

Memorandum submitted by Richard Starkey
Tyndall Centre for Climate Change Research, University of Manchester
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Introduction

1. Since 2003, Dr Kevin Anderson and I (both of the Tyndall Centre, University of Manchester) have been assessing the feasibility and appropriateness of implementing a Domestic Tradable Quotas (DTQs) scheme, the most widely discussed of personal carbon trading schemes.
2. This memorandum is submitted in a personal capacity. It begins by offering a definition of personal carbon trading (PCT) and outlining various proposed PCT schemes. It then discusses whether a policy space can be found for the implementation of an economy-wide PCT scheme. The memorandum goes on to outline arguments made both for and against PCT that I regard as unconvincing. The final section summarizes what I take to be the substantive areas of debate around PCT.
3. In December 2005, Dr Anderson and I published a detailed report on DTQs (Starkey and Anderson, 2005). Henceforth, this report is referred to as the Tyndall Report (TR) and is referenced as appropriate.

PCT defined

4. PCT schemes generally deal with emissions from the combustion of fossil fuel and Figure 1 is a simplified schematic of emissions arising within a nation from fossil fuel combustion. These can be divided into *direct* and *indirect* emissions. An individual or organization emits *directly* when they themselves combust fossil fuel and, in Figure 1, direct emissions by organizations are divided into those produced from the generation of electricity and those produced from other combustion activities. In the remainder of this section, the bracketed numbers refer to the box numbers in Figure 1.
5. As the following equation shows, total emissions **with** a nation are the sum of all direct emissions.

Equation 1

$$\text{Total emissions (1)} = \left\{ \begin{array}{l} \text{Individual direct emissions (2)} \\ + \\ \text{Organizational direct emissions - electricity (3)} \\ + \\ \text{Organizational direct emissions - other (4)} \end{array} \right.$$

6. An individual or organization emits *indirectly*, when they consume goods or services, the provision of which involved direct emissions by one or more (other) organizations. As can be seen in Figure 1, an electricity generator's direct emissions (3) can also be regarded as the indirect emissions of its customers (5, 6). Hence, Equation 1 can be modified as follows.

