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Title: The relationship between justice and acceptance of energy transition costs in the UK

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Highlights

- Energy justice often focuses on production and consumption concerns
- A way to respond to concerns is government policies promoting justice
- Costs associated with paying for such policies may create further injustice
- The UK public often oppose such policies due to current perceived injustices
- Public support, even for laudable programmes, is not certain if they must pay

Abstract

Relatively little energy research has attended to justice considerations. The limited energy justice inquiry that exists focuses on justice in relation to impacts of energy production, consumption, and policies that either exacerbate or seek to mitigate distributive and procedural concerns. Programmes associated with the so-called 'energy transition' have strong implications for energy justice. For example, efforts to reduce energy consumption and/or carbon emissions, policies to increase energy security, and programmes to increase energy access and affordability all address distributive concerns. Nevertheless, the costs associated with meeting such goals and running such programmes also have justice implications and should be viewed alongside the other aforementioned normative issues as an aspect of energy justice. Here, we examine public perceptions of *who should* fund programmes designed to ease the transition to a more sustainable and equitable energy system, finding most responsibility assigned to energy companies, and beliefs about procedural justice meaningfully shaping thoughts on who should pay. Our UK-based mixed methods inquiry reveals that whilst our respondents (survey) and participants (focus groups) accept some personal costs directed towards governmental programmes that could reduce energy injustices, acceptance is dependent on several factors, including perceived importance of distributive justice and whether the energy system exhibits procedural justice. The influence of normative factors on cost acceptance has implications for feasibility of policies to promote energy justice. We conducted a survey (N=3,150), followed by five focus groups (N=6-9 each) throughout Great Britain with survey respondents to explore further their answers and explain some of our quantitative findings. We conclude this paper with tangible policy recommendations for government, such as the amount (cost) and types of environmental and social levies that are viable, based on their public acceptance, and suggestions for other approaches to funding energy transitions, so as not to exceed the limit of public acceptance.

Keywords: energy costs; energy transitions; distributive justice; procedural justice; public perception; United Kingdom

1. Introduction

As evinced by the rationale for this special issue, relatively little energy research has attended to justice considerations. The limited energy justice inquiry that exists focuses on justice in relation to impacts of energy development (i.e., 'production') and differences in energy use across populations (i.e., 'consumption') (Fuller and McCauley 2016). This focus requires an analysis of energy policies and programmes that either exacerbate or seek to mitigate the distributive and procedural concerns arising from such issues as: access to affordable energy, siting of energy production infrastructure, and involvement in decision making on energy issues (Heffron and McCauley 2014, McCauley *et al.* 2013).

Sovacool and Dworkin (2015, 436) define 'energy justice' as 'a global energy system that fairly disseminates both the benefits and costs of energy services, and one that has representative and impartial energy decision-making'. For the system to accomplish these goals, policies and procedures must be in place to facilitate such just means and ends (Heffron *et al.* 2015). Resultantly, energy justice, as an incipient area of theoretical and empirical investigation, recognises the need for governmental programmes, such as

efforts to expand low-carbon energy production and offers of financial or infrastructural assistance to vulnerable and disadvantaged populations (Jenkins *et al.* 2018).

Low-carbon efforts or programmes to reduce overall energy consumption could improve justice by stemming the worst effects of climate change, which are predicted to differentially affect vulnerable peoples worldwide (Rosenzweig *et al.* 2014, Schewe *et al.* 2014, Thornton *et al.* 2014). Direct assistance to vulnerable and disadvantaged peoples (e.g., relief on energy bills or subsidised infrastructure updates, such as insulation installation) can increase energy access and affordability for marginalised populations (Bouzarovski 2014, Middlemiss and Gillard 2015). Programmes to ensure energy security and reliability of energy supply could promote justice by preventing blackouts that affect certain populations disproportionately, and by protecting against severe price shocks due to supply problems (Heffron and McCauley 2014).

In the UK, and other nations, the costs for such programmes are increasingly paid by the general public via levies on energy bills (Committee on Climate Change [CCC] 2017). There has been a progressive shift from general taxation to bills over the last decade in the UK; previously such programmes were funded more through general government tax revenue (Preston and Croft 2012). These costs, as a percentage of energy bills, are predicted to increase substantially over the next couple decades to keep pace with governmental commitments to carbon reduction (CCC 2017). One reason we focus on the UK in this research is the UK policy context in which numerous programmes funding social and environmental transitions exist, with costs being directly transferred to energy consumers. Efforts to transition to a more just energy system are generating costs with potential justice implications.

Environmental and social levy costs are consistently incorporated into estimation of possible energy transition pathways (Ault *et al.* 2008, Energy Technologies Institute 2015, Pye *et al.* 2014, Strbac *et al.* 2012) and in high-level policy discussion of energy transitions (CCC 2017, DECC 2010), but there has been far less critical engagement of who will pay such costs, and no academic discussion of the normative or justice implications of who pays these costs or how much members of the public are asked to pay. Therefore, few questions have been asked about the justice implications of who pays for government programmes that, themselves, have the objective of increasing justice (Vaze and Hewitt 2012). Modelling of energy transitions often merely assumes the public will pay (Vaze and Hewitt 2012) or eschews the question entirely as extraneous to technical estimates of cost (Foxon 2013, National Grid 2014). Nevertheless, popular discourse in mass media has increasingly decried increasing levies, implying potential justice concerns (e.g., Chapman and Cohen 2013, Poulter 2012). In this paper we focus specifically on public perceptions of energy transition costs, seeking to better understand perspectives on how costs should be distributed and the extent to which the public are willing to accept costs personally.

2. Public perceptions of energy transition costs

Research repeatedly establishes the importance of public perceptions and social structures in facilitating energy transitions (Kasperson and Ram 2013, Rayner 2010, Webler and Tuler 2010, Wüstenhagen *et al.* 2007). Without public acceptance, policies that seek a transition to a more sustainable and fairer energy system will likely be met with opposition that delays or derails such efforts, or relevant policies might never even be proposed. By

‘transitions’, we mean movement to a more sustainable, fair, clean, and secure energy system (Steg *et al.* 2015, Verbong and Geels 2007). We consider costs associated with four types of energy system change here (i.e., increasing low-carbon energy, helping vulnerable populations pay for energy, reducing energy use, and increasing energy security) because these are the primary foci of current and planned UK government programmes that facilitate a fairer energy system; members of the public are paying via their energy bills to enable all of these goals simultaneously.

Surveys of the British public reveal that energy costs are a leading concern and that government policies that pass transition costs on to consumers via energy bills could receive substantial push back if not carefully tailored (Vaze and Hewitt 2012, YouGov 2014). This poses potential difficulties for policies and policy recommendations that seek to address energy justice concerns through government programmes that eventually pass costs on to energy consumers. Therefore, understanding the extent to which the general public is prepared to accept responsibility for costs associated with energy transitions, and why, is essential for catalysing programmes to achieve energy transition goals commonly funded through levies on energy bills (e.g., reducing emissions, reducing energy poverty, reducing overall energy use, and increasing energy security) (Preston and Croft 2012, Vaze and Hewitt 2012).

Previous research has also revealed that public conceptions of energy transitions are affected by a range of personal values (Butler *et al.* 2015, Demski *et al.* 2015, 2017), particularly normative considerations such as perceptions of justice and trust (Demski *et al.* 2015, 2017, Mumford and Gray 2010, Rayner 2010, Ricci *et al.* 2010, Vaze and Hewitt 2012, Walker *et al.* 2010). Most prior research on public perspectives in relation to energy transitions, however, has examined perceptions of transitions themselves and not the costs associated with them. Nonetheless, empirical qualitative research has shown that members of the general public frequently find other entities responsible for funding energy transitions (Butler *et al.* 2013, Mumford and Gray 2010, Ricci *et al.* 2010, Vaze and Hewitt 2012), whilst leaving open the possibility that under certain circumstances, people would take responsibility for shouldering a portion of these costs.

