



RSA

A persuasive climate
Personal trading and changing lifestyles
A report by Matt Prescott



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The Royal Society for the encouragement of Arts, Manufactures and Commerce

8 John Adam Street

London WC2N 6EZ

T +44 (0)20 7930 5115

www.theRSA.org

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About the author

Matt Prescott is an environmental scientist who ran the RSA Carbon*Limited* project from its inception at the beginning of 2006 to this conclusion. Matt's earlier career included working with the Royal Institution of Chartered Surveyors on built environment sustainability and the London Borough of Lambeth where he developed national firsts in sustainable construction and worked on award-winning community sustainability projects such as Brixton's Angell Town regeneration. Matt is an adviser to Green Rewards and will continue as an adviser to Carbon*Limited* as it further develops at the LGiU. He has a Masters degree in environmental science from University College London.

Executive summary

Almost half of the UK's emissions of greenhouse gases can be attributed to our individual actions. A framework aimed at systematically reducing them is therefore an attractive prospect: using emissions trading to achieve this is appealing because it has the potential to be more progressive than a carbon tax. Indeed, the provision of incentives (financial or otherwise) is vital to encourage environmentally friendly behaviour, whilst avoiding many of the sticky issues of compulsion.

Potential for 'double counting' exists where both individual and aggregated schemes can claim reductions for the same carbon saved. So for example an individual's savings could be counted through a personal carbon trading scheme and again by an energy company or airline. This double-counting has previously been considered to be an insurmountable hurdle, along with the inefficiency of having millions of individuals participating rather than a few large industry players. However, the current policy mix is not able to achieve the targets set out in the Climate Change Bill, and existing double counting in that mix implies that there is room for new measures, especially if they are able to tackle personal transport emissions.

However, there remain barriers to establishing a nationwide personal carbon trading scheme. Public support for such a scheme is tempered by concerns about fairness as well as widespread scepticism about the trading market itself.

Research shows that when it comes to cutting our individual carbon emissions, people seem to 'hit a wall' at about 20 per cent. Yet, to date, most of the discussions about models for personal carbon trading schemes are implicitly around achieving cuts within this 20 per cent figure: this would be costly and inefficient. However, schemes based on reducing *individual* reductions at a higher level are likely to result in unintended inequities and generate myriad complexities.

So what is the way forward? The RSA's research found that if carbon trading were to be introduced locally – and on an 'opt-in' basis – people would be more willing to get involved, and greater reductions in emissions could be achieved. To go further than our 20 per cent 'wall', people need interventions at a scale greater than the household: car share clubs, sustainable energy schemes, and other community-level initiatives and innovation.

Initially this could be delivered through an opt-in personal carbon reduction policy operated at a local level, in which there are benefits to the achievement of a personal carbon allowance target in the form of finance for community energy and energy efficiency projects. Individual carbon emissions could be aligned to community level reduction objectives, whether that community is a business, a local authority or any group.

Later, a 'cap and trade' could be introduced in which local authorities or other community-scale entities, such as local energy service companies, trade personal

carbon reductions on the behalf of individuals, recycling the revenue into schemes which build local energy security, or into local carbon tax charges or discounts according to performance against a personal allowance.

Community carbon trading

So there is a need to reconsider how we develop future personal carbon trading schemes at the community or collective level. These schemes could be more appropriate and intuitive to the needs of individual citizens, much more likely to be cost effective and would not compromise the unique selling point of being able to change people's behaviour and attitudes. We might call it community carbon trading.

The report starts by examining a traditional view of personal carbon trading. Criticised as an expensive solution pandering to middle class ideals, it has been commonly misrepresented and misconstrued. It summarises four discrete pieces of work which tell us what it is about the current view of personal carbon trading that seems to work, what doesn't work, and what that means for the future of the idea.

Loyalty card

A Persuasive Climate follows a successful trial conducted by the RSA and Atos Origin of over 100 volunteers who used Nectar shopping loyalty cards at BP garages to record how much fuel they purchased.¹ In aiming to understand what participation in a personal carbon trading scheme would look like and what technology would be needed, the RSA's *CarbonLimited* project set out to explore the technological means for delivering participation.

The trial, using a loyalty card to collect and process carbon emissions data from fuel purchases, demonstrates that the cost of operating a scheme could be much lower than previously thought. This suggests that a scheme which offers behaviour change as its unique selling point over other policies could migrate from its current status as complex and costly towards simple and value-for-money. There are a number of mechanisms from credit and debit cards through to loyalty and fuel cards that can be used to measure usage automatically and report personal carbon emissions. An open mind on design and further work on behavioural modelling would be needed to achieve this.

Behaviour change

Research led by Dr Abigail Bristow at Loughborough University used computer-assisted behavioural tests to uncover the relative merits of carbon taxation and a mandatory form of personal carbon trading in terms of their ability to influence choice. It found that, in the immediate term, carbon taxation has the greater potential to influence everyone, but personal carbon trading could achieve greater cuts if people 'got on board'. Many outcomes pivot around specific design

¹ <http://www.atosorigin.co.uk>

attributes, which the research showed could make a threefold difference in acceptability between the 'best' and 'worst' designs.

Public attitudes and the carbon market

Research commissioned by the RSA from the consultancy E3 added vital and consolidating clues to the way personal carbon trading should be designed. It suggests that uncertainty over the carbon price in a personal carbon trading scheme would need to be controlled to avoid the cost of the scheme exceeding the benefits of its resultant behaviour change. The logical means for achieving this is the more straightforward method of carbon taxation. However, there remains a deep mistrust amongst the public in using revenue pegs. The authors - Dr Andy Kerr and William Battye - argue that a hybrid of the two offers the best way forward.

CarbonDAQ

Many commentators have been calling for more empirical evidence of behaviour change, but not restricted by a specific design, so that the right way forward can be identified. This is where the RSA's CarbonDAQ², an on-line experiment in personal carbon trading, fits in. The RSA aimed to provide the infrastructure for any individuals to form groups of any type and use the basic premise of a carbon trading scheme as a means to achieve a group-wide emissions target. This would emulate 'cap and trade' schemes but without the shackles of particularly burdensome rules. CarbonDAQ - though not without its problems - has demonstrated the importance of the nature of incentives. Critically it points to one important ingredient which encourages engagement: a strong sense of community identity, online networks which provide a sense that 'we're in this together'.

So where we do go from here? There is a clear need to continue to consider individuals as the focal point given the share of emissions emanating directly from them³. However, schemes designed to use the community as the hub, the support network and the source of encouragement seem to be an attractive way forward. This points us to a hybrid design taking the participative elements of the more traditional models of personal carbon trading, but with rewards and incentives tied to community-scale adaptations to climate change, in the form of sustainable energy and consumption.

This suggests a space for models which speak to the localism agenda, which devolve responsibility, authority and democracy and which focus on sustainable energy, energy security and stronger environmental citizenship. For this reason the RSA's legacy from its Carbon*Limited* project is to 'hand over' CarbonDAQ' to the Local Government information Unit (LGIU) so that it can explore this idea further.

There remains a gaping hole between our levels of carbon consumption and where these need to be if we are to reduce the UK's carbon consumption and radically change people's behaviour. The RSA's work concludes that personal

2 At the time of writing, available at www.theRSA.org/carbondaq, to be replaced by www.carbonlimited.org.uk

3 <http://www.defra.gov.uk/corporate/ministers/speeches/david-miliband/dm060912.htm>

carbon trading could play a critical role in achieving this but only if we take a more collective or community approach and if we find the right design and understand the incentives that encourage individuals to participate in decarbonising the UK.

