

# **Judge a book by its cover: the impact of policy framing on the willingness to reduce energy consumption**

Yael Parag, Deborah Strickland and Stuart Capstick

## **Abstract:**

Framing alters the way that individuals react to signals. A possible opportunity therefore exists for saving energy and emissions by changing the policy framing. A comparative experiment (N=1200) examined peoples' willingness to change energy consumption behaviour under three differently framed policy instruments: carbon tax, energy tax and Personal Carbon Allowances (PCA). PCA is a radical alternative to taxation proposed in the UK. Under a PCA scheme carbon credits are allocated periodically, at no cost, to individuals, and require surrendering when energy is purchased. PCA scheme would cover electricity, gas, gasoline, and air tickets but not embedded carbon in products. Under-emitters could sell their surplus credits in the personal carbon market, while over-emitters would need to buy extra credits. Whereas taxation supposes to change economic behaviour, PCA additionally postulates to impact behaviour by shifting individual's carbon perception and setting a new social norm for personal emissions. It is therefore hypothesised that PCA has greater potential to deliver emissions reductions than taxation. Participants in three groups each received one version of a survey with the same questions about energy consumption behaviour (household and transport) and energy efficiency, under one of the following framings: PCA, carbon tax and energy tax (where carbon was not mentioned). Results suggest that more people are willing to make reductions under a PCA framing as compared to the two taxation options; carbon visibility has an impact on behaviour; PCA framing encourages people to reduce emissions covered by the scheme as well as non-inclusive emissions more generally (spillover effect).

# **Judge a book by its cover: the impact of policy framing on the willingness to reduce energy consumption**

Yael Parag<sup>1</sup>, Deborah Strickland<sup>2</sup> and Stuart Capstick<sup>3</sup>

## **Introduction**

Carbon tax and personal carbon trading are two suggested policies put forward to tackle individual's direct carbon emissions. Personal Carbon Allowances (PCA) is one form of personal carbon trading<sup>4</sup> and has been proposed in the UK as an ambitious scheme for reducing emissions by allocating individuals with a free carbon allowance which must then be surrendered against transactions relating to household energy (mainly gas and electricity), personal travel and flights. Those who use less than their full carbon allowance can sell their surplus credits; likewise, those using more than their allowance can purchase extra, thus creating a price and market for carbon to be traded among individuals. The allowance, which is set annually and reduced each year in line with national emission reduction targets, will be awarded to all individuals at no cost, and over time, as the allowance shrinks, will require greater energy conservation.

One of the added benefits hypothesised around PCA is the psychological and social aspects of the scheme in addition to the purely economic effect of raising prices (Parag and Strickland, 2009; Capstick and Lewis, 2008). Figure 1 shows the routes by which PCA, carbon tax and general tax may deliver reduced demand for carbon emitting activities. General taxation (referred to as an energy tax) is a simple price signal and is limited to the economic path as

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<sup>1</sup> Corresponding author, Environmental change Institute, Oxford University School of Geography and the Environment. Yael.parag@ouce.ox.ac.uk.

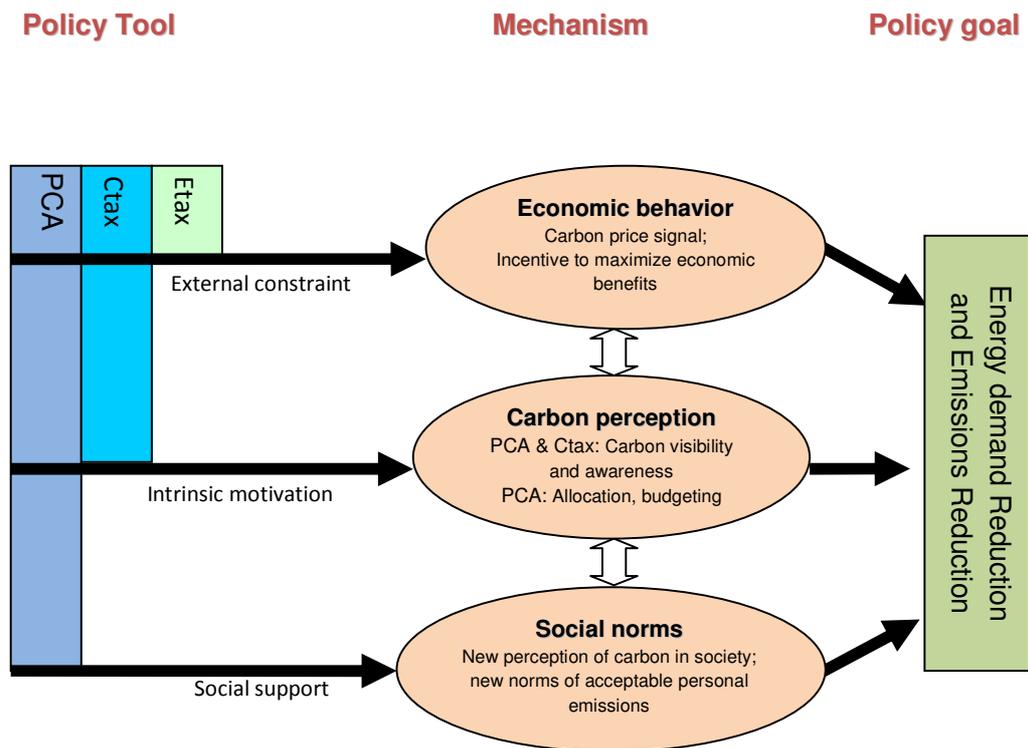
<sup>2</sup> Environmental change Institute, Oxford University School of Geography and the Environment.