Furthermore, Demski and colleagues (2017) use survey research to reveal that beliefs about the importance of energy affordability (one aspect of energy transitions) is more dependent on beliefs about who should be responsible for paying than on personal finances. They suggest that their findings point to the importance of distributive justice and equality in affecting support for energy transitions (although not explicitly cost of energy transitions). The questions, thus, remain: to what extent does the public accept a role in shouldering costs associated with energy transitions, under what conditions, and what role does perception of justice play in assessment of transition costs?

3. Methodology and Methods

Our study was guided by mixed-methods inquiry that combined an online survey of the general public in Great Britain (England, Scotland, and Wales; N=3,150) with five focus groups throughout Great Britain. Data collection for the survey occurred from 8 July – 1 August 2016. The focus groups, which were comprised of respondents to the survey, were held in November-December 2016.

3.1. *Survey procedures and sample*

The survey was designed with quotas to make the sample approximate the British public on income, sex, age, education, and population distribution across the eleven census regions. See Supplementary Table 1 for demographic statistics for the survey sample and the supplementary text for the full survey wording. The panel survey was administered through Qualtrics, a firm that works with multiple partners who maintain their own online panels. Median completion time was 22 minutes. This survey explored public attitudes and beliefs about energy system change – also called ‘energy transitions’ – specifically in relation to costs associated with governmental programmes that facilitate such change. Our analysis herein examines factors that affect two key constructs: (1) perceptions of public responsibility for bearing some of the costs of such change and (2) personal acceptance of such costs.

To ensure that data quality was maintained, Qualtrics only included in the final data set respondents who answered at least 90% of the questions and who spent at least eight minutes responding to the survey. A pre-test established that these were reasonable thresholds to exclude respondents who were likely engaging in strong satisficing (including actions such as repeatedly picking the same answer – especially in battery-style questions, skipping multiple items, and terminating the survey early). Response rates are not indicative when using online quota-sampling, as non-response cannot be easily defined; demographic approximation of population values should be consulted instead (Dillman 2007). Four hundred fifty-five people who met the quota criteria exited the survey prematurely; this equates to an adjusted completion rate of 87%.

3.2. *Dependent variables*

We were primarily interested in understanding public perceptions of costs associated with energy transitions, and specifically the role the public believes they should play in financing these. We examined this in two ways. First, we sought to understand the extent to which people attribute responsibility to the public as a general group, relative to other potential actors that might have some role in financing energy transitions. Research shows that people’s conceptualisations of responsibility for societal risks and goals are inherently interlinked with the responsibility they attribute to other relevant actors in society (Bickerstaff, 2008).

Second, we were interested in understanding personal acceptance of cost; individual actions are one manifestation of public responsibility (Eden 1993). Although ‘willingness to pay’ (WTP) captures this general idea, we avoid that explicit operationalisation here because of nuanced deviations of the construct we studied from WTP (Coursey *et al.* 1987, Hanemann 1991, Shogren *et al.* 1994). We did not ask how much respondents would voluntarily pay, but rather what level of cost imposed on them by an external entity (e.g., government or energy company) they would find acceptable. This approximates the way people are likely to encounter costs associated with energy policies – via environmental or social levies on their energy bills. Acceptance of imposed cost could differ from voluntarily proffered willingness to pay for many people (Wiser 2007), considering that there is evidence in the UK for wide acceptance about the need for energy transitions, but

a desire for government (not individuals) to ensure that the transition occurs (Butler *et al.* 2013, Ricci *et al.* 2010).

Both our dependent variables were created by averaging responses across a number of related items from the survey. In each case, our combination of items into a single variable for the purpose of the analysis was theoretically justified based on the construct we sought to measure and was empirically verified through a factor analysis (principal axis factoring).

1. '*Public responsibility for costs*': this variable combined four questions on the extent to which respondents believed the 'general public (through new taxes or fees on energy bills)' 'should be responsible for costs associated with' four different aspects of energy system change: (1) increasing use of low-carbon energy sources, (2) helping vulnerable and disadvantaged people pay for energy, (3) funding programmes to reduce energy use in the UK, and (4) ensuring a reliable supply of energy is continuously available. Respondents answered with a percentage of responsibility they would assign to the general public. They needed to assign a total of 100% to four actors (each actor could receive between 0-100%): general public, energy companies, UK Government, and future UK residents. The factor analysis on the four items generated a single factor, with 68% variance explained and the lowest loading at 0.75. The Cronbach's alpha for reliability was 0.84.
2. '*Personal acceptance of costs*': this variable combined four questions on 'what percent of your total energy bill do you think would be reasonable to be used for each of the following'¹ (the four options were the same aspects of energy system change as for the previous question). The factor analysis on the four items generated a single factor, with 71% variance explained and the lowest loading at 0.75. The Cronbach's alpha was 0.86.

3.3. Normative predictor variables

To better understand people's perceptions of public and personal responsibility for costs associated with energy transitions, we analysed which factors affect cost acceptance. Although cost concerns have been important for shaping policy support for environmental levies on energy bills (Stokes and Warshaw 2017), other research has revealed differential support for environmental and social levies based more on perceptions of justice and fairness than on personal financial impact (Vaze and Hewitt 2012).

An increasing body of research makes the connection between people's acceptance of energy transitions and the extent to which these are seen to address procedural justice, distributive justice, and/or fairness concerns (Demske *et al.* 2015, 2017, Mumford and Gray 2010, Rayner 2010, Ricci *et al.* 2010, Walker *et al.* 2010). Nevertheless, research into cost acceptance for other goods and services has been inconclusive on the extent to which ethical considerations translate into acceptance of costs. For example, whilst a study of farm animal welfare showed a positive relationship between perceived moral intensity of the issue and willingness to pay to address the issue (Bennett *et al.* 2002), a study of

¹ In background information provided for this question, we informed respondents that currently 7% of their bills are used for such levies. This disclosure reflects the information people would actually have if a new policy were being discussed publicly. Without providing the anchor of 7%, we would not anticipate reliable answers.

willingness to pay for fair-trade coffee showed that despite ethically-informed preferences for morally-desirable outcomes, far fewer support the ethically-desirable outcome when asked to shoulder extra associated costs (De Pelsmacker *et al.* 2005).

We drew our normative constructs from the recently emergent literature that has highlighted the role of procedural and distributive justice in shaping views on energy system change (Bickerstaff *et al.* 2013, Cotton 2013, Evensen 2015, Fry *et al.* 2015, Heffron *et al.* 2015, Jenkins *et al.* 2016, Rayner 2010, Siegrist *et al.* 2012, Sovacool and Dworkin 2014, 2015, Sovacool *et al.* 2017). We included multiple measures of distributive justice, procedural justice, and trust, because, as Siegrist *et al.* (2012) observe, normative considerations relevant to complex technological innovation and change cannot be limited to a single component of justice or trust.

Our measures of procedural justice were composite variables created by averaging several related indicators of these constructs (items derived from Besley and McComas 2005, Colquitt 2001, Dixon *et al.* 2016, Siegrist *et al.* 2012; again, each combination was theoretically justified based on the construct we sought to measure and was empirically verified through a factor analysis).

1. Procedural justice: 'Voice': this variable combined two questions about whether one feels he/she can have a voice in the processes that the energy industry uses to make decisions about the energy system: (1) opportunities to have a say and (2) energy industry is willing to listen to people like the respondent. The Pearson correlation between the two items was 0.65.
2. Procedural justice: 'Respect, openness, and honesty': this variable combined five questions about perceived treatment from actors in the energy system: (1) level of respect received from energy companies, (2) level of openness in communication from energy companies and from (3) UK government, (4) degree to which procedures ensure honesty from energy companies and from (5) UK government. These items combined onto one factor, with 59% of the variance explained and the lowest loading at 0.75. The Cronbach's alpha was 0.89.

Distributive justice was measured by three individual items (derived from Colquitt 2001, Cotton 2013, Fry *et al.* 2015, Rayner 2010, Sovacool and Dworkin 2015). Two items assessed level of agreement that: (1) low income people should pay less for energy, and (2) benefits and burdens of paying for energy are distributed fairly. The third measured perceived importance of equitable cost sharing between the general public and industry for funding energy transitions.