The introduction of personal carbon trading needn't be financially or technically prohibitive. Providing people with strong incentives to join local carbon trading schemes would be a good way of encouraging the wider public to embrace the concept.

Introduction

Scientists have for a long time been warning of the impact on our climate of our polluting habits. The figures and scenarios presented in the media often seem frightening to the extent of being disabling. The kind of changes we could expect for our world if the average temperature rose by an average of just 2°C are severe. Consequences are not easy to predict, but they would certainly include highly disruptive increases in the incidence of drought, famine, flooding and extreme weather patterns.

To avoid this fate, it is often said that we need to keep below 450 parts per million concentration of ‘CO2 equivalent’⁴ in the atmosphere. The pre-industrial level was around 280ppm. We now look set to overshoot this level considerably. As a result, the environmental community have been persuaded to modify their focus from one of mitigation – avoiding the overshooting of 2°C – to adaptation – learning to live with an average increase of probably greater than 2°C. To put this in context, the last time that glacial ice sheets reached down from the Arctic as far as New York and London, average global temperatures were about 4 or 5°C cooler than the present day.

Of course, 2°C was just a hopeful and rather arbitrary target to aim for. Whether above or below that level, people would have to learn to adapt – to change their lifestyles – as business-as-usual would no longer be an option. Tackling climate change has now become the greatest challenge facing modern society, one with no short-term fix or silver bullet solution. It will affect us all – our livelihoods, economies, food, security, ecosystems, health, well-being. Climate change is a problem which can only be addressed by a combination of state, corporate and individual action.

} Tackling climate change has now become the greatest challenge facing modern society, one with no short-term fix or silver bullet solution

With carbon emissions from individuals rising and representing a significant share of the UK’s emissions (44 per cent), there is a clear need to encourage people to change their individual and collective behaviour. This has become a priority area for public policy. To do this, it is important to understand what motivates change and ensure that the tools exist to enable it.

Evidence from polling research highlights the extent to which public engagement on climate change will be a difficult task, with “widespread contradictions” in people’s feelings on the issue according to one recent Ipsos-Mori poll⁵. Prominent amongst the areas of concern is cynicism about government legislation that restricts lifestyles. In Ipsos-Mori research presented to the RSA, seventy-four per cent of people felt that “we are heading for environmental disaster if we don’t quickly change our habits”, yet fifty-nine per cent said that “they are doing nothing about it”.

Such findings point to the need to develop a nuanced package of measures to reduce carbon emissions, which are able to take into account the variety of attitudes and behaviours of different groups and to do so with more emphasis on carrots rather than sticks. It would also appear necessary to build an accurate

4 http://en.wikipedia.org/wiki/Carbon_dioxide_equivalent

5 <http://www.guardian.co.uk/environment/2008/jun/22/climatechange.carbonemissions>

picture of what the best motivations for change are likely to be in each population segment. For example, strong growth in the sale of organic food has often been attributed to reasons of health than to a concern for the environment. This need not be problematic, especially where many low carbon behaviours, such as cycling and walking, are also beneficial to health, air quality and well-being.

This keen interest in citizen action on climate change raises a number of important questions about the kinds of interventions that are needed and the relationship between ‘hard’ and ‘soft’ policy measures aimed at changing attitudes or behaviour.

A personal carbon trading scheme, as originally described, would offer a combination of “hard” and “soft” measures – compulsory participation in carbon footprint management and a cost for those exceeding a specified target level combined with the freedom to make personal behavioural choices in an effort to attain that level. In other words, it would combine incentives with a national framework for action.

To date, the government has focussed its attention on addressing ‘carbon literacy’, providing information and education on the causes of carbon emissions and the steps that people can take to address them. The central message remains ‘*save energy, save carbon*’, but, as *CarbonLimited’s* work shows⁶, the number of steps that people can take in the home to reduce their emissions are limited, and energy use in the home is covered by a number of different policy mechanisms.

Whilst reducing overall demand for energy remains crucial, behavioural change needs to be linked to demand for lower carbon energy supply (i.e. consumers taking an interest in how energy is produced), and technological improvements to enable more efficient use of energy for which consumer demand will go a long way to stimulating innovation in a low carbon market.

Individual involvement is essential if we are to create the conditions for a lower carbon economy and will be essential if a more sustainable, diverse, and in many cases decentralised, approach to the provision and use of energy services is to be realised. Different solutions and forms of organisation may be appropriate for different people and places. A coastal village in the south of England will have a very different set of options to a land-locked town in the north, both in terms of social and natural resources.

CarbonLimited’s work to understand what form of citizen-centred approach should lie at the heart of environmental policymaking speaks to the RSA’s belief in the potential of groups of individuals to help to shape the kind of society they want. This report describes a possible format to encourage a new form of civic environmentalism in which the individual and community both have a much more prominent role.

6 Personal carbon trading – its economics efficiency and fit with other policies, Andy Kerr and William Battye, <http://www.rsacarbonlimited.org/carbonlimitedresearch/default.aspx>

I The birth of an idea

Since the introduction of the European Union Emissions Trading Scheme (EU ETS) in 2005, there has been heightened interest in carbon trading as a potentially reliable means to control emissions. The application of emissions trading principles to individuals, first described by David Fleming in 1996, became a strong talking point when the Tyndall Centre for Climate Change Research published research on it in 2005 and David Miliband, then Secretary of State for the Environment, spoke enthusiastically about it at a conference in 2006 before launching the *CarbonLimited* project. Aside from being the kind of citizen-centred approach that the RSA takes a strong interest in, its potentially progressive, redistributive and inclusive nature, and the increasingly urgent search for climate change solutions, were key factors in the RSA's decision to look in more detail at the idea.

Personal carbon trading hit the headlines for a number of reasons. It represented bold, new thinking on the environment, at a time of increased public appetite for action. It looked like an idea which could answer the question 'why should I do something only for my neighbours to nullify my efforts with another patio heater?' – the neighbours would be part of the system too. Talking about carbon 'points' was attractive when compared with the opaque language surrounding the EU ETS and other policy measures aimed at climate change and energy use mostly hidden from the consumer's view.

Furthermore, climate change was, and still is, a cross-party issue, appealing to those on all sides of government. Being, as it is, a market-based mechanism, the underlying emissions trading principles of personal carbon trading have broad appeal across mainstream government, as well as, importantly, industry. It appeals to modern conservatism, yet it is also based on the fundamental principle of an equal right to pollute – equal access to a shared resource – a principle attractive to many traditional environmentalists and many of those on the political left. Of course, this also meant that the not immodest level of scepticism about it is equally felt cross-party. The apparent sense of fairness of an equal allowance sounded sensible, equitable and progressive. However some argued, astutely, that the idea was far enough away from having any chance of implementation that a focus on it would nurture a maintenance of the status quo.

While he was Secretary of State for the Environment, David Miliband initiated a study by government which resulted in four reports published in May 2008. Interpreted by many in the media as 'a kick into the long grass', Defra, the department leading the study, said that it remained interested in the idea, but it was, in essence, 'ahead of its time'. A few weeks later, the cross party Environmental Audit Committee, chaired by Conservative MP Tim Yeo, published its report into personal carbon trading. It was more favourable towards the idea and slammed the government for failing to continue to take it forward in the near term. However, for the time-being at least, the government's view is that it is a complex means to tackle emissions from individuals which doesn't justify the costs, estimated to run into billions of pounds.

Defra's report had largely focussed on the model of personal carbon trading originally developed by David Fleming in 1996, known as domestic tradable quotas (DTQs), a whole-economy scheme, which would incorporate not only individuals, but business and industry. A useful study, it contributes greatly to a sparse body of research. However, the focus on DTQs feels a little like standing with ones back to the Arc de Triomphe and staring down one of the eleven avenues that run away from it, unaware that ten others exist. The debate really needed to be at a higher level – asking whether a solution of this type – the use of a market-based mechanism to control emissions from individuals – is appropriate in the first place.