<sup>3</sup> School of Psychology, Cardiff University, Wales.

<sup>4</sup> For consistency we refer to PCA as the chosen personal carbon trading policy throughout this paper despite some of the cited references referring to other variants. A summary of the various personal carbon trading schemes is given by Roberts and Thumin (2006) and includes Tradable Energy Quotas (TEQ), Domestic Tradable Quotas (DTQ's), Personal Carbon Allowances (PCA) and Cap and Share.

there is no visible relationship between this form of taxation and carbon reductions; carbon taxation still relies heavily on the price signal but additionally introduces an element of intrinsic motivation to reduce emissions through raising carbon perception and awareness (assuming the tax is explicitly linked to climate change); additionally PCA brings a higher degree of carbon awareness through the allocation and budgeting process, thus providing further potential to influence behaviour by changing social norms (Parag and Strickland 2009). In this sense PCA combines all three mechanisms illustrated in figure 1: economic, psychological and social.

**Figure 1: The routes by which PCA, carbon tax and general tax could reduce demand for carbon related activities.**



In their recent scoping study, Defra (2008) concluded that for PCA to be considered as a policy option the additional impact on behavioural change (beyond visibility) needs to be justified.

Some suggestions as to how PCA might influence behaviour have been made by Capstick and Lewis (2008) in their review of the psychological and behavioural economics literature. They

suggest a number of psychological reactions to PCA which may positively impact individual's willingness to change energy demand, and propose that many of these reactions are likely to be mediated by how the policy is framed. Reactions include, carbon budgeting and a greater readiness to bring carbon to mind - both of which may lead to carbon conservation. They conclude from their review that PCA is likely to have more effect on individuals' behaviours than pure price effects, but acknowledge that further evidence would be needed to test this further. While the carbon perception aspects of PCA are cited from a theoretical stance (Capstick and Lewis, 2008; Defra, 2008; Parag and Strickland, 2009), little empirical evidence is currently available to back the impact that perception has on people's willingness to reduce their demand for energy.

Fawcett et al (2007) suggest that useful insights about behavioural responses to a PCA scheme could be gained by running a pilot. In particular they propose that a pilot could help to monitor which aspects of PCA motivate behavioural change, but they also recognise that it would be a costly exercise. Bristow et al. (2008) made the first attempt to investigate the behavioural response under PCA and taxation schemes using surveying and modelling techniques, and reported mixed results: more respondents said they would change their behaviour under a carbon tax, but greater reductions were measured under personal carbon trading. They conclude that further work is needed to deduce conclusions about the behavioural responses to these schemes. Following on from their theoretical study of the behavioural influences of personal carbon trading, Capstick and Lewis (2009) carried out a pilot simulation study to monitor carbon decision-making under a PCA scheme and found evidence that the budgeting process does encourage individuals to rethink and reduce their energy consumption. This supports the notion gained from focus studies carried out by the Institute for Public Policy Research, (IPPR, 2008) which suggests that one reason why PCA was found to be less

opposed than carbon tax and upstream cap and trade, is because of its potential for making individuals think about their behaviour.

In the current study we build on earlier work outlined above to explore whether there are measurable differences between individuals' decision making under a PCA scheme compared to taxation. Given the need for empirical work expressed in the PCA literature, and the suggestion made by Capstick and Lewis (2008) that PCA framing impacts peoples energy behaviour and decision making, the current work has collected quantitative data into the effect that framing has on willingness to make energy conscious choices. Framing has long been shown to play a factor in how individuals mentally account money and react to risk (Tversky and Kahneman, 1981; Thaler, 1999; Cullis et al 2005). The introduction of psychology to traditional economic theory shows that individuals are more likely to make decisions based on varying combinations of habits, emotions, assumptions, social norms and nudges; not solely on monetary considerations. The aim of the current study is to discover how energy-use choices might be affected under situations of increased costs as a direct result of three possible government policies with respect to individual carbon emissions.