Beyond our operationalisations of procedural and distributive justice, another normative construct we included in the survey was *trust* in energy companies and government. The influence of trust on perceptions of energy transitions (Mitchell and Woodman 2010, Mumford and Gray 2010, Rayner 2010, Ricci *et al.* 2010, Whitfield *et al.* 2009) has been frequently attributed to the importance of 'value similarity' – an indicator of 'relational' trust – although competence of relevant system actors is seen as a second central component of trust (Earle 2010, Poortinga and Pidgeon 2003, 2006, Siegrist *et al.* 2012). Trust has been shown to increase cost acceptance in contexts outside of energy (e.g., purchasing organic food, pesticide-free produce, or products from humanely-treated

livestock) (Boccaletti and Nardella 2000, Krystallis and Chryssohoidis 2005, Nocella *et al.* 2010, Wiser 2007).

Trust was measured by the composite variables ‘value dissimilarity’ and ‘competence’ (items derived from Earle 2010, Mitchell and Woodman 2010, Poortinga and Pidgeon 2003). For details on item construction, see the supplementary information.

3.4. Survey data analysis

Our primary approach to data analysis was to conduct linear regressions, with the two aforementioned key constructs (i.e., public responsibility for cost and personal acceptance of cost) as the dependent variables. For predictor variables we included demographic characteristics (age, sex, political leaning), the aforementioned measures of perceptions of justice and trust, and a range of attitudes and beliefs (see below).

One might reasonably anticipate that the extent to which one values the energy system goals that are being funded would increase cost acceptance and perceptions of public responsibility. Therefore, we included perceived importance of the four energy system goals discussed herein in our analysis. We also explored the effect of current *beliefs about energy bills* on acceptance of costs (i.e., what percentage of bills do people think go to environmental and social levies? To energy company profits?). We anticipated that beliefs about current levy costs would function as an anchoring and adjustment heuristic (Gilovich *et al.* 2002) – if costs are perceived to be higher already, acceptance will be higher. We expected respondents’ guesses as to energy company profits, and then acceptance of energy company profits once being told what profits are, would affect acceptance of public responsibility. Higher guesses of company profits and lower acceptance of profits should be a rationale for companies needing to pay more, thus meaning that the public share of costs would be lower (Butler *et al.* 2013, Mumford and Gray 2010, Ricci *et al.* 2010, Vaze and Hewitt 2012).

To compare the importance of normative beliefs alongside the influence of personal financial circumstances on cost acceptance, we also examined the effect of *household income, current energy bill cost, concern over energy costs, and frequency of thinking about energy costs* on acceptance of public responsibility for costs. More concern, higher bills, and lower income should relate to lower acceptance if perceptions of public responsibility are financially motivated.

We used the same predictor variables in both linear regressions to allow us to compare across the models. We initially included 25 independent variables in each model, but upon noticing that several variables were non-significant and/or contributed very little to the model effect size (R^2), we deleted nine predictors to allow for more intelligible and parsimonious models. We discuss some of these excluded variables that were surprisingly unimportant below. In the supplementary material we provide additional tables that show the results of the larger regression models (Supplementary Tables 2 and 3). In our final linear regressions, we entered the independent variables in blocks, to evaluate the change in effect size afforded by each set of predictors (R^2 ; i.e., the variance in responses to the dependent variable explained by the independent variables).

3.5. Qualitative follow-up

After completing the survey, we re-contacted respondents who expressed interest in potentially participating in a follow-up focus group discussion about the topics discussed in the survey. We held five such discussions – one each in Birmingham (England), Cardiff (Wales), and Glasgow (Scotland), and two in London (England). Each group had 6-9 participants, evenly split between males and females. The conversations lasted for three hours and consisted mostly of free-flowing discussion of the topics included in the survey; we particularly focused on the level of personal and societal cost acceptance related to energy system change and the reasons why people expressed the level of acceptance that they did. Data analysis consisted of thematic coding; in this article we draw from the key themes of company profits, openness, and justice, which paralleled our quantitative findings.

4. Empirical findings

4.1. *Perceived public responsibility for costs*

We first explored ‘who’ survey respondents viewed as responsible for costs associated with energy system change. Figure 1 displays the percentage of responsibility attributed to the four groups of actors across the four goals associated with energy transitions: increasing low-carbon energy, helping vulnerable people, reducing energy use, and ensuring a reliable supply. Despite minor differences across these four goals, the pattern is consistent across all. Averaging across the four goals, respondents assigned the greatest responsibility to energy companies (45%), followed by the UK government (32%); nevertheless, respondents allocated some responsibility to the general public (12%) and future residents (11%).

Our focus group participants affirmed and help shed light on the rationale for responsibility being distributed in this way. A Cardiff participant (female) stated of responsibility for energy transition costs, ‘It should really come from the energy companies who are making so much money from us anyway. They’re going to need to sustain what they’ve already built.’ Similarly, a Glasgow participant (female) asserted, ‘I know the businesses are making a fortune so they should have the biggest part of it, but everybody else will have to pay their share and that goes for the public.’ This second comment also acknowledges that even if the lion’s share of responsibility falls on the energy companies, the public have a role to play. Finally, a London participant (female) summarised well why energy companies were perceived as chiefly responsible – ‘The companies should be paying more because they can afford it’. Each of these comments employs the normative language of ‘should’ and touches implicitly on what is fair; perceptions of excess energy company profits were clearly on the mind of many survey respondents when they assigned relative responsibility for energy transition costs. Our regression analysis of the survey data also supported the connection between beliefs about energy company profits and the extent to which respondents viewed the public as responsible for energy transition costs. The higher respondents guessed profits were, and the less profits they found acceptable, the more responsibility for cost they attributed to the public (Table 1).

Additional important normative variables in the survey for predicting public responsibility for costs were both of our measures of procedural justice and one of our

trust measures (energy company competence) (Table 1). In terms of procedural justice, perceptions that the public is able to have a voice in decisions about the energy system, and that energy companies and the UK government act with respect, openness and honesty, both led to higher levels of responsibility attributed to the general public. Perceived competence of energy companies had the reverse relationship from what we had expected – higher perceived competence equated to less ascribed public responsibility. A possible rationale for this unexpected finding is that if people trust energy companies, they may believe that these companies will follow through on delivering appropriate energy system change and, therefore, less public intervention is required. None of the three measures examining perceived importance of distributive justice were significant predictors of public responsibility.

The qualitative data elucidate further the connection between views of energy companies and the degree of perceived public responsibility for energy transitions costs. In the focus groups, several instances of opaque, disrespectful, and dishonest transactions with energy companies and government were divulged. An exchange in Birmingham proceeded as follows: [Participant 1, female]: ‘Unless you are a mathematician you don't know how on earth you decide...,’ [Facilitator]: ‘Why do you think the information is that complex?’ [Participant 1]: ‘Because the energy companies don't want us to...,’ [Participant 2, female]: ‘They are trying to trick us.’ A participant from London (female) voiced similar frustrations, ‘Because the businesses lie all the time. I mean, they keep... I watch the price of fuel goes up and down, fluctuates all the time. My electric bill only goes up. It never goes down.’ She later followed up, asserting, ‘You can't rely on a profit making company to be fair. We know we cannot rely on the government to be fair because most have some connection with one company or another anyway, so they're biased. These regulators are hired by the government, and often they are executives of the power companies. So we're in a no-win situation.’ The theme of dishonesty and intentional obfuscation was notable within each focus group. Perceptions of an unfair system seemingly decreased perceived public responsibility for such individuals.

Perceived importance of three of the four energy system goals was, unsurprisingly, also important for explaining greater attribution of responsibility to the general public (Table 1). Nevertheless, the justice and trust variables cumulatively explained as much variance as did perceived importance of the system goals (see R^2 change in Table 1). Both sets of variables were more important for explaining variation in why respondents attributed responsibility to the public than were the personal characteristics or beliefs about energy bills.