One of the issues raised by Defra was public acceptability. Nobody can really know how people would actually respond to such a scheme, given that it's not possible to pilot a mandatory approach. *CarbonLimited* addressed this by breaking the problem down into pilot-worthy elements – the technology itself and a mock-up of the experience, supplemented with a citizens' forum and computer-assisted behavioural modelling.

Defra's study had used a two hour workshop to deduce likely behavioural responses. All of the attitudinal research generated responses familiar to those working on the idea: What about children – do they receive allowances? What about colder parts of the country? What about my flights to visit family, and so on. *CarbonLimited's* research managed to cut through many of these devilish details to establish that people generally viewed the proposals as fair and that they would be effective, but that barriers existed to their understanding of the scheme's overall approach, with widespread scepticism and concern about the carbon trading market itself.

Like many new ideas, there remains a high level of ambiguity about what personal carbon trading actually is. *CarbonLimited* has, for example, received a great deal of attention from those in the carbon offsetting world, often mistaking personal carbon trading, which would involve a cap on emissions from individuals, for carbon offsetting, which doesn't. The majority of those researching the personal carbon trading field remain unconvinced by any given model. No wonder, then, that confusion persists about the detailed nature of the proposals.

} Like many new ideas, there remains a high level of ambiguity about what personal carbon trading actually is.

The DTQ model of personal carbon trading remains unworkable in the eyes of many and a difficult task in the eyes of everyone else. Is there a model of personal carbon trading that would work? Not only is it not possible to imitate a mandatory trading scheme, it's also hard to pilot a voluntary iteration in the absence of a tangible incentive. A network of Carbon Rationing Action Groups⁷ has done an excellent job of attempting such a voluntary cap and trade, but participation is restricted to the segment of the population willing to ration their own energy use. One alternative approach gaining traction in the Republic of Ireland through the Green Party is called 'Cap and Share'⁸.

7 <http://www.carbonrationing.co.uk>

8 <http://www.capandshare.org/>

Like many organisations interested in the idea, the RSA took the view that a personal carbon trading scheme would be a scheme only for individuals, with other policy measures, such as the EU ETS covering emissions from other sections of the economy. There is no reason to assume that a personal carbon trading scheme should be the only policy measure aimed at individuals – it seems sensible to use a basket of measures to control emissions from this sector by taking actions for which they can be held entirely responsible, such as driving and home heating.

To move from the current state of citizen engagement – namely a handful of largely unconnected voluntary carbon counting exercises – towards a simple and coherent overall strategy for controlling emissions, will involve the development of a number of different incentive-only schemes. The prototype personal carbon trading platform CarbonDAQ is an attempt to advance this exploration – it enables any group to trade for any incentive, for any reason. For example, if by participating in a group formed in the workplace in which the incentive to cut emissions is annual leave, where an employee might receive, say, one hour of annual leave for every 10kgs of carbon saved beyond a given target, then arguably many more people will be likely to participate. In order to understand the potential for a workable voluntary scheme, we want to know (i) what drives people to take part (ii) what attributes does their scheme have? This exercise therefore provides some pointers for the kind of schemes that could be expected to gain traction and generate significant impact.

Debate about personal carbon trading has been nebulous to date because the nature of the solution and the specific model of personal carbon trading have become blurred. This has had two results. First, detractors have pointed to aspects of the specific model which cause problems. Second, there has not been enough debate about whether or not personal carbon trading *per se* is the right sort of approach.

Implicit in personal carbon trading is a ‘cap’, i.e. a total volume of permissible emissions, and a ‘trade’, at the level of the individual. In simplistic terms, the Carbon*Limited* project has established that the cap is seen as critical, but the trade is problematic. The primary alternative, a carbon tax, doesn’t contain a cap. One way forward, therefore, could be to take the cap from personal carbon trading (i.e. one imposed at the level of the individual) and combine it with trading, or some form of hypothecated taxation, at a level higher up the food chain, where the value can be generated to incentivise personal carbon reductions.

It is this idea which Carbon*Limited* intends to take forward as a new work stream at the independent think tank, LGiU⁹. It will seek to re-engineer the idea by bringing the ‘community-scale’ into the scheme, possibly leading to a new model which may not fall under the ‘personal carbon trading’ banner.

⁹ Local Government Information Unit, www.lgiu.org.uk

2 Developing the idea

2.1 Evidence from other trading schemes and policy interventions

Amongst the most popular questions posed to *CarbonLimited* concerned the cost of carbon that would be anticipated in a personal carbon trading scheme.

Answering this would be like providing a ten year weather forecast. With none of the scheme detail in place, even arriving at a theoretical price would be difficult. Price is, however, crucially important. Too low and the policy would lack adequate impact to justify its cost, too high and it would become a threat to social security, plunging many people into financial difficulty – delivering a social bad for an environmental good – not a sustainable development.

In both the transport and household sectors, the main policy focus has been to improve energy efficiency: largely successfully in the case of households; less successfully in the case of transport. In both sectors, policy makers have shied away from the difficult challenge of tackling consumer behaviour. However, better understanding of energy services, even involvement in them, such as is so well exemplified by the Baywind Project in Cumbria¹⁰, is certainly a means to win hearts and minds about the need to change our lifestyles.

Understanding the impact on behaviour relies to a large extent on understanding the nature of the instrument itself. Research produced for *CarbonLimited* by Andy Kerr and William Battye¹¹ looks at the current and planned policy landscape (as well as the question of economic efficiency). The core economic instruments for managing emissions for the foreseeable future are the European Union Emissions Trading Scheme (EU ETS), which caps 52 per cent of projected UK carbon dioxide emissions, and the domestic supplier obligations (EEC, to become CERT, and the Supplier Obligation from 2011). Any analysis of a personal carbon trading system that does not operate in tandem with these instruments will be purely academic. This suggests that DTQs, and similar designs of personal carbon trading that assume organisations and individuals operating together in an economy-wide scheme are non-starters, at least for the time-being. It would also appear to lessen the probability that a downstream trading scheme would fit into the current or planned climate policy landscape.

As a policy measure that needs to slot in alongside a number of others, rather than representing a silver bullet of itself, personal carbon trading may need to look very different to the traditional DTQ model. What's more, it is the market mechanism itself which shows the least promise in terms of public acceptability, as well as being quite clearly the more troublesome aspect in terms of deliverability. In practice, individuals have neither perfect market information or foresight; they do not act rationally and make optimal decisions consistently, which will make the personal carbon market unpredictable. Poor information, high implicit discount rates, and capital constraints are common reasons for inactivity in a carbon market. These barriers account for the 'gap' (often referred to as the efficiency gap in the literature) between the cost effective potential and actual practice. This is observed with industry participants who usually were with dedicated staff to manage compliance in carbon trading – imagine how magnified these inefficiencies would be in a personal scheme.

¹⁰ http://www.baywind.co.uk/baywind_home.asp

¹¹ http://www.rsacarbonlimited.org/uploads/documents/Personal_Carbon_Trading_Andy_Kerr_55.pdf

As Kerr's report highlights, higher income households appear to take decisions regarding energy use more patiently than lower income groups. This is possibly because poorer households frequently pay higher rates of interest on debt and suffer more from capital constraints and credit rationing, which is closely linked with another pervasive barrier: capital availability. A lack of initial capital to undertake investment in more efficient technology or behaviour means missing out on net savings in the medium and long term. This underlines the concerns about potential inequalities in personal carbon trading, perhaps too complex to mitigate against.