In this study, over 1000 respondents were sampled in three roughly equal groups each with a differently framed version of the same questionnaire: PCA, carbon tax (Ctax) and 'neutral' energy tax, where carbon was not mentioned (Etax). Respondents were asked a series of questions related to their expected energy behaviour in the home and for personal travel under the specified framing. Critically, across the three conditions the cost increases as a result of the imposed policy were financially equal, with the conditions only differing in their framing of the costs. This data provides one of the first attempts to empirically test the impact framing has on personal energy decision making and the effect of price and visibility on anticipated behaviour.

It does not however offer any insights into the social mechanism driving behaviour (the third route suggested in figure 1).

## **Method**

Three versions of the questionnaire were designed under contrasting framing conditions. The first outlined the PCA scheme; the second a carbon tax scheme and its links to climate change; and the third a tax on fuel and energy where carbon was not mentioned. Each participant completed just one of these (i.e. a between-subjects design was used). In all questionnaires participants were asked to assume that the scheme highlighted was in operation and asked to say how this would influence their energy consumption. The consumption decisions covered personal car use, home heating, washing machine temperatures, and a range of household appliances. The survey also included two 'spill-over' questions where indirect carbon reduction choices were monitored for decisions which incurred no monetary or carbon cost to the individual (e.g. embedded carbon in food). The purpose was to test whether there was a positive behavioural effect in terms of additional emission savings associated with any of the schemes. Basic environmental attitudes and demographic data were also recorded. Box 1 gives an example for one question in its three different framings.

Each question included in the survey offered information guidelines to assist participants to give more realistic answers. For example, question 1 asked participants about their willingness to reduce their mileage and included the following statement: *"As a guideline, 1000 miles relates to around 5 journeys from London to Bristol, or 200 short journeys by car (e.g. to the supermarket)".* Question 2 asked participants about their willingness to reduce their home temperature (see box 1) and included the following statement: *"Average room temperature is 21°C. Temperature preferences vary considerably between individuals. As a rule of thumb,*

*reducing by 1°C may mean you feel slightly cooler; 2°C will possibly require an extra layer of clothing; 3°C will be noticeably cooler and might require a warmer layer”.*

The sample included over 1000 participants in an omnibus survey. It was not a population representative sample, but results have been weighted. People who answered the survey in less than 4 min have been deleted from the file. 1096 remaining participants have been used in the final analysis: Ctax, 372; PCA, 362; and Etax, 362. SPSS software was used for the statistical analysis.

**Box 1: An example for the different framings of a question**

**PCA forms:**

It has been calculated that every 1°C of your heating and boiler thermostat is equivalent to around 300 carbon units over the course of a year (about 6% of your annual carbon allowance). For example, a home heated to 20°C would use 300 carbon units less than one heated to 21°C.

For every 1°C *reduction* of your thermostat, you would therefore be using approximately 300 units *less* of your 5000 unit allowance. This would be equivalent to about £30 to buy, sell or keep.

**Cax forms:**

It has been calculated that every 1°C of your room heating thermostat would result in an additional cost via a carbon tax scheme of around £30, over the course of a year. For example, a home heated to 20°C would pay £30 less carbon tax than one heated to 21°C.

For every 1°C *reduction* of your thermostat, you would therefore pay £30 *less* of the new carbon tax.

**Etax forms:**

It has been calculated that every 1°C of your heating and boiler thermostat would result in an additional cost via the new tax scheme of around £30, over the course of a year. For example, a home heated to 20°C would pay £30 less tax than one heated to 21°C.

For every 1°C *reduction* of your thermostat, you would therefore pay £30 *less* of the new tax.

Each participant received only one version of this description followed by the same question:

Under the circumstances described by how much would you turn down your room thermostat?

- I would not turn it down
- I would lower my thermostat by:
  - 1°C
  - 2°C
  - 3°C
  - More than 3°C

## Results

To estimate mean differences between groups we have run Anova and t-tests. The results are aggregated in table 1 and summarised below for each of the survey questions.

