal.

In the libertarian world in Section 6, sinks are regarded simply as a constraint on emissions and, hence, emissions rights are allocated to *fossil fuel* owners. But if, as Philippa suggests, owners of land and sea own the sink capacity of their land and sea, then emissions rights should instead be allocated to *sink* owners.

[114] For one right-libertarian view on the ownership of water resources see Whitehead Jr and Block (2002).

[115] CO_2 is by far the main greenhouse gas produced by the combustion of coal. Hence, for simplicity, other greenhouse gases can be ignored. As the bases for CO_2 sinks are the biosphere and oceans (see Section 3.1), the issue of ownership of air molecules (see Section 5.5) does not need to be addressed in this example.

[116] In other words, the quantity of CO_2 released from the combustion of 100 tonnes of coal is the capacity of the *persistent natural sink*. For a discussion of persistent natural sinks see Houghton et al (2001, p224).

Appendix 3: Non-philosophers' views on fair shares of emissions rights and energy

Under proposed personal carbon trading (PCT) schemes (see Section 2), emissions rights are allocated to individuals on an equal per capita basis (Starkey and Anderson, 2005). Having presented the idea of PCT at various meetings, members of the audience have, on a number of occasions, questioned whether an equal per capita allocation is fair.

At one meeting, Richard Black, the environment correspondent for the BBC News website, asked me whether people who lived in colder parts of a country shouldn't get more emissions rights. At another meeting, someone told me that their friend lived a rural life in northern Scotland and wondered whether this friend shouldn't therefore receive a greater number of emissions rights. And at yet another meeting, someone argued that people living in London should receive less emissions rights than others because, as the public transport system is so comprehensive, they are able to rely less on private transport than the rest of the UK's population. It seems to me that behind these views lies the idea that certain people need more energy to live their lives and that these people should therefore receive more emissions rights.

Whilst this view has most often been expressed to me verbally, there are a few instances where it can be found in writing. For example, commenting on a blog on PCT posted by the UK's then Secretary of State for Environment, Food and Rural Affairs, David Miliband (Miliband, 2006), one respondent (Harry Manuel) argued (echoing Arneson in Section 7.1) that those with a disability may require additional emissions rights.[117]

> Will everyone get the same fixed amount, if so this is unfair on those with disability etc, who have a greater reliance on mechanical/electrical aids?

In an article in his local paper, Mrs Thatcher's former Press Secretary, Bernard Ingham (2006), also responded to Miliband, describing PCT as

> A perfect wheeze for champagne socialists, but egalitarian, my foot. Nor is there anything fair about a single carbon allowance, bearing in mind the differing needs of the elderly, families with young children, the disabled and those who live in the country who simply have to have a vehicle.

In her column in the Guardian newspaper, Polly Toynbee (2006) extolled the virtues of PCT.

> But Miliband's electric radicalism comes in his plan for personal carbon allowances. Here is where social justice meets green politics for the first time. Give every citizen the same quota of energy and let them buy and sell it on the open market. The half of the population who don't fly will make money from selling their quota to the half who do. Drive a gas-guzzling 4x4 and you will have to buy a quota from the third of the population with no access to a car. Who could complain about such transparent fairness?...Why is this a quintessentially Labour policy that the Tories would never copy? Because it in effect redistributes money from the rich to the poor, from the frequent flyers to never-flyers, with a parallel currency.

Responding – it has to be said, less than kindly – to Toynbee on the *Tim Worstall* blog site, a Dr Dan H (H, 2006) wrote

[117] See also Footnote 77.

> "Give every citizen the same quota of energy" – Some poor widow woman (cue violins) with a pack of bairns, living above the 1000 ft contour in Aberdeenshire, gets the same quota as a millionaire gadabout basking in the mild climate of Poole. Polly would be the first to complain. Give the children a quota too: Polly would complain that that would be unfair to an elderly couple, she bed-bound, he exhausted by caring for her, living above the 1000 ft contour in Cumberland. It's a wonderful world: Polly…can urge changes which would themselves just generate even more opportunity to whinge.

Note here that Toynbee misunderstands PCT, writing that it involves allocating *energy* equally, when, in fact, it involves allocating only *emissions rights* equally. Hence, H's response is also about the fair allocation of *energy* and, in line with those arguments made in Section 7.3, he makes the case that, in the real world, a fair allocation of energy is an *unequal* one.