However, there is a substantial ray of hope for the idea in Kerr's analysis of the efficiency of personal carbon trading. In practical policy making, the response to these barriers has been the imposition of multiple economic instruments on the same unit of energy or along the same energy consumption chain, precisely because politically expedient applications of 'upstream' instruments do not appear to provide sufficient rationale to change organisational or individual behaviour 'downstream'. For example, the UK Government has attempted to raise interest in carbon management at senior levels within businesses by focusing on organisational reputation (Carbon Reduction Commitment); or used suppliers – rather than householders – to uncover household efficiency measures (Energy Efficiency Commitments). Which is to say, policymakers have found that the short run impact of marginal price changes upstream is not sufficiently effective at changing individual behaviour downstream and re-organising the economy away from its fossil-fuel basis. In other words, there is definitely room for such an intervention.

Under the current framework, policy makers are caught in a dilemma between applying sufficiently high prices (either via upstream tax or market mechanisms) to uncover economically beneficial efficiency measures and to change individual behaviour, without causing severe regressive economic impacts downstream. Many commentators consider that policy should focus on developing an informed society that is supportive of strong climate change mitigation. Underpinning this is the development of a high level of carbon awareness, so that people want carbon reductions and are prepared to take personal responsibility.

In transport, the technical potential to reduce emissions which has not kept pace with increasing demand; this process is not expected to change until post 2020. The real costs of motoring have declined for the past six years, while the average real cost of airline tickets is around the same as in 1996. Given that disposable income has increased appreciably, this has made driving and flying considerably more affordable than before. Meanwhile, the real cost of bus and train fares has increased sharply, by 31 per cent and 16 per cent respectively; in the case of buses, this has outpaced the rise in disposable income, meaning they are not just less affordable relative to car use, but absolutely less affordable than they used to be. An attempt to rebalance these trends in favour of cutting emissions will involve a narrowing of the gap between what reductions are technically possible and that which is expected to be delivered by the current and proposed policy framework. This gap appears largest in the transport sector and rather small in the household sector, perhaps telling us that

personal choice has favoured emissions reductions in the home over cuts from travel. This suggests that the greater provision of behavioural interventions to cut emissions from travel could be the most important focus of a personal carbon trading scheme, where overlap with other policies could be tolerated to the greatest extent. However, findings from CarbonLimited's piloting work outlined below point to these emissions also being the most problematic to measure.

Since 1996, average households have spent less than 4 per cent of total expenditure on household fuel and power. The typical household spends as much on alcoholic drinks and tobacco as it does on either gas or on electricity¹². The total fuel and power bill is similar to that spent on household toiletries. If an individual could reduce his or her emissions by up to 20 per cent over the course of a year...through uncovering efficiencies and or changing behaviour...then this would equate to ~1tCO₂e saved. At a nominal carbon price of £25-50/tCO₂e, the opportunity cost associated with researching, uncovering and implementing the efficiency gains would need to be rather low to obtain any benefit from the action. This is particularly the case in the face of volatile – or uncertain – carbon prices. While businesses can employ hedging strategies of varying degrees of sophistication to manage price fluctuations, the opportunity costs associated with such actions are unlikely to make them amenable for individuals.

The typical household spends as much on alcoholic drinks and tobacco as it does on either gas or on electricity

Kerr's report, therefore, points to personal carbon trading lending itself to some form of hybrid scheme, with the participation of individuals generating informational benefits only, insulated from the ravages of the market. After all, according to Kerr, the cost of optimising a position within a trading scheme rises rapidly with future price uncertainty and volatility, and highly volatile price fluctuations are common. Such outcomes in a personal carbon market may well raise the cost of participating in the scheme close to or above the marginal economic benefit of the scheme. This suggests that clear, stable price signals would be vitally important – not a fact which plays to the rationale of employing a market-based mechanism in the first place. However, evidence suggests deep distrust of environmental taxation which would provide the obvious solution to the need for stable price signals.

One alternative that provides both clear price signals and a long term emissions target and has been flagged internationally is the McKibben-Wilcoxon Blueprint. Whilst rightly criticised for its inability to meet international climate policy requirements, its features, which include the government or independent climate committee setting the price of annual carbon allowances and a fixed number of long term allowances equal to the desired emissions reduction from individuals, are attractive to the particular demands of a personal carbon trading scheme. In rough terms, a model could be envisaged in which social landlords, local authorities or other 'community-scale' entities deliver scheme compliance for householders by controlling their allowances, recycling carbon market profits into further fuel saving and energy efficiency measures and employing central information about the best available options. Individuals would remain centrally involved by being charged for excessive emissions.

¹² Personal carbon trading – its economics efficiency and fit with other policies, Andy Kerr and William Battye, <http://www.rsacarbonlimited.org/carbonlimitedresearch/default.aspx>

Such a marriage of individual and community-scale schemes could deliver the greatest benefit in reduced bills, energy security and home or community energy infrastructure improvements. These activities have good potential to engage individuals, especially where they could see that steps taken to save energy in the home could result in cost-saving, or other beneficial improvements to local schools, leisure centres or other community facilities. The delivery framework would look like an expansion of services already offered by the likes of the Energy Saving Trust¹³ and the outcome, however hard to accurately predict, would naturally encourage stronger civic engagement around environmental issues.

2.2 Behavioural responses to scheme design

Research by Loughborough University and the University of Leeds¹⁴ developed and implemented a survey tool with the ability to examine and quantify behavioural responses to a personal carbon trading scheme with a distinct DTQ accent. It found variation in terms of behavioural adaptation to carbon taxation and personal carbon trading, as well as the impact of specific design characteristics on respondents' choices.

Age, transport habits, home tenure, perceived ability to reduce home energy usage and carbon footprint were the variables which appeared to explain respondents' choices. The carbon price appeared only to explain respondents' initial decision whether or not to reduce emissions, while no impact on the magnitude on savings was detected.

In 2007 Tight et al¹⁵ interviewed 35 households in-depth and asked them to work towards a 60 per cent carbon reduction target in their transport activities. Hypothetically, households were able to achieve an average saving of 21 per cent. This figure was closely replicated by recent research led by Dr Abigail Bristow. There are policy implications here: how much can people be expected to do in the absence of significant supportive measures?

This research is an important first step in assessing how changes in behaviour might arise and where changes might happen earliest. It also helps identify areas where energy consumption is highly valued and change is unlikely.

Respondents believed it is more difficult to make carbon savings in transport than in domestic energy use – conflicting unfortunately with the observation that it is the transport sector which is most in need of an effective carbon reduction policy. Indeed most respondents report that they are already saving energy in the home. The most popular actions taken in the experiments were win-win, where energy is saved without a reduction in comfort. The least popular actions related to energy investments, especially where the technology is unfamiliar and expensive. For those who fly, cutting flights is the least likely action to be adopted in the future.

A higher proportion of respondents say they would be more likely to change their behaviour in response to a carbon tax than they would be to personal carbon

¹³ <http://www.est.org.uk>

¹⁴ Available at www.carbonlimited.org.uk

¹⁵ <http://www.its.leeds.ac.uk/index.html>

trading. However, those who do change their behaviour because of a personal carbon trading scheme achieve greater reductions in emissions. Overall, hypothetical savings of 12 to 19% were achieved. The evidence as to whether there is a difference in response to a carbon tax or a personal carbon trading scheme is therefore mixed.