**Q1: Willingness to reduce personal mileage.** (*The cost associated with this decision for each policy is given as £35 / 1000miles.*) Across all surveys 52% of respondents said they would reduce their personal car use under varying amounts. Within each survey this breaks down to: Ctax 45%; Etax 44%; and PCA 65%. The average amount by which respondents would reduce their mileage was 3.87, corresponding to between 200 and 300 miles per year. Results for each group were: Ctax 3.8 (200-300 miles per year); Etax 3.48 (200-300 miles per year); PCA 4.34 (between 300 and 400 miles per year). The difference between groups was found to be significant ( $p < 0.05$ ).

**Q2: Willingness to reduce room thermostat.** (*The cost associated with this decision for each policy is given as £30 / 1°C per year*). Overall 79% of respondents said they would turn down their room thermostats: Ctax 78%; Etax 77%; and PCA 83%. The average amount people said they would turn it down was 2.76, corresponding to between 1 to 2°C across all three survey groups (specifically: Ctax 2.96; Etax 2.64; and PCA 2.68). The differences between these results was found to be significant ( $p < 0.01$ ).

**Q3: Willingness to reduce washing machine temperature** (*The cost associated with this decision for each policy is given as £5 / 10°C per year*). 76.5% said they would turn down the temperature of their washing: Ctax 77%; Etax 75%; PCA 78%. The average amount they would turn it down by was 2.3, corresponding to 10-20°C (specifically: Ctax 2.5; Etax 2.1; PCA 2.2). The difference between groups was found to be significant ( $p < 0.01$ ).

**Q4: Willingness to switch off personal computers.** (*The cost associated with this decision for each policy is given as £3 / machine per year*). Across all respondents 55% said they will always unplug their machines (Ctax 58%; Etax 59%; PCA 47%). The average amount they would unplug their PC was calculated as 2.4, which corresponds to between 50% of the time (or 50% of their computers) and all the time. By individual survey, these results were: Ctax 2.45; Etax 2.46; and PCA 2.34, the difference between groups was found to be significant ( $p < 0.05$ ).

**Q5: Willingness to switch off televisions.** (*The cost associated with this decision for each policy is given as £2 / TV per year*). There was no correlation found between the number of TVs people had in their home and their likelihood to leave it on standby or unplug it (Spearman correlation). Overall, 72% of those surveyed said they will always turn off all their televisions (Ctax 75%; Etax 74%; and PCA 67%). The average was calculated at 2.65, which corresponds to most people turning off most of their TVs most of the time. (Ctax 2.66; Etax 2.68; PCA 2.61). The difference between groups was not found to be significant.

**Q6: Willingness to reduce consumption of imported strawberries.** (*The cost associated with this decision for each policy is zero*). Of all respondents whom state they consume strawberries, 87% said they will buy strawberries only in season when they are grown locally (Ctax 85%; Etax 89%; and PCA 88%). The average was found to be 1.87, which corresponds to the above statement about purchasing seasonal/locally grown strawberries (Ctax 1.85; Etax 1.89; PCA 1.88). The differences were not found to be significant.

**Q7: Willingness to reduce consumption of dairy produce.** (*The cost associated with this decision for each policy is zero*). 78% of participants surveyed said they will **not** change their dairy consumption (Ctax 81%; Etax 83%; and PCA 72%). The average from the results was 1.45, which represents a reduction in milk consumption by 0-10% (Ctax 1.47; Etax 1.32; PCA

1.57). These small differences were found significant ( $p < 0.01$ ). There was no significant correlation found between dairy product consumption and willingness to reduce consumption.

These descriptive statistics are grouped together in table 1 and suggest that PCA respondents are on average more willing (in 4 out of 7 questions) to make reductions to their energy consumption than respondents of the two tax options. The PCA group also showed more likelihood of making energy reducing choices for the behaviours attributed to relatively more carbon emissions: personal mileage, room thermostat and washing machines.

**Table 1: % of each survey group willing to make reductions**

Willingness to make reductions (of any amount)	All	Ctax	Etax	PCA	Carbon monetary value per year
Question 1: <b>personal mileage</b>	52%	45%	44%	65%	£35/1000
Question 2: <b>room thermostat</b>	79%	78%	77%	83%	£30 / 1°C
Question 3: <b>washing machine</b>	77%	77%	75%	78%	£5 / 10°C
Question 4: <b>PCs</b>	55%	58%	59%	47%	£3 / machine
Question 5: <b>televisions</b>	72%	75%	74%	67%	£2 / TV
Question 6: <b>strawberries</b>	87%	85%	89%	88%	0
Question 7: <b>dairy</b>	21%	19%	17%	28%	0

Lowest	Mid	Highest
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The results show there is less willingness to reduce dairy consumption (question 7) across all three policies, but greater willingness under the PCA condition compared to the two tax ones. This implies some indication of spill-over to wider energy conservation behaviours under the PCA scenario. The results for question 7 indicate that PCA framing has greater impact on decisions which are not related to the direct cost of carbon and may imply that it provokes greater acceptance of personal responsibility for upstream carbon.