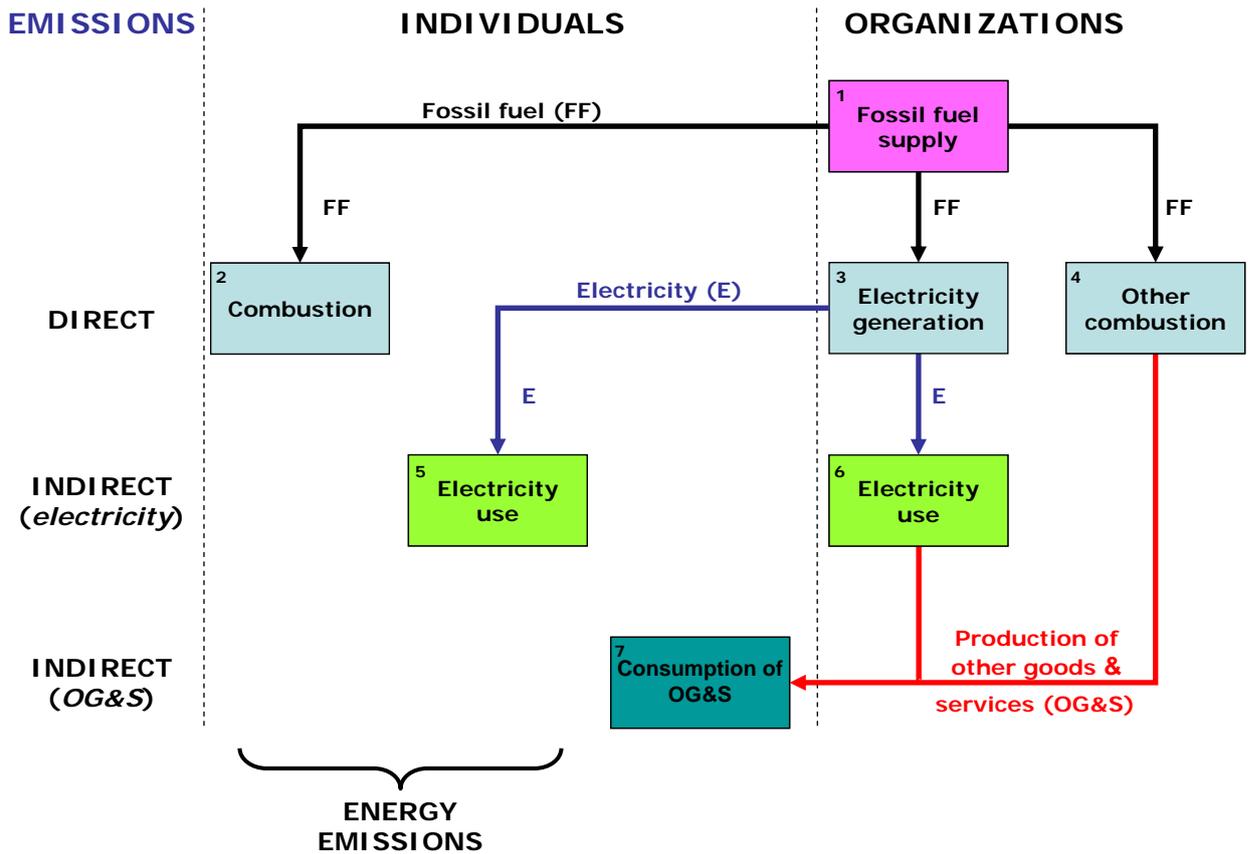


Figure 1: Emission arising from fossil fuel combustion

Equation 2

$$\text{Total emissions (1)} = \begin{cases} \text{Individual direct emissions (2)} \\ + \\ \text{Individual indirect emissions – electricity (5)} \\ + \\ \text{Organizational indirect emissions – electricity (6)} \\ + \\ \text{Organizational direct emissions - other (4)} \end{cases}$$

7. It is customary for individuals and organizations to refer to their combustion of fossil fuel and use of electricity as “energy use”. Therefore the direct emissions of an individual or organization from their combustion of fossil fuel combined with their indirect emissions from electricity use are referred to as their *energy emissions*. Hence, Equation 2 it can be modified as follows.

Equation 3

$$\text{Total emissions (1)} = \begin{cases} \text{Individual energy emissions (2+5)} \\ + \\ \text{Organizational energy emissions (6+4)} \end{cases}$$

8. As Figure 1 shows, organizations use fossil fuel and electricity to produce consumer goods and services. Therefore, organizations’ indirect electricity emissions (6) and non-electrical direct emissions (4), i.e. their energy emissions (6+4), can be regarded as individuals’ indirect emissions arising from their consumption of goods other than fossil fuel and electricity and of services. These are referred to below as

OG&S (other goods and services) emissions (7). Hence, Equation 3 can be modified as follows.

Equation 4

$$\text{Total emissions (1)} = \left\{ \begin{array}{l} \text{Individual energy emissions (2+5)} \\ + \\ \text{Individual OG\&S emissions (7)} \end{array} \right.$$