A final notable result from our linear regression relates to factors which did not show any significant relationship with public responsibility for costs (see Supplementary Table 2). Perhaps most interestingly, concern over energy costs, current cost of energy bill, and income did not predict the level of responsibility attributed to the public when it comes to shouldering energy transition costs. These variables' lack of significance highlights the relative import of factors beyond pure financial considerations when assessing public conceptions of responsibility for additional costs to fund energy system change (Demski et al., 2017). Trust in government and political leaning were also non-significant predictors.

4.2. *Personal acceptance of costs*

After exploring perceived public responsibility for costs associated with energy system goals, we analysed respondents' personal acceptance of costs on energy bills to fund these goals – operationalised as the percentage of their bill that they think would be reasonable to go towards programmes addressing the goals (Figure 2). Respondents on average indicated support for 10% of their energy bills being used to fund the goals (the current percentage in the UK is approximately 7%). Although one might anticipate that perceptions of public responsibility and acceptance of personal cost would be related, because both are measures of the extent to which people think private citizens should fund energy system goals, the correlation between the composite measures for the two variables was not pronounced, at only 0.18. As both constructs could affect support for energy policy directions, and the normative implications of societal and personal mandates might be perceived differently, we examined both.

Comparing the factors that affect personal acceptance of cost to those discussed above affecting ascribed public responsibility, some notable differences emerge. For personal acceptance of cost, procedural justice beliefs played a smaller role; perceived importance of distributive justice was a stronger predictor (see beta coefficients in Table 2). Specifically, respondents who reported higher importance associated with (1) equitable cost sharing and (2) cost distribution that is proportional to income were more likely to accept personal cost on their energy bills. One measure of trust (the opposite trust measure as in the previous regression) predicted cost acceptance – the more our respondents' values diverge from those they perceive energy companies to hold, the less they accept personal costs.

The focus group findings similarly illustrate the import of distributional justice concerns. A Cardiff focus group participant (female) explicitly connected personal cost acceptance to equitable cost sharing, explaining, 'The energy companies paying is more appealing to me. ... I think the general public would buy in more if we said the energy company is ... paying for the vulnerable.' A Birmingham participant (female) linked equitable cost sharing back to profits, contending, 'It's got ridiculous now. ... I just think energy companies could take more of the share of everything in the future, I don't know how many millions of profit they make.' She was one of many participants who viewed the current distribution of costs as unfair, and therefore was reticent to accept additional personal cost. A London participant (male) linked cost acceptance and equitable cost sharing, stating, 'When the survey was sent out, that was one of the questions: would you be prepared to pay more ... I said I'd be happy to pay more if the energy suppliers paid an increase, and the government.'

In terms of the belief that low income people should pay less for their energy than wealthy people, a Glasgow participant explained, 'They've tried, with the tariffs, to actually explain what's on your bill...the bill has to go up by 1% and you go "aye, I agree with that, if it helps with the vulnerable, sick, pensioners or whatever."' A London participant (female) similarly contended, 'I think it [energy] should be guaranteed to everybody independently, it's a need that needs to be guaranteed to everybody but whoever has higher income and more money should pay a higher price; it should be proportioned in the way that people on lower income can have what they need.' Energy justice concerns fostered higher cost acceptance, all else equal.

Beyond the relevance of distributive justice concerns, the survey findings revealed that perceived importance of the four energy system goals was less important for personal acceptance of cost in the second regression (compared with the first regression); only importance of increasing low-carbon energy was significant. By far the strongest influences on personal acceptance were beliefs about energy bills – as evidenced by the beta coefficients and amount of variance in cost acceptance explained by these variables (Table 2). Guesses of higher current levy costs and higher company profits led in predicting personal cost acceptance. In general, the sample fared quite well in guessing the amount of energy bills used for levies (mean guess: 14%, median: 10%, mode: 4%, actual: 7%); nevertheless, the respondents excessively overestimated the amount of profits energy companies derive from energy bills (mean and median: 30%, mode: 50%, actual [as reported by the UK regulator Ofgem]: 9%). This could indicate a misinformed public, but it could also reflect that consumers feel they are receiving unfair treatment from energy companies.

The survey findings revealed that beliefs about the extent of public voice in energy decisions was the only justice variable that related significantly to public responsibility for cost *and* to personal acceptance of cost. A Cardiff focus group participant (female) explicitly connected cost acceptance and having voice in energy decisions in the following exchange: [Facilitator]: ‘Do you think it’s acceptable to have some percentage of the energy bill go directly to things like these [environmental and social levies]?’ [Participant]: ‘Yeah, as long as you know where it’s going, rather than just throwing money away; it would be nice to know where does it go and what is being done with it. And having some sort of say in what’s done with it as well.’ An exchange in London highlighted the scepticism that many participants had that energy companies or government would listen to the public: [Participant 1, male]: ‘I think sometimes it depends on who the government hear though ... They don’t hear us.’ [Participant 2, female]: ‘Because they wouldn’t listen.’ [Participant 3, male]: ‘We’re just a small person at the bottom of the pile. We’re insignificant and it doesn’t really matter if the lady that lives next door to me can’t afford her power so she dies in the cold. And it happened last year.’ Perceptions of a lack of voice were one manifestation of disenchantment with governance and operation of the energy system in general. This broader agnosticism or antipathy towards the roles afforded to various energy system actors repeatedly reduced cost acceptance in the focus groups.

Initially surprising was that although guesses about company profits were negatively related to ascribed *public* responsibility (i.e., more perceived profits equates to less public responsibility), they were positively related to *personal* acceptance of cost. How could perceptions of more company profit lead to more cost acceptance? This is possibly explained by the difference in the dependent variables (DVs). The first DV (public responsibility for costs) asks for the percent of energy transition costs to be allocated to the public; as such one’s answer is in direct comparison with other actors, such as energy companies. If profits are thought to be high, it is sensible that energy companies should pay *relatively* more. This would result in a negative association between beliefs about profits and perceived responsibility for the public to pay. The second DV (personal acceptance of costs) did not have this comparative aspect; one could think that companies should pay more but also be willing to pay more themselves at the same time. Our results might indicate that people who care about energy transitions are somehow predisposed to

think that companies have higher profits², for example, due to increased exposure to mass media on this topic, which (at least in the UK) consistently dwell on company profits.

It is further clear that other normative issues are closely associated with beliefs about company profits. The two procedural justice measures had correlations of 0.25 and 0.31 with acceptance of company profits, whilst a distributive justice measure (perceived importance of benefits and burdens being allocated fairly) had a correlation of 0.27 with profits acceptance, and the value dissimilarity item had a correlation of -0.25 with profits acceptance. These data, in concert with the aforementioned focus group quotes, reveal that perception of energy companies as fair entities that respond to societal needs is associated with more acceptance of energy company profits, which, in turn, is strongly associated with acceptance of more costs on public and personal levels.

The data paint a more nuanced image than has previously been understood in terms of the differential importance of various aspects of justice and trust in relation to aspects of energy transitions. Procedural justice considerations can explain nearly all of the normative influence on ascribed public responsibility, whilst perceptions of distributive justice dominate as the normative influence on personal acceptance of cost. One aspect of trust (value similarity) was relevant for personal cost acceptance whilst the other conceptual component of trust (institutional competence) was relevant for public responsibility attribution. These findings at once affirm the importance of normative considerations but also point to their multifaceted nature.

Furthermore, the relationships between cost acceptance, justice perceptions, trust, and beliefs about energy bills revealed in both the quantitative and qualitative inquiry suggest normative assessments are central to perceptions of profits. Further, perceptions of profits, perhaps, capture additional normative characteristics not included in our measures of distributive and procedural justice and trust. Future research could explore additional operationalisations of justice and trust and investigate rationales for the differing effects of the various normative commitments.