Table 2 groups together the mean values from each of the survey groups for each question and tests for mean differences between them. The results show that the differences between the three survey groups' willingness to make energy conscious decisions are significant in 5 of the 7

questions but also shows that the differences are small and inconsistent in terms of which survey group is making the most energy-saving choices. While collectively PCA respondents show more likelihood of making some kind of reduction (table 1) in terms of the mean value of these reductions there is little evidence that any one scheme scores better than the others.

Among the 5 significant results Etax results are lowest in 4, suggesting that specific reference to carbon in the context of climate change has some effect on willingness to make reductions. The carbon visibility effect will be examined further below.

Studies have shown that the same framing impacts many segments of society in different ways (e.g. Cullis et al 2005). Hence, we further analysed the data to see if there are any trends relating to age, gender, social economic grouping or income. There was little evidence of differences found.

**Table 2: Mean and standard deviations of reductions made by each group**

Mean (standard deviation)	Ctax	Etax	PCA	Carbon monetary value/yr
Question 1: <b>personal mileage*</b>	3.79 (4.054)	3.48 (3.889)	4.34 (3.833)	£35/1000
Question 2: <b>room thermostat**</b>	2.96 (1.480)	2.64 (1.341)	2.68 (3.00)	£30 / 1°C
Question 3: <b>washing machine**</b>	2.49 (1.300)	2.14 (0.893)	2.22 (1.023)	£5 / 10°C
Question 4: <b>PCs*</b>	2.45 (0.719)	2.46 (0.719)	2.34 (0.702)	£3 / machine
Question 5: <b>televisions</b>	2.66 (0.636)	3.00 (0.578)	2.61 (0.606)	£2 / TV
Question 6: <b>strawberries</b>	1.85 (0.362)	1.89 (0.315)	1.88 (0.329)	0
Question 7: <b>dairy**</b>	1.47 (1.149)	1.32 (0.847)	1.57 (1.158)	0

\* P <0.05; \*\* P is <0.01

Lowest	Mid	Highest
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### Correlation between attitude to the environment and willingness to make reductions

It is reasonable to assume that people who are more aware and concerned about the environment would be willing to conserve more carbon. Hence we ran a correlation test between attitudes toward the environment and willingness to change behavior. A combined attitude score was produced by adding four questions together and dividing the score by 4 (see box 2). This meant that someone who was very concerned about the environment would have a score of 5 and someone who was not, a score of 1, with the other scores reflecting various environmental attitudes in between. Results are presented in table 3 and show that the non-parametric (spearman) correlations were weak but significant in many cases ( $p < 5\%$ ).

**Table 3: Correlation between attitude towards the environment and willingness to change behaviour**

Correlation between attitude to the environment and willingness to change behavior	All	Ctax	Etax	PCA
Question 1: <b>personal mileage</b>	0.070	0.139**	0.023	0.056
Question 2: <b>room thermostat</b>	0.1**	0.044	0.085	0.178**
Question 3: <b>washing machine</b>	0.143**	0.160**	0.024	0.254**
Question 4: <b>PCs</b>	0.078*	0.039	-0.004	0.237**
Question 5: <b>televisions</b>	0.182**	0.170**	0.144**	0.244**
Question 6: <b>strawberries</b>	0.075*	0.071	0.052	0.112
Question 7: <b>dairy</b>	0.077*	0.054	0.124*	0.055

\*  $P < 0.05$ ; \*\*  $P < 0.01$

Weakest	Mid	Strongest
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Results show that overall there is a weak positive correlation between respondents' attitude toward the environment and their willingness to cut emissions. However, the correlations were found to be much stronger under PCA and significant in 4 out of 7 questions, compared with 3 for the Ctax group and 2 under Etax conditions. This may suggest that PCA framing pushes the already environmentally concerned people to do even more, a finding that could be explained by Schwartz's norm-activation theory (Schwartz, 1977). Schwartz's theory states that behaviours are influenced by personal norms and are activated when individuals are aware of the positive

impact of their actions and take personal responsibility for a problem, in this case climate change. This activation of a personal norm then guides their subsequent behaviour and may explain why individuals are willing to make further cuts in their emissions.

We also checked for correlation between the extent to which respondents have already changed their behavior due to environmental concerns (e.g. already reduced their personal mileage and energy consumption) and their willingness to make further cuts. There are two possible hypotheses: the first is that those who have already made reductions may not wish to make further behavioral changes under a policy tool such as PCA or taxation. The alternative hypothesis is that PCA or taxation may further encourage them to cut emissions.