9. I now describe a number of different emissions trading schemes which vary with regard to (a) the entities to which emissions rights are allocated and (b) the entities that surrender emissions rights.
10. The Sky Trust proposal (TR, Section 3.2) is an upstream scheme under which emissions rights are auctioned to fossil fuel suppliers who surrender them when they sell fuel to combusters. The auction revenue is allocated to individuals on an equal per capita basis.
11. Under DTQs and the scheme proposed by Robert Ayres (TR 3.2) emissions rights are surrendered by energy end-users i.e. individuals and organizations other than electricity generators whenever they purchase fuel or electricity. In other words, individuals and end-user organizations surrender emissions rights to cover their energy emissions (See Equation 3). Under DTQs, a proportion of emissions rights are allocated to individuals on an equal per capita basis and the remainder are auctioned onto a carbon market on which organizations must purchase the emissions rights they need and on which individuals may purchase emissions rights additional to their original allocation. In contrast, under the Ayres scheme, all emissions rights are allocated on an equal per capita basis to individuals, from whom organizations must purchase (via market makers) the emissions rights they require.
12. The RAPS scheme (TR 3.2) is one under which all emissions rights are allocated to *and* surrendered by individuals. Here, individuals surrender emissions rights whenever they buy energy and also other goods and services. In other words, they surrender emissions rights to cover not only their energy emissions but also their OG&S emissions (see Equation 4).
13. The Personal Carbon Allowances scheme (PCAs) proposed by Hillman (2004), under which individuals surrender rights covering emissions from their energy use and their use of public transport, is conceived of as a staging post on the road to a fully-fledged RAPS scheme (or, at least, to a scheme as close to RAPS as can practically be achieved).¹
14. Under the cap and share (C&S) scheme proposed by the Irish NGO, Feasta (cap and share, 2007), emissions rights are allocated downstream to individuals, who then sell them upstream to energy suppliers. Energy suppliers then surrender these rights when they sell fossil fuel to combusters. Hence, under the cap and share scheme, individuals are initially allocated all of the emissions rights but do not surrender any, whilst energy suppliers surrender all of the rights but are not initially allocated any.
15. The term *personal carbon trading* can be used as an umbrella term for either (1) all emissions trading schemes under which individuals are allocated emissions rights or (2) all schemes under which individuals are allocated *and* surrender rights. Under the first usage, DTQs, the Ayres scheme, RAPS, PCAs and C&S are all PCT schemes whereas under the second, C&S is not. Below, I adopt this second usage, as proponents of C&S claim that an advantage of their proposal is that it avoids the

¹ Mayer Hillman, personal communication, 27 November 2006.

technology, administration and costs associated with the surrender of emissions rights under the other schemes.

Policy space for PCT

16. Considerable attention has been devoted to assessing the appropriateness and feasibility of PCT. However, before looking at these issues, I discuss whether a policy space exists for PCT as this is a significant issue in the light of current and soon-to-be-implemented policy instruments.
17. It might be that, if one was implementing from scratch a policy regime to tackle climate change, one would favour the use of a PCT scheme as the central policy instrument for reducing fossil fuel emissions. However, this is not the situation that presently exists. Currently, EU ETS covers around 50% of the UK's CO₂ emissions (DTI, 2007). The proposed Carbon Reduction Commitment will cover slightly less than 10% of additional CO₂ emissions² and the proposed Supplier Obligation, which might take the form of a cap and trade scheme (Defra, 2007b), could cover around another 15% of CO₂ emissions.³ The Commission has proposed the inclusion of aviation emissions within the EU ETS in Phase 3 and the UK government has proposed that emissions from surface transport also be included. Hence, it is possible that the majority of UK emissions will be captured under one or other cap and trade scheme by 2013.
18. Implementing a PCT scheme in parallel with these trading schemes would thus result in the majority of UK emissions being covered by PCT *and* another trading scheme. In other words there would be a very considerable degree of "double counting".⁴
19. Assuming the continued existence of EU ETS, then, in theory, the only way to implement PCT and avoid such double counting would be to modify the allocation rules of EU ETS so that it was permissible to allocate emissions rights to energy end-users.⁵ (Currently, under EU ETS, emissions rights in the electricity sector must be allocated to generators and it is proposed that surface transport be incorporated into EU ETS by allocating emissions rights to fuel suppliers.) In this case, the Carbon Reduction Commitment and the Supplier Obligation could be removed and their coverage being subsumed in an economy-wide PCT scheme, one part of which would constitute the UK's implementation of EU ETS.
20. There may be benefits (for instance, in terms of simplicity and efficiency) in having all fossil fuel emissions covered by a single instrument such as PCT rather than the proposed patchwork. If so, then there would be merit in taking steps to ensure that the implementation of PCT at a later date **was** not precluded.