5. Conclusions and Policy Implications

Although the British respondents in this study view the government and especially energy companies as substantially more responsible for costs associated with energy system change than they themselves are, they also accept a role for the public, and for themselves as individuals, in funding these transitions. Crucially, however, the extent of this role is dependent on normative views about both energy company and government behaviour and the ways in which those transitions are implemented. The sample's acceptance of more of their energy bills, on average, than is currently the case (10% vs. 7%) going towards environmental and social levies (i.e., programmes that work towards energy justice) is cause for optimism. Nevertheless, the UK Committee on Climate Change (2017) estimates that 15% of bills will need to go towards levies by 2030 to meet

² The bivariate correlations between the guess of profits with each of the five measures of importance of energy transitions (i.e., of low-carbon energy, affordability, helping vulnerable people, reducing energy use, and increasing energy security) were positive and significant at $p < 0.01$. This means that the more important energy transitions were perceived to be, the higher one's guess of company profits was.

emissions reductions required by the fifth carbon budget approved by Parliament in 2016. This suggests that envisioned increases in levies may stretch the limits of current public support in the UK, and that this approach to meeting energy and environmental justice goals may not be viable long term.

Recent (March 2018) research from the UK Energy Research Centre (UKERC) suggests a way around continually increasing levies on energy bills. This work on how to finance the social and environmental aspects of energy transitions recommends shifting the costs from consumers to businesses or general taxation (Barrett *et al.* 2018). The authors suggest general taxation would be a less regressive means of funding the programmes. Whilst previous research (Vaze and Hewitt 2012) revealed a public preference for paying such costs via energy bills, compared to through general taxation, our research (five years later) reveals the opposite. In our survey, support for paying further transition costs assigned to the public via energy bills significantly lower than for paying via additional taxes. Barrett *et al.*'s (2018) recommendations, thus, represent one publicly acceptable solution to the energy justice issue raised herein.

Public cost acceptance is dependent on several factors. As anticipated, measures of justice played a notable role in shaping perceptions of public responsibility for, and personal acceptance of, costs associated with energy system goals. Furthermore, these normative considerations predicted ascribed public responsibility and personal acceptance when personal financial issues (i.e., level of concern about cost of energy, frequency of thinking about energy costs, and total cost of energy bills) played no discernible role. Additionally, reported income was not relevant for personal acceptance of costs.

Support for environmental and social levies to fund energy system changes likely requires one to think that the public, holistically, should pay *and* that they themselves feel it appropriate to undertake that role. To the extent that this is true, perceived presence of procedural justice (such as consumers having voice in decision making relevant to the energy system), perceived importance of distributive justice (such as lower income people paying less for energy), and value similarity with energy companies would be expected to increase acceptance of levies.

Increasing trust where deep-seated distrust exists is never easy. According to Slovic (1999, 46), 'once trust is lost, it may take a long time to rebuild to its former state...lost trust may never be regained'. Nevertheless, transparency on and increased awareness of company profits seem essential for potentially heightening acceptance of public and personal costs associated with energy system change, especially in light of recent news coverage (e.g., Vaughan 2017a, 2017b) – including the UK Business Secretary citing 'flagrant mistreatment' of customers by energy firms – and a major report from the Competition and Markets Authority (2016) revealing that 70% of UK consumers are 'overpaying' for household energy.

The UK Government has not expressed a clear energy policy strategy for several years (e.g., with commitments to emissions reductions, but at the same time reversals on solar and wind subsidies, suspension of plans for carbon capture and storage demonstration projects, and new tax breaks for oil and gas production). Nevertheless, to the extent that the UK Government is clearly committed to any energy policy goal, this would seem to be affordability. Nevertheless, affordability did not stand out as more important than

other transition goals to the public in our survey or focus groups. That few notable differences exist for cost acceptance across the four aspects of energy system change (Figures 1 and 2) is actually positive for energy policy – this potentially affords greater flexibility in which approaches are taken by government to enact energy system change.

Whilst our findings indicate that affordability is important, the UK public does not interpret this as meaning that energy bills simply need to be kept as low as possible. They accept extra costs if it ensures that energy comes from low carbon sources, that energy is secure, and that energy is affordable for the less fortunate (Demski *et al.* 2015, 2017). Perceptions of a fairer and more open energy system increase such acceptance. This is both a challenge and reason for optimism in relation to energy justice. People are open to taking on extra costs to ensure a just energy system, but they are less likely to do so if they do not think that the system is currently just.

In any further theoretical development of the energy justice concept, not only perceived responsibility for transition costs, but also the normative foundations influencing such perceptions must be accounted for. The theoretical implications of our empirical findings are that policies on who pays to fund energy justice programmes as part of energy transitions matters. Economists and modellers with the UK Energy Research Centre (Barrett *et al.* 2018) have recently highlighted potential approaches to distributing such costs in a way that could continue to support the programmes advancing energy justice, whilst preventing some of the justice concerns related to ‘who pays’. Further, Jenkins *et al.*’s (2018) research on the need for attention to energy justice in the process of realising energy transitions affirms how incorporation of responsibility for cost into energy justice conversations can meaningfully expand the scope of other important aspects of energy justice (Fuller and McCauley 2016, Heffron and McCauley 2014, McCauley *et al.* 2013).

Concern about energy company profits limited acceptance of personal and societal costs and was strongly correlated with perceived presence of procedural justice, importance of distributive justice, and value similarity with energy companies. Broadly, whether people viewed companies as doing the right thing directly and indirectly (through profits acceptance) affected cost acceptance for environmental and social levies. In light of this, the UK Government’s current forceful rhetoric on its regulator – Ofgem – reigning in energy company behaviour and (over)charging could be helpful in increasing acceptance of costs, if this translates into effective and easily-understood tangible policy action. Whilst more public awareness of the actual profit level for energy companies could increase public and personal cost acceptance (e.g., when informed that current profits are, on average, 9% of bills, our sample accepted an average profit level of 9%), we caution against placing too much emphasis on addressing ‘misinformation’. The focus groups revealed that normative perceptions of company and government behaviour had a strong influence on cost acceptance, independent of factual beliefs about profits and costs. Simply providing additional facts will not change the related trust and justice perceptions.

In conclusion, the data herein highlight two novel and important considerations for the energy justice literature: (1) policies that seek to promote energy justice could be delayed or derailed if it is simply assumed that their costs will be passed on to the public, and the public is opposed to funding them, and (2) a substantial reason why such opposition might emerge is due to perceptions of injustice related to the energy system and funding of energy transitions.

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Figure 1.

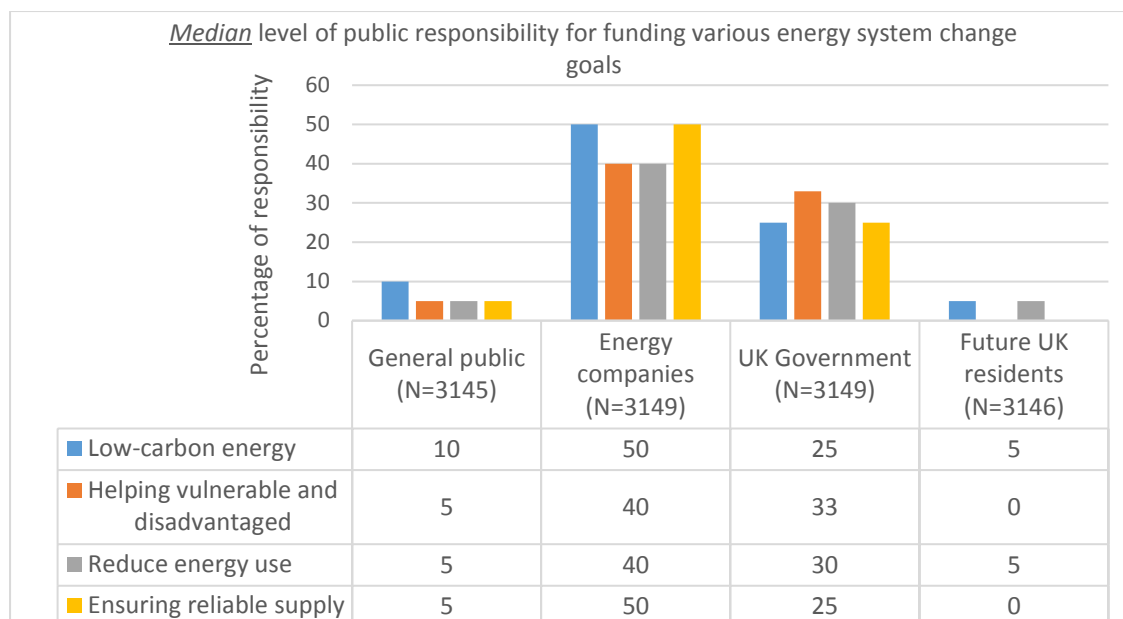


Figure 2.