Results of a non-parametric correlation test are presented in table 4 and show that correlations between past reduction in mileage driven due to environmental concerns and willingness to further reduce personal mileage are positive. Positive correlations were also found between past reductions in home energy use due to environmental concerns and willingness to further reduce energy demand. Hence, across all schemes the results support the latter hypothesis: respondents who have already reduced household energy use would do so even more if any of these three policies came about. When assessed by each of the schemes, there is no clear consistency as to which one is correlated with greater cuts.

**Table 4: Correlation between past reductions due to environmental concerns and willingness to do further cuts.**

<b>Correlation between past reductions and willingness to make further cuts</b>	<b>All</b>	<b>Ctax</b>	<b>Etax</b>	<b>PCA</b>
Question 1: <b>personal mileage</b>	0.361**	0.279**	0.379**	0.377**
Question 2: <b>room thermostat</b>	0.216**	0.355**	0.051	0.236**
Question 3: <b>washing machine</b>	0.266**	0.437**	0.099	0.228**
Question 4: <b>PCs</b>	0.118**	0.124*	0.147**	0.089
Question 5: <b>televisions</b>	0.188**	0.203**	0.241**	0.140*

\* P <0.05; \*\* P is <0.01

Weakest	Mid	Strongest
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**Box 2: Attitudes toward the environment** (for further details see Capstick and Lewis, 2009)

Each participant answered the following four questions:

Degree of climate change concern: **“How concerned, if at all, are you about climate change?”** (Select a number from 1 to 5, where 1 is 'not at all' and 5 is 'a large extent'.)

Degree of responsibility felt: **“I feel jointly responsible for climate change”**  
(Select a number from 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'.)

The next two items are from the 'Dominant Social Paradigm' (DSP) questionnaire. DSP items tend to inversely correlate with environmentalist items.

**“Future resource shortages will be solved by technology”**

(Select a number from 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'.)

**“Our present rate of consumption can be maintained with no ecological problems”**

(Select a number from 1 to 5, where 1 is 'strongly disagree' and 5 is 'strongly agree'.)

To create one scale for attitude toward the environment we first inverted the DSP scale, then for each participant added all scores and divided the result by 4. Hence, someone who had a pro-environmental attitude would have a score of 5 and someone who had not, a score of 1, with the other scores reflecting various environmental attitudes in between.

### **Carbon visibility effect**

Two of the three surveys – Ctax and PCA - explicitly link the chosen scheme to climate change and the need to reduce carbon emissions. The third survey - Etax - made no link, introducing the tax without any wider connection to climate change (see appendix 1). By grouping together the results from the Ctax and PCA surveys and comparing them with the Etax we attempt to evaluate whether carbon visibility has any impact on respondents intended decision making.

The effect of visibility was examined using a t-test to compare means between the *carbon visible* and *invisible* groups and results are displayed in table 5.

**Table 5: Mean and standard deviations of groups relating to carbon visibility**

Mean(standard deviation)	Carbon <i>invisible</i> (Etax)	Carbon visible (PCA and Ctax)
Question 1: <b>personal mileage*</b>	3.5 (4.241)	4.1 (4.309)
Question 2: <b>room thermostat*</b>	2.641 (1.341)	2.825 (1.373)
Question 3: <b>washing machine**</b>	2.137 (0.893)	2.361 (1.179)
Question 4: <b>PCs</b>	2.457 (0.719)	2.395 (0.712)
Question 5: <b>televisions</b>	2.682 (0.578)	2.637 (0.621)
Question 6: <b>strawberries</b>	1.889 (0.315)	1.861 (0.346)
Question 7: <b>dairy**</b>	1.324 (0.847)	1.519 (1.154)

\* P <0.05; \*\* P is <0.01

Lowest	Highest
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Significant results have been found for 4 out of the 7 questions, and all occur in favour of the group where carbon was made visible. The data therefore support the hypothesis that carbon visibility has a positive effect on willingness to reduce emissions and provides further evidence in favour of this widely discussed assumption. When carbon is explicitly mentioned, there is more chance of respondents making carbon reductions. Results from the dairy question (q7) show further evidence of the suspected spill-over effect from the raised carbon visibility, by having a wider effect on intended behaviour and backing the findings made in tables 1 and 2.

There was some indication from within these results that males are more likely than females to reduce their mileage and reduce their dairy consumption when carbon is visible; whereas women are more likely to reduce room and washing machine temperatures but less inclined to turn off computers.