Technical feasibility and appropriateness

21. The remainder of this memorandum assumes a policy space for PCT could be found and addresses issues of feasibility and appropriateness.
22. Certain recurring arguments regarding the feasibility and appropriateness of PCT are, in my view, unconvincing and these are set out in the next section. Equally, there are, in my view, some unconvincing arguments in favour of PCT which I set

² According to the government (Defra, 2007a), the 6000kwh threshold will capture most of the emissions (15MtC) covered by the original 3000kwh threshold (Defra, 2006)

³ Households account for around 25% of CO₂ emissions, around 35% of which are from electricity. These electricity emissions are already covered by EU ETS.

⁴ For more on double counting see Sorrell and Sijm (2003).

⁵ This would mean that emissions rights could be allocated to one entity (e.g. electricity generators) in one country and to another entity (e.g. electricity users) in another. I have not explored in any detail whether this is feasible. Alternatively, it could be required that all emissions rights under EU ETS to be allocated to energy end-users (though this is hardly likely politically).

out in the following section. The final section of the memorandum discusses what I regard as the substantive debate around PCT.

Unconvincing arguments against PCT

The technology for PCT doesn't currently exist

23. In a speech on 7 November 2006, Chris Huhne, the Liberal-Democrat Shadow Environment Secretary argued that

the technology at present in my view is not available to make such a PCA scheme workable in the ten to fifteen years in which we need to act. So we must rely on existing technologies (Huhne, 2006).

In fact, PCT would rely on tried and tested existing credit card technologies and, thus, is currently technologically feasible.

PCT gives the rich a licence to pollute

24. The aim of cap and trade system is to reduce the cap to a level where it is no longer polluting (in the sense of forcing further warming). Of course, within this cap, the rich can afford to buy additional emissions rights but under a carbon tax or upstream trading system, equally the wealthy can afford to **pay and carry on** emitting. The simple truth is that the additional spending powers of the rich means that they **benefit** under any scheme! And if this is a problem, it is not a problem that PCT should be expected to solve. (In the final analysis, the solution is, presumably, to put an end to richness!) At least, under the equal per capita allocation of PCT, the wealthy must pay for their above-allocation emissions rights and the less wealthy can make money from selling their surplus emissions rights.

Some people just won't be able to understand PCT

25. True, but not an argument against PCT. A person who doesn't understand the scheme can make an arrangement (or someone can make an arrangement on their behalf) to automatically sell their emissions rights to a market maker immediately they are allocated to them by government. The person then buys the rights they require at the point of sale. In this way, they would deal only in money and their experience of the scheme would be transformed into something akin to a carbon tax.

PCT is like the poll tax

26. PCT is similar to the poll tax in that both involve equal quantities. However, equal quantities are involved in *diametrically opposed ways*. Under a poll tax, everyone must *give* an equal quantity of money to the government. This makes a poll tax *regressive*. Under PCT everyone *receives* an equal quantity of emissions rights from the government. This makes PCT broadly *progressive* (but see paras 34-35).

Carbon cards would be like ID cards

27. Not even those groups most vehemently opposed to ID cards would seem to endorse this view. In her evidence to the Home Affairs Select Committee on ID cards, the Director of Liberty characterized ID cards as a "single identifier that is used for multi-purposes" (HAC, Ev 20). This she contrasted with "purpose specific identity material". The carbon card would be an example of the latter, as it would be used to verify identity only for the specific purpose of surrendering and trading emissions rights. Whilst Liberty opposes the use of single identifiers for multiple purposes, the Director noted that Liberty has

no problem with purpose-specific identity material that is used for a specific purpose. We have for example NHS cards already and we have National Insurance cards (HAC, Ev 20).

28. However, it is important to address the issue of how much information is held on the central PCT database and who has access to that data. An expert seminar convened by the Royal Society of Arts concluded that it was possible to implement a "privacy-friendly" version of PCT.