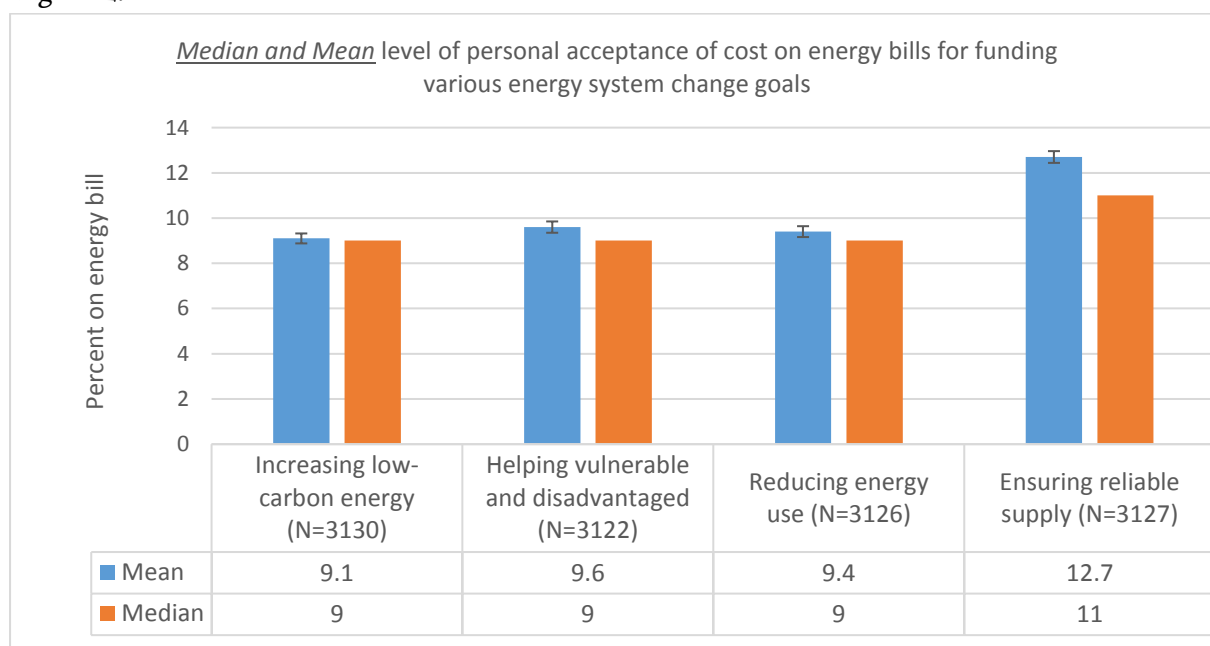


Table 1. Factors affecting perceived public responsibility for costs associated with energy system change (N=2814)

Predictor	Standardised beta coefficient	Sig.	Addition to R ² from group
<u>Demographic background</u>			.04
Sex	.031	.080	
Age	-.088	.000	
<u>Views on energy system goals</u>			.07
Importance of low-carbon energy	.049	.021	

Importance of affordability	-.127	.000	
Importance of reducing energy use	.032	.132	
Importance of ensuring reliable supply	-.086	.000	
<u>Trust</u>			.07
Value <i>dissimilarity</i> (factor)	-.007	.746	
Competence (factor)	-.076	.000	
<u>Procedural justice</u>			
Voice (factor)	.098	.000	
Respect, openness, honesty (factor)	.056	.014	
<u>Distributive justice</u>			
Fair distribution of benefits, burdens	.036	.071	
Low income should pay less	-.003	.847	.04
Equitable cost sharing	.024	.197	
<u>Energy bills</u>			
Percent to levies (guess)	.177	.000	
Percent to company profits (guess)	-.106	.000	
Acceptance of company profits	.091	.000	

The full model had an effect size (adjusted R^2 value) of 0.21; that is, 21% of the variance in the dependent variable could be explained by the combined total of the independent variables. The variance inflation factors (VIF) for all variables were less than 2.0, indicating low levels of multicollinearity.

Table 2. Factors affecting perceived *personal acceptance of costs* associated with energy system change (N=2810)

Predictor	Standardised beta coefficient	Sig.	Addition to R^2 from group
<u>Demographic background</u>			.02
Sex	-.016	.337	
Age	.036	.035	
<u>Views on energy system goals</u>			.03
Importance of low-carbon energy	.052	.009	
Importance of affordability	-.010	.647	
Importance of reducing energy use	.029	.145	
Importance of ensuring reliable supply	-.033	.119	
<u>Trust</u>			.07
Value <i>dissimilarity</i> (factor)	-.043	.028	
Competence (factor)	.029	.084	
<u>Procedural justice</u>			

Voice (factor)	.051	.008	
Respect, openness, honesty (factor)	-.010	.658	
<u>Distributive justice</u>			
Fair distribution of benefits, burdens	-.033	.075	
Low income should pay less	.119	.000	
Equitable cost sharing	.076	.000	
<u>Energy bills</u>			.19
Percent to levies (guess)	.263	.000	
Percent to company profits (guess)	.223	.000	
Acceptance of company profits	.215	.000	

The full model had an effect size of 0.31. The variance inflation factors (VIF) for all variables were less than 2.0.

Supplementary Table 1. Demographic descriptive statistics (N=3150)

Question and response options	Survey sample (%)	Population in Great Britain (%)
Please indicate whether you are male or female.		
Male	50%	49%
Female	50%	51%
How old are you (in years)?		
18-24 years	7.7%	12%
25-34 years	13.3%	17%
35-44 years	15.8%	16%
45-54 years	20.6%	19%
55-99 years	42.6%	37%
What is your annual household income before tax?		
Less than £10,000	15.5%	19%
£10,000 – £19,000	25.3%	27%
£20,000 – £29,000	20.5%	18%
£30,000 – £39,000	15.8%	13%
£40,000 – £49,000	9.5%	8%
£50,000 – £59,000	5.2%	5%
£60,000 – £69,000	3.1%	4%
£70,000+	5.1%	6%
In which of the following regions do you live?		
North East	5.5%	4.2%
North West	12.7%	11.5%
Yorkshire and The Humber	8.5%	8.6%
East Midlands	7.3%	7.4%
West Midlands	9.8%	9.2%
East of England	8.3%	9.6%
London	11.5%	13.4%
South East	15.2%	14.1%
South West	8.5%	8.6%
Scotland	7.5%	8.2%
Wales	5.1%	5.2%
What is the highest academic or professional qualification you have obtained?		