Appendix 4: Egalitarian liberals versus right-libertarians

As explained in Section 4.1, a right to liberty is at the heart of libertarianism. As Mack and Gaus (2004, pp116-7) explain

> The liberty tradition takes individual liberty to be the core *political* or *legal* norm. Individual liberty is what each individual may *legitimately demand* of each other individual. There may be may other things that are good in life as ends in themselves or as means to those ends, but – at least absent complicating special circumstances – these rarely can be demanded of others as a matter of right. Part of the reason that liberty is the only thing – or at least the primary thing – that may be demanded of others as a political right is that the demand for liberty is uniquely modest; to demand liberty is merely to insist that one be left alone in one's solitary activities or in one's joint activities with other consenting individuals. Liberty as non-interference by others is thus a good that everyone with aims, goals or projects has an interest of demanding from all others; it can only be supplied by others, and it can be universally supplied at modest costs, unlike demands to be benefited or served at the expense of others.

Egalitarian liberals, on the other hand, hold that what we may legitimately demand from others is equality of opportunity for welfare or some similar equalisandum. Furthermore egalitarian liberals hold that in order to equalize the chosen equalisandum, it is entirely legitimate for the state to take income from some and give it to others. Or as Arneson (2003, p139) puts it

> coercion aimed at bringing about a more equal distribution across persons can be morally acceptable.

However, for right-libertarians, taxing in the name of, say, equal opportunity for welfare is illegitimate as it violates self-ownership and rights to justly acquired property. In other words, it violates individuals' rightful demand for liberty. Cohen (1995, p229) sums up the disagreement thus.

> It is difficult to criticize [the thesis of self-ownership] in a non-question-begging way. Thus, for example, it is, in my opinion, a considerable objection to the thesis of self-ownership that no one should fare worse than others do because of brute bad luck,[118] for no luck is bruter than that of how one is born, raised and circumstanced, the good and bad results of which adhere firmly to individuals under the self-ownership principle. But the fact that it sanctions the results of luck will not move a moderately sophisticated believer in self-ownership. The conflict between the relevant principles is too basic, and too evident, for her not already to have countenanced it and (*ex hypothesi)* stood her ground.

And right-libertarians do indeed stand their ground by making the following sort of argument.

> Libertarians resist the egalitarian claim that 'no one should fare worse than others do because of bad brute luck'…by asking the egalitarian whether he favors the forcible redistribution of eyeballs so as to achieve an equality of eyeball distribution among a group of people some of whom luckily have two good eyeballs and some of whom unluckily have none. This resistance is usually tactically successful because most egalitarians do not want to bite the bullet of

[118] On "brute luck", see Footnote 66.

> endorsing forced eyeball redistribution. Libertarians then advance to the claim that it is the thesis of self-ownership that explains the wrongfulness of forced eyeball redistribution, along with the wrongfulness of taking persons' lives by way of destruction or enslavement, and that one of the many costs of rejecting self-ownership would be the licensing of the forced redistribution of eyeballs (Mack, 2002b, pp266-7).

Recognizing that the argument that no one should fare worse than others because of bad brute luck will not persuade right-libertarians like Mack to abandon the self-ownership principle, Cohen proposes another way of arguing against self-ownership that does not involve invoking the brute luck argument. Cohen notes that supporters of self-ownership hold that abandoning self-ownership brings with it very high costs – such as licensing slavery, restricting autonomy, using people as mere means and licensing body part (including eyeball) redistribution. He therefore seeks to show that the costs of abandoning self-ownership are not nearly as high as right-libertarians suggest, by putting forward alternative philosophical arguments that explain the wrongness of such acts.

> Such arguments do not *refute* the thesis of self-ownership: I do not think it can be refuted. But if the arguments are sound, they diminish the appeal of the [self-ownership] principle, sufficiently, I am sure, to detach many people from their allegiance to it (p230).

Unsurprisingly, right-libertarians do not find Cohen's arguments persuasive. Narveson (1998, pp24-5) is forthright in his disagreement, maintaining that

> the price of abandoning self-ownership is high – 'astronomical' seems about right.

Interested readers can explore further Cohen's arguments (see also Cohen, 1998) and right-libertarian responses. With regard to the latter, see also Mack (2002a) and Feser (2000). For another egalitarian-liberal critique of right-libertarianism, see Kymlicka (2002, ch 4).

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Over the course of my research into personal carbon trading, a number of people have questioned whether the equal per capita allocation of emissions rights underlying this approach to emissions reduction is completely fair (see Appendix 2). When, at a public meeting, Richard Black, the environment editor of the BBC News website, asked me whether people who live in cold regions of a country should be allocated additional emissions rights, what I regarded as my wildly unsatisfactory answer played a significant part in motivating me to embark upon this paper. Having done so, hacking my way through the jungle of distributive justice to get to the finish line took very much longer than I had anticipated. So sincere thanks to my manager, Kevin Anderson, for biting his tongue and allowing me the time necessary to complete this piece of work.

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