The analysis suggested that the design attributes of personal carbon trading schemes had a strong influence on acceptability. Respondents preferred personal carbon trading with:

- * Allocations that are transparently fair and based on principles of equality with children receiving an allowance and extra support for those with greatest needs
- * Choice in the disposal of excess permits
- * Permits having a one year lifespan, with a banking option
- * No need for an additional transaction
- * Some limits to be placed on permit purchase, but fairly liberal
- * Management by one agent or known institutions
- * Price set by the market, with or without limits

For carbon taxation, responses point to the importance of a tax exemption, with weaker support for revenue recycling into measures that would further reduce emissions either through spending on technology or measures to make behavioural change easier.

Those who travel by air and/or car have a greater preference for longer permit lives and the ability to bank than those who do not use these modes. Car users also prefer higher purchase limits. Air users have much higher aversion to price. Overall those with a higher footprint prefer more permissive regimes.

Bristow's research shows that the acceptability of the best and worst designs varies by a factor of three, providing clear evidence of the imperative for selecting the right design attributes with respect to either personal carbon trading or carbon taxation.

2.3 Experimenting with participation

We should look more radically at the option of tradable personal carbon allowances. Imagine a world where carbon becomes a new currency. We all carry carbon points on our bank cards in the same way as we carry pounds. We pay for electricity, gas and fuel not just with pounds but carbon points.

David Miliband, July 2006

When confronted with the idea of a personal carbon trading scheme, the majority of people will first wonder what it would look and feel like, and how it would impact on them. This quote from David Miliband caused a polemical riot in the blogosphere. A recent post from the 'The Error Log' talks of an 'Orwellian

nightmare of the government deciding, and tracking, how much [carbon] you will be allowed to spend, travel and consume'¹⁶. This is not an atypical response.

Even those who are more positive about the underlying rationale for the scheme have concerns about the accuracy of data. This would be crucial for any scheme, but especially one based on mandatory participation. One CarbonDAQ participant submitted that it was '*irresponsible to suggest any form of trading on the basis of roughly estimated numbers*'.

For public debate on this issue to advance, it would seem necessary to pilot the experience, to build a picture of what participation would feel like in practice and to see what technology would be required to tackle these concerns. In a partnership with Atos Origin, an international IT services company, CarbonLimited explored various options for delivering Miliband's vision of a 'carbon credit card' for every citizen. This was an important step in describing participation in a basic scheme, which would seek to obtain the kind of data that would be required (and would spark privacy concerns) and in establishing whether it could be made to work straightforwardly.

Use of carbon calculators, especially the more accurate ones, is difficult to encourage. They engage the user in a lengthy, tiresome process. Unless they are linked to incentives of some kind, it is unlikely that the use of carbon calculators will expand. To be able to circumvent the carbon calculator process by delivering automated carbon footprinting would considerably diminish hassle as well as considerably enhancing accuracy. As with smart metering, this dynamic information is itself attractive to individuals wishing to understand their emissions, either in pursuit of cost saving or greener living.

Research began by looking at the range of cards available which could capture information relevant to the purchase of fuel in the petrol forecourt as originally described by Starkey and Anderson (2005) in their seminal paper examining DTQs¹⁷. Home energy purchases are rarely paid for by card, so the project team chose to focus on the purchasing of fuel on the petrol forecourts, where cards are invariably the method of payment.

The objective was to deliver a 'proof-of-concept' pilot to show that it is possible to re-use existing IT infrastructure to capture the information to enable accurate carbon footprinting and send it to CarbonDAQ where it would be presented as a 'carbon usage statement'. The project considered Miliband's 'standalone' card, credit cards, fuel cards, pre-payment cards (similar to credit cards but pre-paid to avoid credit risk) and loyalty cards. Each of these options has strengths and weaknesses. The key points are highlighted below.

✱ The "standalone" card

The 'standalone' card – the recycled plastic or corn-based material card you would keep in your wallet to carry out personal carbon trading related

¹⁶ <http://theerrorlog.blogspot.com/2008/08/miliband-and-personal-carbon-trading.html>

¹⁷ http://www.tyndall.ac.uk/research/theme2/summary_t3_22.shtml

transactions such as the purchase of fuel at the petrol forecourt, raised immediate concern from retailers.

Key considerations for them included point of sale software/hardware changes, staff training regarding the presence of a new card and, most importantly, time taken by the customer at the checkout through the addition of a new transaction. So much effort is channelled into reducing time at the checkout that any measure which threatens this is certain to be unpopular with retailers.

This rules out the 'standalone' card for a large-scale pilot. Indeed, amongst the more common feedback were questions about how much time participation in the pilot would take. When looking at unveiling such an approach nationally, it would be commercially naïve to expect retailers to handle additional cards unless the considerable weight of government policy was behind the scheme. In any case, for a mandatory scheme, it would seem too easy to find ways to avoid handing over the card.

For local level applications, the picture may be different. The Dutch 'NU card' scheme¹⁸ is an incentive system for sustainable behaviour and consumption. Every cardholder buying a product or service from a shop that participates in the NU savings programme receives NU points. Cardholders can redeem the points they have saved for 'sustainable rewards' at participating firms. A distinct 'standalone' card is an obvious choice for this.

* Credit cards

Credit cards, it was found, did not provide an adequate breakdown of any given transaction to deliver true data on personal emissions. In other words, if you spent £50 on some petrol and a bag of sweets, it wouldn't be possible to decipher how much was spent on each, nor would it provide information about what grade or volume of petrol was represented in the price. To use the credit card infrastructure would be to make a set of assumptions, upsetting those wishing carbon debits to be fiercely accurate. It is worth noting however that a sophisticated methodology has been developed by the ICE organisation for this purpose, in a relationship with the Dutch bank Rabobank¹⁹.

* Fuel cards

Fuel cards are commonly used by small businesses. For example take a plumbing business, with six vehicles. The company director hands out a fuel card to each of the drivers who swipe the card when buying fuel. The director would receive an itemised bill at the end of the month, attach a cost for carbon, and easily see the environmental impact of the fleet and of each driver, which might be useful in determining the success of an 'ecodriving' course.

Applied to individuals, the logic for the card is reduced (i.e. the consumer is also paying the bill) and the whole forecourt retail industry would have to

¹⁸ http://www.nuspaarpas.nl/www_en/html/spaarpas_def.htm

¹⁹ <http://www.greenpowerconferences.com/corporateclimateresponse/document/s/JudeThorne.pdf>

change, with direct debiting or some other retrospective billing taking place. This is satisfactory for piloting, but the view of the project team was that it would not be scalable and not popular with the industry, being even more onerous than the 'standalone card'.

* Pre-pay cards

Pre-pay cards are similar to credit cards, but take the risk away from the finance provider, with the cards 'charged' up with money by users before they draw down against it. London's Oyster card, used for public transport journeys is a form of pre-pay card.

Pre-pay financial cards face similar problems to credit cards – the data that is transferred from the point of sale is simply the economic value of the total transaction. Schemes such as Oyster could hold greater promise for a personal carbon trading scheme, especially one in which users 'pay as they go' above a certain level of carbon usage and at a relatively fixed carbon price. Whilst in carbon credit, purchases of fuel, electricity or travel using the card would result only in the deduction of cash. When the credit has run out, carbon credit top up could be added to the bill. This would require cross-sector systems integration, making it initially costly, but it would connect well with a voluntary incentive-only or opt-in approach.

* Loyalty cards

Loyalty cards vary with respect to the data collected, but the project team determined that the Nectar card²⁰, the UK's most widely used loyalty card, would be able to capture the level of detail necessary to separate fuel from a bag of sweets in a user's purchase. It would also be able to identify the grade and volume of fuel.

Existing users already implicitly trust Loyalty Management Group, Nectar card's owner, with their personal information. So as long as third parties do not obtain access to these data, then many of the privacy concerns expressed by some commentators are more or less defunct in an opt-in scenario.