<ul style="list-style-type: none"> • Higher degree (e.g., MSc, MBA, PGCE, PhD, MD, MRCVS) • Degree (e.g., BA, BSc) • Professional qualifications (e.g., teaching, nursing, accountancy) • NVQ level 4-5, HNC, HND, RSA Higher Diploma, or BTEC Higher Level 	30.2%	27.2%
<ul style="list-style-type: none"> • 2+ A levels / VCEs, 4+ AS levels, Higher School Certificate, or Progression / Advanced Diploma • Welsh Baccalaureate Advanced Diploma or Advanced Higher (Scotland) • NVQ level 3, Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, RSA Advanced Diploma, or BTEC National 	16.1%	12.3%
<ul style="list-style-type: none"> • 5+ O levels (passes) / CSEs (grade 1) / GCSEs (grades A*-C) • Welsh Baccalaureate Intermediate Diploma or Higher Grade (Scotland) • School certificate, Lower (Scotland), 1 A level, 2-3 AS levels / VCEs, Intermediate/Higher Diploma • NVQ level 2, Intermediate GNVQ, City and Guilds Craft, RSA Diploma, or BTEC First / General Diploma 	18.3%	15.3%
<ul style="list-style-type: none"> • 1-4 O levels / CSEs / GCSEs (any grade) • Entry level or Foundation Diploma • NVQ level 1, Foundation GNVQ, Basic Skills 	16.0%	13.3%
<ul style="list-style-type: none"> • Apprenticeship • Other qualification (including vocational and work-related qualification) 	8.1%	9.2%
<ul style="list-style-type: none"> • No academic or professional qualification 	11.4%	22.7%

Supplementary Table 2. Factors affecting perceived *public responsibility for costs* associated with energy system change; additional predictor variables (N=2445)

Predictor	Standardised beta coefficient	Sig.	Addition to R ² from group
<u>Demographic background</u>			.05
Sex	.049	.010	
Age	-.086	.000	
Annual household income	.036	.061	
Political spectrum (liberal – conservative)	-.008	.696	
<u>Views on energy system goals</u>			.06
Importance of low-carbon energy	.062	.007	
Importance of affordability	-.111	.000	
Importance of reducing energy use	.023	.307	
Importance of ensuring reliable supply	-.081	.001	
Importance of helping vulnerable people pay for energy (factor)	-.025	.286	
<u>Trust</u>			.06
Value dissimilarity (factor)	.004	.867	
Competence (factor)	-.063	.006	
Value similarity w/ govt. (factor)	.002	.940	
Competence of govt. (factor)	.006	.784	
<u>Procedural justice</u>			
Voice (factor)	.103	.000	
Energy system interactions (factor)	.059	.023	
<u>Distributive justice</u>			
Fair distribution of benefits, burdens	.026	.245	
Low income should pay less	.019	.372	
Equitable cost sharing	.039	.052	
<u>Energy bills</u>			.04
Total cost of energy bill	-.010	.601	
Concern about current energy costs	.015	.522	
How often do you think about energy costs?	-.018	.437	
Percent to levies (guess)	.161	.000	
Percent to company profits (guess)	-.099	.000	
Acceptance of company profits	.079	.000	
<u>Regulation</u>			.00
Favour heavy regulation or nationalisation of energy industry?	-.067	.001	

The full model had an effect size of 0.20. The variance inflation factors (VIF) for all variables were less than 2.5.

Supplementary Table 3. Factors affecting perceived *personal acceptance of costs* associated with energy system change; additional predictor variables (N=2443)

Predictor	Standardised beta coefficient	Sig.	Addition to R ² from group
<u>Demographic background</u>			
Sex	-.006	.729	.02
Age	.046	.013	
Annual household income	-.003	.867	
Political spectrum (liberal - conservative)	-.019	.295	
<u>Views on energy system goals</u>			
Importance of low-carbon energy	.055	.011	.05
Importance of affordability	-.036	.127	
Importance of reducing energy use	.015	.481	
Importance of ensuring reliable supply	-.040	.073	
Importance of helping vulnerable people pay for energy (factor)	.072	.001	
<u>Trust</u>			
Value dissimilarity (factor)	-.073	.004	.05
Competence (factor)	.003	.889	
Value similarity w/ govt. (factor)	.040	.112	
Competence of govt. (factor)	.030	.156	
<u>Procedural justice</u>			
Voice (factor)	.045	.030	
Energy system interactions (factor)	-.002	.950	
<u>Distributive justice</u>			
Fair distribution of benefits, burdens	-.007	.729	
Low income should pay less	.088	.000	
Equitable cost sharing	.058	.002	
<u>Energy bills</u>			
Total cost of energy bill	-.005	.757	.19
Concern about current energy costs	.035	.119	
How often do you think about energy costs?	-.014	.508	
Percent to levies (guess)	.261	.000	
Percent to company profits (guess)	.221	.000	
Acceptance of company profits	.204	.000	
<u>Regulation</u>			
Favour heavy regulation or nationalisation of energy industry?	.024	.202	.00

The full model had an effect size of 0.30. The variance inflation factors (VIF) for all variables were less than 2.5.

Supplementary information

Additional methodological information

Trust was measured by the composite variables ‘value dissimilarity’ and ‘competence’.

1. ‘Value dissimilarity’: these variables (one for energy companies and one for the UK Government) combined the absolute value of five differences calculated between two sets of variables. The first variables were respondents’ perceived importance of various energy system changes: (1) increasing low carbon energy, (2) making energy affordable for all households, (3) helping vulnerable people pay for energy, (4) reducing energy use, and (5) ensuring reliable energy supply. The second set of variables was the extent to which respondents thought energy companies (or Government) found each of these same goals important. To produce a measure of value dissimilarity, which is a component of (lack of) trust, we subtracted the perceived importance attributed to energy companies (or Government) from the personal importance and then took the absolute value of the result. We then conducted a factor analysis on the five differences. For energy companies, these items combined onto one factor, with 56% variance explained and the lowest loading at 0.53. The Cronbach’s alpha for reliability was 0.81. The Government items also loaded one factor: 60% variance explained, lowest loading at 0.65, and alpha of 0.83.
2. ‘Competence’: these variables (one for energy companies and one for the UK Government) combined five questions about the extent to which respondents perceived energy companies (or Government) could take effective action on the same five aspects of energy system change covered in the value similarity measure. For energy companies, these items combined onto one factor: 61% variance explained, lowest loading at 0.61, and alpha of 0.84. The Government items also loaded one factor: 69% variance explained, lowest loading at 0.75, and alpha of 0.89.

Additional descriptive statistics

(Frequency data is given as percentage of respondents in each response category in the tables below; the mean for each item is given just after the question number)

Distributive justice measures

Q6.9 (mean = 4.22)

Listed below are a number of items that have been identified as important when deciding on the UK's energy future. Please let us know to what extent you feel each of the following is important:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
Equitable cost sharing between the general public and industry (9)	2%	5%	22%	31%	24%	17%

Q24.1-Q24.2 (mean: Q24.1 = 2.87; mean Q24.2 = 3.85)

To what extent do you agree or disagree with the following statements:

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)
The benefits and burdens of paying for energy are currently distributed fairly in society. (1)	18	24	25	22	9	2
People with low incomes should pay less for energy than people with high incomes. (2)	8	12	17	29	18	16

Procedural justice measures

Q8.1-Q8.2 (mean: Q8.1 = 3.69; Q8.2 = 3.11)

To what extent do you agree or disagree with the following statements: When it comes to the process that the energy industry uses to make decisions about the energy system, I ...

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)	Don't know
Believe that there are opportunities for people like me to have a say. (1)	11	16	14	19	23	13	5
Think that the energy industry is willing to listen to people like me. (2)	17	21	18	15	14	8	6

Q16.1-Q16.5 (mean: Q16.1 = 3.25; Q16.2 = 2.94; Q16.3 = 3.07; Q16.4 = 3.58; Q16.5 = 3.39)

To what extent do you agree or disagree with the following statements:

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)	Don't know (7)
In general, energy companies treat people like me with respect (1)	14	15	20	25	14	4	9
Energy companies generally communicate openly about their decisions and actions (2)	18	20	21	19	10	4	9
The UK Government generally communicates openly about its decisions and actions (3)	19	15	19	21	13	4	8
There are procedures in place to ensure energy companies are honest about their actions (4)	9	11	13	28	18	5	15
There are procedures in place to ensure the UK Government is honest about its actions (5)	13	12	13	25	16	5	16

Trust measures

Q12.1-Q12.5 (mean: Q12.1 = 3.59; Q12.2 = 3.34; Q12.3 = 3.30; Q12.4 = 3.23; Q12.5 = 4.41)

To what extent do you think energy companies find each of the following goals important:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)	Don't know (7)
Increasing the use of low-carbon energy sources (1)	6	14	28	21	14	10	7
Making energy affordable for all UK households (2)	13	22	20	15	11	14	5
Helping vulnerable and disadvantaged people pay for energy (3)	12	22	21	16	11	12	6
Reducing overall energy use in the UK (4)	14	21	20	18	12	9	7
Ensuring a reliable supply of energy is continuously available (5)	3	4	17	23	25	23	5

Q14.1-Q14.5 (mean: Q14.1 = 3.06; Q14.2 = 3.14; Q14.3 = 3.05; Q14.4 = 2.71; Q14.5 = 3.36)

To what extent do you think energy companies can take effective action on the following:

	Not at all (1)	A little (2)	A fair amount (3)	A great deal (4)	Don't know (5)
Increasing the use of low-carbon energy sources (1)	4	19	36	32	9
Making energy affordable for all UK households (2)	7	17	25	44	6
Helping vulnerable and disadvantaged people pay for energy (3)	8	19	27	39	7
Reducing overall energy use in the UK (4)	9	29	35	20	8
Ensuring a reliable supply of energy is continuously available (5)	3	11	31	49	6

Values

Q2 (mean = 5.32)

How important do you feel it is that energy is affordable for all UK households?