People could be cut off if they didn't have emissions rights to cover their utility bills

29. Yes, some could be, but this does not constitute a departure from the situation that exists today. Under PCT, if a customer does not have emissions rights within their account to cover their utility bill, the utility purchases the relevant number of emissions rights on the national carbon market and add the cost to the customer's bill. If the customer is a non-vulnerable customer and does not pay their bill then, just as today, they could be cut off. However, if the customer is a vulnerable customer then just as today, their utility could not cut them off.

The country could run out of emissions rights

30. The whole point of a hard cap such as that under PCT is to limit the quantity of greenhouse gases emitted by a nation in a given period. If, under the cap, there was a high demand for fossil fuel there would also be a high demand for emissions rights which would result in an increased price. This price would incentivize investment in energy efficiency and conservation measures and low/zero carbon energy supply. The same would be true under a hard cap implemented upstream.
31. Under a hard cap government could play a role enabling the economy to flourish through taking measures to remove barriers to the take up of energy efficiency and conservation measures and to the provision of low-carbon supply. But clearly, there would need to be provision for expanding the cap in exceptional circumstances (for example, a very cold winter and wartime).

Unconvincing arguments for PCT

PCT is necessarily fairer than a carbon tax or other trading schemes

32. The fairness of a carbon tax depends upon how the tax revenue is used. If the revenue is recycled to individuals on a lump-sum (equal per capita) basis then, arguably, it is equivalent to the equal per capita allocation of PCT. Likewise the revenue from an upstream cap and trade scheme under which rights are allocated by auction could be recycled to individuals on a lump-sum basis.

The equal per capita allocation of PCT is obviously the fairest allocation

33. A number of people have argued that an equal per capita allocation is not entirely fair, as those whose life circumstances require them to use more energy, for example, those who live in the countryside and those who live in colder parts of the country, should receive a greater quantity of emissions rights. I have forwarded a separate memorandum on this issue.⁶

PCT benefits all those on low income

34. Under DTQs, individuals are allocated emissions rights covering their energy emissions. Dresner and Ekins (2004) found that, if a DTQs scheme was implemented today, then, whilst the majority of households would be better off, around 30% of households in the lowest two income deciles would actually be made worse off due to having above-average energy emissions (mainly as a result of fuel poverty). Hence if DTQs were to be implemented in a way that did not disadvantage any low income households, fuel poverty issues would also need to be addressed (TR 3.4).

⁶ This was originally submitted to the Environment, Food and Rural Affairs Committee in September 2006.

35. However, if a PCT scheme was implemented today under which emissions rights covering energy *and* OG&S emissions (i.e. total emissions - see Equation 4) were allocated to individuals on an equal per capita basis,⁷ then it is not clear what percentage of low income households would be disadvantaged.⁸ Research into this question would be very useful.

Substantive debate around PCT

36. In para 32, I noted that the lump-sum recycling of revenue from a carbon tax or upstream auction is equivalent to an equal per capita allocation of emissions rights. It has been argued that a tax or upstream auction with lump sum recycling would be significantly cheaper than implementing a PCT scheme. For instance, Dresner (2005) writes

An ecobonus is a payment of equal size given to each individual to redistribute the revenues from an ecotax (say, a carbon tax) and has the same distributional effect as a personal quota assigned equally, it's just that the individual is given money, rather than a personal quota they can trade. In the same way, the Sky Trust proposal to equally distribute the revenue from an upstream emissions auction...is distributionally equivalent to a personal quota.

However, there's a huge difference administratively. Now we have a largely integrated tax and benefits system, an ecobonus or the equivalent from an upstream emissions auction can be delivered just by increasing the personal tax allowance, benefits and tax credits by a certain amount. It could be made more explicit and popular by making it an additional item shown in everyone's benefits or a credit in the calculation of their tax. Either way, the marginal administrative costs are virtually zero because you're using systems that already exist. And because it's collected upstream, the administrative costs of tax collection or an upstream auction are very low, actually much less than those of the Climate Change Levy, which could be abolished.