The project team used this approach to deliver the resulting trial scheme, which enables users to swipe a Nectar card at BP petrol stations, resulting in the requisite number of carbon units being debited in the participant's carbon account in CarbonDAQ, with information about the transaction being displayed there.

The purpose of the trial is to establish, in principle, that it is possible to use existing infrastructure to capture the type of information required. Users may well avoid BP petrol stations to buy fuel elsewhere. But if the incentive of participation had been tied to nectar card points, then it is possible to imagine how, in an opt-in format, this concern could be minimised. Users would wish to participate correctly in order to gain additional 'points'.

²⁰ <http://www.nectar.com/NectarHome>.
nectar

This trial brings in to question the cost estimates that Defra have placed on the operation of a personal carbon trading scheme. Whilst many of the cost aspects of Defra's study would remain, the pilot tells us that approximately half of the estimated £700m - £2bn set up costs could be avoided by thinking more flexibly about the specific model of personal carbon trading employed²¹.

In operational terms, the £50m - £100m identified for vehicle fuel purchases has been directly addressed and removed by the nature of the pilot. More importantly, the whole mindset of the need to build fresh infrastructure and accounting mechanisms is called into question. There is no doubt that this would be a difficult and costly exercise, but the £1bn - £2bn operational cost estimates published by Defra are based on broad-brush assumptions which assume a parachuting-in of a new system, not the reconfiguration of existing and current trends in loyalty and retail.

The fundamental problem for most studies to date is that they look at a fixed model of mandatory personal carbon trading, based on DTQs, not an evolutionary pathway through a set of simpler learning phases. This evolutionary pathway may provide a way to avoid the large infrastructure set-up costs typically envisaged.

Unanticipated costs may occur, of course, but the fixed mental model that personal carbon trading would only work through a mandatory UK-wide scheme is unhelpful. In any case, the political difficulty of winning this debate suggests that a voluntary approach must come first.

Beyond capturing emissions information from the petrol forecourt, the project team considered a matrix of emissions – looking at travel and building in use emissions for both the workplace and the home. We concluded that the capture of the data would be relatively straightforward using existing infrastructure for workplace emissions, business travel and household emissions, with personal travel the hardest of the quartet to capture.

Rather than seeing it as essential to capture all emissions within the same initiative, these findings suggest that when viewed in terms of individual chunks of emissions that can be reduced, significant progress could be achieved by isolating these chunks and applying a cap and trade approach to each of them.

For organisations needing to comply with the forthcoming Carbon Reduction Commitment for example, the development of a system of tradable carbon quotas, perhaps managed by existing budget holders, could be a thoroughly attractive and cost effective means to cut emissions. By associating incentives (eg. bonuses, annual leave, charitable fundraising etc.) with the achievement of carbon reduction targets, organisations could acquire both a more integral accounting mechanism for carbon and an excellent means to engage staff. Expense claim systems and existing business accounting software offer ideal conduits for the associated data

²¹ For set-up, the costs allocated to accounting and transactions, some £270m to £910m, taking their range of estimates, would most likely be removed or at least severely slashed.

management and would place ‘environmental sustainability’ at the heart of the business, precisely where best practice says it should be.

The ‘carbon card pilot’ used a loyalty card network to prove that it is possible to capture data relevant to a personal carbon trading scheme without building new IT infrastructure. However, a user could purchase fuel from a different retailer and so avoid having those emissions data captured. It would not seem sensible to coerce all petrol forecourts to participate through one or other loyalty card schemes; even if it were, the value of participating would need to outstrip the value of the loyalty points, otherwise people would avoid presenting their card.



The ‘carbon card pilot’ used a loyalty card network to prove that it is possible to capture data relevant to a personal carbon trading scheme without building new IT infrastructure

This approach is therefore only suitable for a restricted incentive-only scheme. For a scheme open to anyone, the data on car use would most likely need to be captured by a body like the Vehicle and Operator Services Agency (VOSA) who oversee vehicle MOTs²². The use of MOTs to verify data would come with the drawback that data would only be collected annually. That such data would be of lesser interest informationally and hence have lesser impact in terms of behaviour could be countered by voluntary self-assessment, akin to gas meter readings, with the likelihood of misinformation being mitigated against by the annual data from VOSA. The collection and storage of such data for carbon emissions management purposes could be mandated by law.

The remaining ‘direct emissions’ of home energy and air travel could be captured by energy companies and air lines respectively through a voluntary or mandatory code of practice. Again, voluntary self-assessment would enhance the real-time feel of such data capture. Our learning from the carbon card pilot suggests that consumer IT will be the best way to provide this interim data, either accurately (e.g. the Nectar card trial) or by proxy (e.g. telematics). By dropping its pay-as-you-drive insurance product²³, Norwich Union has taken away an opportunity to better understand people’s appetite for ‘in car’ information technology. Although it was not designed as a green product, this technology could ultimately reward eco-driving (gentle acceleration etc) and it won’t for the time-being be possible to see how acceptable a commercial product which rewards green behaviour through monitoring would be. Some commentators have suggested that its failure demonstrates people’s reticence to be monitored. This assumption is brought into question by the analysis of the options for capturing emissions data from travel outlined in this report which suggest that the systems do already exist to gather accurate data on at least an annual basis, and on an opt-in basis it would work well. The technology is already trusted and used.

Setting incentives to encourage personal emissions cuts is central to CarbonDAQ, CarbonLimited’s experimental personal carbon trading platform. In no position to issue a scheme akin to a DTQ, or a similar mandatory model, nor to finance the participation of a representative sample of individuals for research purposes, CarbonLimited chose to build a platform which would enable groups of any type

22 <http://www.vosa.gov.uk/vosacorp/aboutvosa/whatwedo/whatwedo.htm>

23 <http://news.bbc.co.uk/1/hi/programmes/moneybox/7453546.stm>

to create their own closed market and elect their own currencies with which to trade, enabling precisely the kind of organisational carbon management described above. It is designed not as a meticulously accurate carbon calculator, but as an illustration of how communities can come together to achieve group-wide targets using a ‘cap and trade’ approach to generate incentives. As one participant put it “emissions trading only really works if everyone joins”. The creation of ‘closed’ trading markets helps to address this common feeling of isolation, and it is easy to imagine these discrete groups later being linked.

The first participants were a group of twenty students from the University of Cambridge and Imperial College London²⁴. These students had become interested in the idea through their networks and studies, and were keen to experiment with it. For an incentive, they identified a ‘bounty’ – theatre tokens and a mixture of other items – in which they issued equal shares to the participants. The carbon allowance was set at 210kgs of carbon per month, almost a ten per cent cut from the average personal emissions of the group at the start of the process. At the end of the designated trading period, average carbon emissions had been cut to 217kgs. The target, as represented by the allowance, was missed, although a real reduction of 5.7 per cent had been achieved. The value of emissions reductions therefore rose in terms of the bounty they could be exchanged for, although the market stalled as they were not able to go into bounty debit. If they had been able to introduce additional liquidity, in the form of their ‘bounty’ currency, in order to continue to offer higher prices for carbon reductions, then the value of a unit of carbon would have risen further, and those in a position to sell would have gained even greater percentage share of the bounty. The simple addition of further students into the scheme would have provided improved liquidity, however it would also have raised heightened concerns about cheating.

The ‘closed markets’ of CarbonDAQ are designed in such a way as to reduce the probability (and problem) of cheating, with participants usually knowing one another and having bought into the value of the exercise. However, it would be likely to become a problem in due course. This emphasises the importance of the ‘carbon card’ trial described above, which would circumvent the self-assessment nature of the existing carbon calculator. Anecdotal feedback suggests that cheating is not currently a problem for CarbonDAQ. Self-assessed calculator revisions more commonly increase participants’ footprints, suggesting that they are not pursuing additional virtual pounds, or whatever other incentives their group has set up, but rather at attempting to achieve a better or more dynamic carbon footprint.