There were also some significant results for those who earned under £20K, with this sub-group making more energy conscious choices for their car mileage, room thermostat and washing machine temperature when carbon was made visible. The non-retired age participants (under 65s) were also more likely to respond to carbon visibility than those over 65 when asked about turning down thermostats, washing machine temperature and reducing dairy intake.

## Taxation versus PCA

Studies have found that PCA is perceived by the public to be more equitable and progressive than taxation (IPPR, 2008; Defra, 2008) and additionally avoids the negative pitfalls often associated with introducing taxation (whether justified or not). Additionally, PCA might be more supported as an allowance is associated as something given to individuals by the government while tax is something the government is taking away. It is therefore hypothesised that a policy framed as PCA will invoke a more positive reaction to behavioural change compared to taxation. The extent to which taxation versus PCA framing has an impact on energy decision making was carried out by grouping together the two taxation groups and comparing responses to those in the PCA group using a t-test to compare means. Results are displayed in table 6.

**Table 6: Mean and standard deviations of groups relating to carbon visibility**

Mean(standard deviation)	Tax (Ctax and Etax)	PCA
Question 1: <b>personal mileage**</b>	3.635 (3.970)	4.341 (3.833)
Question 2: <b>room thermostat</b>	2.803 (1.421)	2.683 (1.238)
Question 3: <b>washing machine</b>	2.319 (1.132)	2.222 (1.023)
Question 4: <b>PCs*</b>	2.453 (0.719)	2.338 (0.702)
Question 5: <b>televisions</b>	2.673 (0.608)	2.609 (0.605)
Question 6: <b>strawberries</b>	1.868 (0.339)	1.878 (0.329)
Question 7: <b>dairy*</b>	1.396 (1.012)	1.572 (1.158)

\* P <0.05; \*\* P is <0.01

Lowest	Highest
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Differences between taxation and PCA were found to be small and inconclusive: 3 of the 7 questions displayed significant differences between the means of the two groups. Two of these were in the favour of PCA: reducing mileage and reducing dairy consumption, whereas turning off computers was a more likely response under the taxation grouping.

Despite the inconclusive results it is not possible to rule out the effect that framing has on respondents' decision making, especially given the earlier results in table 1 and the

aforementioned effect of carbon visibility. Further research is needed to fully understand influence of framing.

## **Summary and conclusion**

Several findings relating to the effect of policy framing and carbon visibility on individuals' willingness to make energy saving choices have been uncovered from this study:

- More individuals would be willing to make reductions under a PCA framing compared to the two taxation options but there is little evidence to suggest that the value of these reductions are larger for any given scheme;
- There is some indication of spill-over towards wider carbon conservation under the PCA framing;
- Individuals with a positive environmental attitude will be even more willing to make reductions under any of the three policies, but most notable under PCA;
- Individuals who had already reduced their emissions due to environmental concern would be willing to make further cuts under all schemes.
- When carbon is made visible and linked to climate change there is more chance that respondents would make reductions;
- Policy framing as PCA was not found to notably invoke a more positive reaction to behavioural change compared to taxation policy.

The results have shown that overall many people would be willing to change their behaviour if taxation or PCA policies were introduced in the UK and that by visibly linking the chosen policy to climate change and carbon reductions, greater cuts would be made. This finding reinforces the psychological impact that framing has on individuals intended decision making (Tversky and Kahneman, 1981). Of the three routes (described in figure 1), for which carbon reductions may be achieved - economic, psychological and social - the first two have been monitored to some

extent in this study. Etax represents the purely economic route, while Ctax and PCA have the added component of carbon visibility in relation to climate change, and therefore have the potential to further bring about behavioural change via psychological elements. PCA has the additional social component compared to Ctax. This study, however, mostly contributes to the examination and measurement of the economic and the psychological effects, as well as their interlinking. Thus, it gives some weight to the claims regarding the impact of PCA on added visibility, provoked responsibility and citizenship also termed the 'PCA effect' (UKERC, 2008). It also goes some way to suggesting that the additional benefits of PCA could be quantified and fed into cost benefit analysis such as Defra's 2008 scoping study. In terms of taxation policies, findings suggest that for a Ctax to be different to general tax (Etax in this study) it needs to tie climate change with carbon explicitly and visibly, as this might induce a more pro-environmental reaction in the public's behaviour.