37. And as noted in para 16, it is also argued that C&S would be cheaper to implement than PCT as it does not require the use of carbon accounts, carbon cards and carbon statements. The question thus arises, if the same degree of fairness can be achieved at lower cost by other instruments, why consider a PCT scheme? The answer, I think, is that one would consider a PCT scheme if it brought with it additional benefits that justified any additional costs.
38. Under a carbon tax or upstream auction, individuals are faced with a price signal whereas under PCT and C&S they hold an allowance of emissions rights. The hypothesis regarding PCT and C&S is that actually holding emissions rights will increase individuals' "carbon consciousness", i.e. they will become more aware of their emissions and more engaged with and focused upon the task of emissions reduction than under other instruments. And if individuals spend more time and effort considering ways to manage and reduce their emissions, then emissions reduction may be more efficient than under other instruments. However, unlike C&S, PCT involves the surrender of emissions rights with (at least) each purchase of fuel or electricity. And the hypothesis is that the physicality/visibility of this surrender process and the receipt of a regular carbon statement will give a more

⁷ Lump-sum recycling the auction revenue under DTQs is equivalent to allocating OG&S emissions on an equal per capita basis.

⁸ If low income households are spending a high proportion of income on fuel and electricity, they will have less to spend on other goods and services, their OG&S emissions will be lower and they will have a greater surplus to sell.

frequent reminder to individuals of their emissions and, thus, their carbon consciousness will be greater increased under PCT than under C&S.

39. However, it is important to distinguish between two types of surrender. The first is surrender from a carbon account either by direct debit when paying utility bills or carbon card when buying fuel at a petrol station. Surrender by direct debit is hardly a physical or visible process but will result in entries upon a carbon statement. By contrast, surrendering emissions rights by card is certainly a visible, physical process and one in which those who run a vehicle would engage more frequently than the paying of utility bills (TR, 5.6).
40. The second type of surrender involves purchasing emissions rights at the point of sale which are then immediately surrendered. As noted in para 26, this second type of surrender is required to cater for those who do not understand PCT. And whilst, technically, emissions rights are purchased only to be immediately surrendered, from the customer's perspective, the entire transaction is cash-based, with the purchase of rights appearing as simply an item on the receipt (rather like VAT). Hence, this type of surrender of emissions rights is a largely invisible process which generates no entries on the individual's carbon statement (TR 5.6). And, of course, this is entirely appropriate from the perspective of those who don't understand the scheme.
41. However, it should be noted that this form of surrender is open not just to those who don't understand PCT, but to all. So it is, in theory, perfectly possible for all individuals to decide to sell their emissions rights immediately upon receipt and buy (and immediately surrender) all the emissions rights they require at the point of sale. Of course, as a result of the bid and offer spread, they would have to buy rights at a slightly higher price than that at which they sold them, but may decide that the convenience of purchase at the point of sale justifies this cost. And if everyone chooses to purchase at the point of sale, then, arguably the benefit of increased carbon consciousness is lost and PCT could be characterized a rather expensive way of implementing a carbon tax. Hence, an important piece of research is to assess the likely split between the two types of surrender.
42. Another proposed benefit of PCT is in relation to the public acceptability of large emissions cuts. In the Tyndall Report (TR, 7.1) we wrote

Allocating [emissions rights] directly and on an equal per capita basis quite literally makes individuals equal environmental stakeholders by awarding them an equal stake or share of the atmospheric sink. Arguably, the lump-sum recycling of auction or tax revenue does not make it as explicit to individuals that they have these equal shares in the atmosphere. If awarding [emissions rights] directly to the public means that they more clearly perceive they have such equal shares, if the public perceives this equal share to be fair, and if fairness is a condition for public acceptability, then DTQs may promote greater public buy-in to the task of substantially reducing emissions.
43. However, as mentioned in para 33, not every one regards an equal per capita allocation as fair. Of course, PCT does not have to use an equal per capita allocation but the issue of how allocations should be adjusted to take account of individuals' varying situations may itself become a source of some contention.
44. No detailed research has yet been carried out into the cost of a PCT scheme. It is important to do this, to assess the extent of additional benefits that a PCT scheme might offer and compare this with the costs and benefits of other instruments/instrument mixes.

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