However, going forward, and especially if backed by external finance, data would need to be more accurate and any cheating minimised so that measurable value could be achieved for the sponsor. This implies a need for points of data collection to be controlled by more centralised, audited and trusted authorities – something which is supported by Dr Bristow’s research described above. However, it is probably worth noting the similarity with tax returns or VAT self-assessments in which so many people participate.

²⁴ Thank you to Thomas Sembres, whose enthusiasm led to the formation of this first CarbonDAQ group.

For participants in the ‘carbon card’ pilot, emissions have, as expected, remained higher than the CarbonDAQ-wide average, with existing car use central to the mechanics of the scheme. However, set against an ‘incentive’ of ‘monopoly money’, emissions from this group have dropped, at the time of writing, over the past four weeks by almost 3 per cent, which points to the value merely of participating in uncovering the potential for emissions cuts.

Another group, staff at the London Borough of Lewisham, exceeded their target ten per cent reduction by almost two per cent, an 11.8 per cent reduction at the time of writing. The average per capita reduction from these three groups works out at a reasonable 4.9 per cent, given sparse incentives. If this were achieved nationally, the saving would be 16 million tonnes, equivalent to the carbon emissions from more than four UK gas-fired power stations.

Levels of participation in the trading platform, as a proportion of overall participation in CarbonDAQ, remains light, with participants making less than one visit to the trading section per month on average. This either suggests that usage will remain light in the absence of more attractive incentives, or that automatic trading, or trading through others would be a preferred form of participation – supporting the concerns raised earlier about the barriers to participation in a trading market. However, in a number of cases, individuals participated regularly in the trading area, buying and/or selling vastly greater quantities of carbon than necessary to balance their accounts, either speculating, or getting a feel for what participation in such a scheme would be like.

Carbon prices vary from group to group. The CarbonDAQ-everyone group is perhaps the best barometer: here, at the time of writing, carbon is trading at £0.82 per 10 kg (1 carbon credit), or £82 *per tonne* from a peak of £120 per tonne. This price is much higher than those in international carbon markets, such as the EU ETS, which typically hover around £20 per tonne. It also far exceeds other prices that have been put forward, such as the government’s ‘shadow price of carbon’ of £26.50 (assuming a 2008 scheme start), more closely mirroring the UK government’s now defunct social cost of carbon of £70²⁵. This may reflect a lack of comprehension or an abundant initial enthusiasm, or perhaps it points towards a genuinely higher value that could be expected from a personal market.

For many, participation in CarbonDAQ highlights what people may already realise about their environmental, or carbon emissions impact. “*I do suffer significantly from living alone, and have neither prospect nor desire to change this situation*”. It is clearly important, therefore, to be able to take people on a journey towards better environmental citizenship; after all, they will be able to make some changes, if not substantial ones. But actions to address ‘direct emissions’, those from home energy and travel, are limited in their scope, despite covering almost half of emissions in the UK and being precisely those emissions which personal carbon trading was first designed to tackle.

²⁵ <http://socialcostofcarbon.aeat.com/>

There is another problem. Direct emissions don't fully reflect one's lifestyle; people are more often than not conscious that they've an impact on emissions through their other habits – buying t-shirts for example. Deciding where to draw the line between information overload and treating an audience as naïve is a difficult balancing act. Advocates of the idea have often considered this as the main rationale for keeping personal carbon trading simple and focussed. And this is equally popular with policy makers who need it to fit somewhere into the policy landscape, rather than overlap with areas already catered for through existing policy mechanisms. However, a problem which can only ever be solved by a 'least-worst' model of personal carbon trading. Then this could be made significantly more workable if it was broken down into a network of markets, each with their own scope, objectives, and carbon values. This would enable people to become immersed and engaged in a more localised view of their environment. The all-important visual aggregation of impact could be achieved by enabling trading between these markets – a situation which would have strong potential to foster innovation, competition and education.

Deciding where to draw the line between information overload and treating an audience as naïve is a difficult balancing act

That participation in a carbon reduction initiative is not akin to the development of a more all-encompassing environmentally sound lifestyle is likely to have consequences for the acceptability of personal carbon trading amongst more environmentally aware groups. For a participant struggling with the calculator because they *'heat [their] house primarily with an air source heat pump...backed up by an efficient log burner and solar panels'*, there's really little in terms of behavioural change that participation could add. This household could either be considered as 'done and dusted', or it could represent the perfect example of a community-leader that needs further help and encouragement in order to have a wider society-wide impact.

However, for those thinking about how to resource such measures in their homes, the income generated by a personal carbon trading scheme could make the numbers add up. Indeed, futures trading has already been mooted as a potential means to finance larger community-scale energy schemes and David Fleming, the originator of the DTQ model of personal carbon trading, considers that to try to avoid futures trading would be folly.

What about the impact of feeling part of a group effort to cut carbon emissions? The power of collective action could be expected to be a force for good for personal carbon trading, but not always: *'I am reluctant to find myself constantly in debit'* wrote one participant pained by the idea of being constantly in the red. The 'normative' potential of the carbon allowance has so far been considered as a positive – with participants glowing in the overall positive outcome of curbing emissions society-wide. Whilst many CarbonDAQ participants have acted with surprise and renewed carbon-cutting determination at the news that their emissions are above the group average (*'I don't believe he's beaten me!'*), the scale of emission cuts needed from the individual sector suggests that many will simply be left feeling like a bit of a failure, leading to disinterest and hence putting considerable strain on the overall system.

'Having a second home and family in Slovenia means that it will be difficult to reduce my number of flights' writes another correspondent. No personal carbon trading scheme on a tight cap will ever be straightforward to square with such lifestyle needs, especially with the grey area of *'combining visits...with business'*. There is clearly a balance to be struck between the intrusiveness of a given personal carbon trading model and its efficacy, leading a number of commentators, including *CarbonLimited*, to press for an opt-in scheme in the first instance.

The CarbonDAQ experiment shows that there is no pleasing everyone when it comes to an engaging carbon reduction initiative, whether that is in terms of calculating carbon footprints, asking for people's time, or winning the argument about why they should participate in the first instance. This suggests either that the formation of a citizen-centred policy or government-led initiative will take a lot of time to get off the ground (glass half empty), or that a network of more grassroots initiatives need to be nurtured and developed around a common theme, so that they can be joined together later to achieve the impact and efficacy that is necessary to address carbon emissions (glass half full).

Taken as a whole, the evidence from *CarbonLimited* suggests that accounting for personal (direct) carbon emissions alone as part of a single scheme will not develop a sense of environmental citizenship, nor would it appear to be an adequate response to the rapidly developing climate adaptation agenda which will necessitate a broader understanding of environmental issues than home energy use and travel.

Many existing CarbonDAQ participants do have the energy and desire to contribute to a positive collective movement, but they start in such different places in terms of attitude and opinion that they would surely want greater autonomy about which individual scheme to be part of. It is this more democratic approach to nurturing schemes that will stimulate environmental citizenship that will show government policy makers the most achievable and effective way forward.

3 The future of Personal Carbon Trading

Exchanging small quantities of carbon to balance an account may seem to be a step too far in terms of citizen engagement, but it does appear to encourage a detailed understanding of the specific impacts of different aspects of lifestyle. Moreover, where incentives were applied to individual CarbonDAQ groups, the average group performance, in terms of emissions cuts, was more successful than the overall average – around ten per cent, rather than five, over a short period (a six month maximum).