This work adds to a growing number of studies attempting to provide empirical evidence of some aspect of the anticipated behavioural response to PCA and taxation (Bristow et al, 2008; Capstick and Lewis, 2009). The findings from our study support those found by Bristow et al. (2008) in that reductions are measurable across all schemes tested, but the two studies differ in terms of which policy generated greatest carbon reductions. Bristow et al. found that more individuals would change behaviour under a carbon tax, but that the carbon savings achieved were about 50% higher under a PCA scheme. We found that more people would be prone to reduce their energy consumption under a PCA framing but the extent of these reductions was not found to be noticeably higher under the policy. Further work is needed to explore the differing aspects of the results; the limitations outlined below may help to explain some of the variations experienced between these two studies.

The findings of this study are somewhat limited by the fact that intended and actual behaviour tend to differ in reality. There is also no measure of the impact these policies would have on long-term behaviour and as individuals became more accustomed to them. Some argue that

the effects of PCA might be more persistent over time as this policy would remain visible in a way that the other two options might not (UKERC, 2008). Under a real PCA scheme, theorists propose that the 'stop and think' moments at the point of purchase will trigger a behavioural response – something that was not fully explored in this experiment. Capstick and Lewis (2009) found some evidence to support this in their budgeting simulation work. There is also no testing of the impact that perceived fairness or social norms will have on decision making, the third route suggested to influence emissions reductions from individuals and one which is inherently difficult to test without a large scale pilot (and even then is limited, see Fawcett et al (2007)). This study is also restricted in its scale, in that it links the policy to a relatively few individual behaviours, some of which may not apply to all respondents. Saving £2 over a year by switching off a TV is unlikely to invoke much behavioural response, even for the poor, and this may have impacted respondent's willingness to make reductions for some of the less costly questions. These small costs may seem more significant when multiplied across all appliances and household energy behaviours under a real scheme.

Further research is needed to better estimate which aspects of framing are important given the inconclusive results from the PCA versus taxation analysis. Since carbon budgeting would most probably be more beneficial under PCA than under Ctax (Parag and Strickland, 2009), it would be useful to include the impact that carbon budgeting has on reducing emissions when comparing schemes and to assess these linkages further. It would also be worth investigating the extent to which the price of carbon might affect individual's willingness to make reductions under the three policy variants. Our results suggest that a higher price per tonne may invoke a greater response under PCA compared to taxation, but further work would be required to ascertain if this is the case.

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We find that many of the frames found to reduce people's propensity to support and engage in climate action have been on the decline in the mainstream media, such as frames emphasizing potential economic harms of climate mitigation policy or uncertainty. At the same time, frames conducive to such engagement by the general public have been on the rise, such as those highlighting... Framing is an essential concept in communication studies and has been a subject of interdisciplinary research for several decades. It refers to the process by which people develop a particular conceptualization of an issue or reorient their thinking about an issue (Chong and Druckman, 2007, p. 102). The process of framing involves two key ingredients: selection and salience. The managerial importance of brand user imagery reflects its ability to help consumers satisfy their self-definition needs. A large part of consumers' purchasing and consumption is motivated by their need for self-congruity, self-enhancement, and self-expression (Belk 1988; Escalas and Bettman 2005; Park and John 2018). In this paper, we explore the impact of using different levels of brand names (corporate vs. product) in social media posts on customer engagement and purchase intentions for services. In contrast, incremental-theorists are more susceptible to framing effects in advertising (Jain, Mathur, & Maheswaran, 2009) and are more accepting of brand extensions compared to entity-theorists (Yorkston, Nunes, & Matta, 2010). On consumption and production, the Commission will have before it: the Secretary-General on the topic (document E/CN.17/1999/2), the proposed draft resolution (document E/CN.17/1999/L.1), and a report of the Inter-Sessional Ad Hoc Working Group on Consumption and Production Patterns and on Tourism (document E/CN.17/1999/16). The Secretary-General's report states that the General Assembly, at its nineteenth special session, in June 1997, identified changing consumption and production patterns as an overriding issue in the implementation of Agenda 21. The session concluded that the focus of poli... If you judge a book by its cover is to judge someone or something before you get to know them or try it. Such as if someone looks funny and you don't know them you shouldn't make fun of them because they could turn out to be the nicest person you ever met. Also if someone advertises for a product and you don't think it will work you shouldn't because it might work really good and it will be fun and/or good for you to have. On the other hand something could look good and be really bad. So if someone is really pretty that doesn't mean 'Oh, that person is really pretty they must be nice!' They c Privacy Policy. Password recovery. Recover your password. Previous article... 4 Past Tenses in English with Examples. Next article BEST E-Books to Learn English. Anastasia Koltai. <https://www.myenglishteacher.eu/>. I'm CEO of MyEnglishTeacher.eu. Nice to meet you! ðŸ™ƒ. Related articles more from author.