Seen from the point of view of voluntary citizen engagement, the results do tentatively suggest that an investment in relatively modest incentives, financial or otherwise, has the potential to deliver a favourable behavioural change, especially where a group-dynamic can be invoked. Developing these networks and linking them together seems like the most viable way to aggregate grassroots action so that it can influence mainstream environmental policy-making.

Dr Bristow's research²⁶ appears to demonstrate that individuals are able to achieve 20 per cent cuts in their personal emissions when presented with a traditional model of personal carbon trading. This limit to its potential to deliver behavioural change in the absence of a package of supporting measures, many of which would involve technical innovation, raised concerns about the efficiency of the instrument. An ever-descending staircase of emissions targets would appear impossible for the whole of society to follow without such supporting measures.

The purpose of the personal carbon trading policy instrument is the modification of personal behaviour. In the household sector there are already a plethora of policy instruments at work and many efficiency improvements that have already been widely implemented (loft and cavity wall insulation and so on). Individuals also often feel that they have done what they can in terms of home energy conservation. Travel is a different story. Not only are emissions from this sector more problematic in terms of their continued growth, but there are also far fewer policy mechanisms at work and people are far less amenable to behavioural change in this area. The development of a carbon allowance for travel only would be an important area for new research.

Incentive-only approaches are popular tools in modern environmentalism – they encourage good behaviour, whilst avoiding many of the sticky issues of compulsion. This is inadequate in the view of many of those in the environmental community, although a majority accept the need to develop good environmental citizenship one step at a time set against a clear strategic direction.

The compulsory element of the personal carbon trading approach is crucial if its purpose is to provide a framework based on equal access to the global commons, which gives the idea a high level of support amongst many environmental commentators. There is no clear evidence that this will be achievable in the short term. However, the ratio of those that experimented with a simple personal carbon allowance and those that went on to trade, of approximately 10 to 1, does

²⁶ Available at www.carbonlimited.org.uk

suggest that a more traditional model of compulsory personal carbon trading would win out in terms of efficacy.

Closer inspection shows that there are equity problems when considering an equal allowance, despite its superficial appearance of fairness and effectiveness, suggesting that if the direct engagement of individuals is deemed essential, then a policy measure more akin to a carbon tax, payable only when an individual or household exceeds their carbon allowance, might make more sense in the near-term. However, hypothecation is considered essential and should be targeted at addressing the climate problem. A form of personal carbon allowances without the mandatory carbon exchange could be the best way to achieve this and would cut out many of the anticipated inefficiencies of mass participation in a trading scheme.

Equity and efficiency concerns, as well as participation rates in the experimental trading platform CarbonDAQ, suggest that a personal carbon trading market is illogical. The assumption that carbon trading will uncover the most efficient carbon reductions, implicit in the proposed use of a market mechanism in the first place, is likely to be wrong. Research undertaken by Dr Andy Kerr highlights a whole raft of likely barriers to the effective operation of a scheme. Personal carbon trading must, therefore, offer distinctive behaviour change potential over and above other policy mechanisms. But feedback from CarbonDAQ suggests that sharing the burden of carbon reduction responsibility amongst a group is more likely to lead to a feeling of negativity about tough personal targets than any sense of euphoria that an entire population has achieved a shared carbon reduction objective. If the need to directly engage citizens in tackling climate change through legislation is taken as a given, then another hybrid form of carbon taxation and allowances would appear simpler to achieve.

The best option is to develop personal carbon trading as an opt-in methodology for the engagement of individuals. Logically, these groups, or markets, should develop where participants are likely to be most receptive – members of environmental charities, professional communities and so on. Important lessons have emerged from the CarbonDAQ experiment which will have major implications for how such a community-scale approach should be developed. Having a carbon footprint far exceeding the average for a group is more discouraging than encouraging and the limited nature of behavioural changes available to people are both restrictive and, for some, disempowering. CarbonDAQ groups have so far used low value or value-free incentives to encourage emissions reductions, in spite of which in excess of 5 per cent average cuts have been achieved to date over a maximum six month period. The measurement of emissions is also highly important when developing an initiative on the basis of individual's carbon footprints, for two main reasons. At the 'greener' end of the spectrum, individuals are often highly carbon literate and will reject anything seen as unfair or inaccurate. At the other end, the hassle-factor is too great. This points to the need for accurate, real-time, automated footprinting as the 'carbon card' pilot described in this report has begun to achieve.

This would lead to an organic and evolving model where an individual may ultimately be able to participate in a number of different groups, or elect one from a number of options, should 'double-counting' become a problem. For example, one person might be a member of an environmental charity, a local authority area and a professional employer. Each of these groups might be pursuing a different environmental objective and using a different incentive (say, raising funds for an environmental project, offering council tax discounts and offering annual leave respectively). The motivations might also be different, and aligned with organisational objectives (e.g. member recruitment and retention, good performance with environmental sustainability aspects of the Local Government Performance Framework and internal carbon budgeting to achieve compliance with the carbon reduction commitment respectively). Viewed as a means to involve individuals in these usually opaque objectives, a form of personal carbon trading, or more likely, personal carbon allowances less the personal trading component, could be a valuable asset for all sorts of organisations.

In national policy terms, to develop this area of thinking in an acceptable way, the investment of decision-making in the hands of individuals and communities appears sensible, but more flexible and nuanced than a DTQ, meaning that a greater environmental remit could be considered (such as water use and waste). The use of incentives should feature as a means to encourage the participation of more than just the 'usual suspects'. Indeed, viewed at the scale of communities, the idea could be quite compelling and have greater potential for implementation. It would take on a form which would probably no longer be known as personal carbon trading, but would utilise its best features. As alluded to above, the sustainable use of energy and travel is to be monitored locally through the National Indicator 186, a requirement of the Local Government Performance Framework. This will assist local authorities in identifying problem areas for energy use, whether associated with fuel poverty, poor quality buildings or extravagant lifestyles. For communities, it would present an enabling framework for participation in climate change.

There is a clear role and benefit for government and business in supporting such a framework for environmental citizenship. The incentives, so crucial to gaining widespread participation, need financing. As CarbonLimited's experimentation suggests, much could be achieved with relatively low cost incentives – which means that providing householders with rewards for cutting their emissions could offer a cost-effective way to contribute to compliance with government emissions targets.

There is a clear role and benefit for government and business in supporting such a framework for environmental citizenship.

Government sponsorship would be a good way to kick-start such an initiative. The networks and groups that would emerge as participants would also afford opportunities to build community cohesion and address parallel issues. Local level innovation in terms of energy supply or demand would also offer insight into acceptable legislative approaches and will also be of interest to the business community, for whom sponsorship would afford marketing and market research

opportunities. Sponsorship and investment from business and industry, even trading of emissions reductions, could therefore offer a logical successor to government finance.

Ultimately, the involvement of all citizens, government and industry is essential, because climate change can only be addressed if all are participating in finding and implementing solutions. A form of 'community carbon trading' will be an excellent way to put the ordinary citizen in a stronger position of understanding, networking and decision-making that will help to accelerate the low carbon marketplace we need for the 21st century and shed light on the legislative interventions the government can and should be making.

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Carbon*Limited* will continue as part of the Centre for Local Sustainability at the Local Government Information Unit, www.lgiu.org.uk. The Carbon*Limited* website is moving from www.rsacarbonlimited.org to www.carbonlimited.org.uk.

RSA

The Royal Society for the encouragement of Arts, Manufactures and Commerce
8 John Adam Street, London WC2N 6EZ
T +44 (0)20 7930 5115
www.theRSA.org