Not at all important (10%); Not very important (0%); Somewhat important (5%);

Important (11%); Very important (25%); Extremely important (58%)

Q2.1-Q2.4 (mean: Q2.1 = 4.81; Q2.2 = 5.00; Q2.3 = 4.58; Q2.4 = 3.88)

Several types of households and individuals struggle at times to pay for

energy. How important do you feel it is that the following groups receive help paying for their energy?

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
People with disabilities (1)	2	3	12	19	26	39
Elderly people (2)	1	2	10	16	25	47
Low-income families WITH children (3)	2	4	16	21	25	32
Low-income families WITHOUT children (4)	4	11	26	27	17	15

Q3 (mean = 4.51)

How important do you feel it is that the UK reduces the use of fossil fuels (like coal, gas, and oil) and increases the use of low-carbon energy sources?

(Note: by 'low-carbon' we mean energy sources that produce minimal emissions that damage the environment)

Not at all important (2%); Not very important (4%); Somewhat important (17%);

Important (23%); Very important (27%); Extremely important (28%)

Q3.1-Q3.7 (mean: Q3.1 = 4.54; Q3.2 = 4.50; Q3.3 = 4.00; Q3.4 = 4.22; Q3.5 = 4.27; Q3.6 = 3.65; Q3.7 = 3.43)

Low-carbon energy sources include different types of energy technologies. How important do you feel it is that the UK pursues each of the following goals:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
To increase electricity production from renewable sources generally (1)	2	4	17	24	25	29
To increase electricity production from solar power (2)	2	4	16	24	26	28
To increase electricity production from ONSHORE wind energy (3)	6	9	22	26	19	18
To increase electricity production from OFFSHORE wind energy (4)	4	7	19	26	22	23
To increase electricity production from marine energy (tidal, wave) (5)	2	6	19	28	22	22
To build nuclear power stations to replace old ones soon to be retired (6)	11	12	24	23	15	15
To build new nuclear power stations in addition to replacing old ones (7)	15	15	24	21	13	13

Q4 (mean = 4.32)

How important do you feel it is that overall energy use in the UK is reduced?

Not at all important (2%); Not very important (4%); Somewhat important (21%);
Important (28%); Very important (24%); Extremely important (21%)

Q4.1-Q4.3 (mean: Q4.1 = 4.42; Q4.2 = 4.79; Q4.3 = 4.66)

Reductions in energy use can be achieved in several ways. Please let us know how important you feel it is to reduce energy use via each of the following:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
Through actions people take in their daily lives (e.g., using less electricity, heat, or water) (1)	2	4	18	27	26	24
Through energy-saving technologies used in industry and business (2)	1	2	12	21	30	34
Through energy efficiency measures in homes (3)	1	2	13	25	29	30

Q5 (mean = 5.27)

Some discussions have focused on how to ensure enough energy is always available in the UK (for example, to keep the lights on and keep homes warm in winter). How important do you feel it is that a reliable energy supply is continuously available?

Not at all important (1%); Not very important (1%); Somewhat important (7%); Important (12%); Very important (25%); Extremely important (56%)

Q6.1-Q6.3, Q6.6 (mean: Q6.1 = 4.68; Q6.2 = 4.99; Q6.3 = 4.81; Q6.6 = 4.85)

Listed below are a number of items that have been identified as important when deciding on the UK's energy future. Please let us know to what extent you feel each of the following is important:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
To reduce carbon (greenhouse gas) emissions (1)	2	4	13	22	24	35
To reduce pollution that could harm human health (2)	1	1	9	19	26	44
To protect the environment (3)	1	3	12	22	25	38
To consider the effects on future generations (6)	1	2	11	22	27	37

Perceptions of energy bills

Q26

What percent of your energy bill do you think currently goes to social and environmental levies? If you are unsure, simply provide your best guess. Levies are portions of the bill earmarked for particular purposes (e.g., to pay for programmes that increase low-carbon energy and help people in energy poverty).

Mean = 14%; Median = 10%; Mode = 4%

Q27

What percent of your energy bill do you think are company profits? If you are unsure, simply provide your best guess.

Mean = 30%; Median = 30%; Mode = 50%

Q29

Approximately 9% of energy (electricity and gas) bills currently go to energy company profits. What percent of your total energy bill do you think would be reasonable to go to company profits?

Mean = 9%; Median = 7%; Mode = 5%

Supplementary Note 2

Full text of survey

To ensure we obtain responses from a range of different people, please tell us the following about yourself:

[Sex] Please indicate whether you are male or female.

- ☐ Male (1)
- ☐ Female (2)

[Age] How old are you (in years)?

[Edu] What is the highest academic or professional qualification you have obtained?

- ☐ Higher degree (e.g., MSc, MBA, PGCE, PhD, MD, MRCS) (1)
- ☐ Degree (e.g., BA, BSc) (2)
- ☐ Professional qualifications (e.g., teaching, nursing, accountancy) (3)
- ☐ NVQ level 4-5, HNC, HND, RSA Higher Diploma, or BTEC Higher Level (4)
- ☐ Apprenticeship (5)
- ☐ 2+ A levels / VCEs, 4+ AS levels, Higher School Certificate, or Progression / Advanced Diploma (6)
- ☐ Welsh Baccalaureate Advanced Diploma or Advanced Higher (Scotland) (7)
- ☐ NVQ level 3, Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, RSA Advanced Diploma, or BTEC National (8)
- ☐ 5+ O levels (passes) / CSEs (grade 1) / GCSEs (grades A*-C) (9)
- ☐ Welsh Baccalaureate Intermediate Diploma or Higher Grade (Scotland) (10)
- ☐ School certificate, Lower (Scotland), 1 A level, 2-3 AS levels / VCEs, Intermediate/Higher Diploma (11)
- ☐ NVQ level 2, Intermediate GNVQ, City and Guilds Craft, RSA Diploma, or BTEC First / General Diploma (12)
- ☐ 1-4 O levels / CSEs / GCSEs (any grade) (13)
- ☐ Entry level or Foundation Diploma (14)
- ☐ NVQ level 1, Foundation GNVQ, Basic Skills (15)
- ☐ Other qualification (including vocational and work-related qualification) (16)
- ☐ No academic or professional qualification (17)

[Income] What is your annual household income before tax?

- ☐ Less than £10,000 (1)
- ☐ £10,000 - 19,999 (2)
- ☐ £20,000 - 29,999 (3)
- ☐ £30,000 - 39,999 (4)
- ☐ £40,000 - 49,999 (5)
- ☐ £50,000 - 59,999 (6)
- ☐ £60,000 - 69,999 (7)
- ☐ £70,000+ (8)

[Region] In which of the following regions of Great Britain do you live?

- ☐ North East (1)
- ☐ North West (2)
- ☐ Yorkshire and The Humber (3)
- ☐ East Midlands (4)
- ☐ West Midlands (5)
- ☐ East of England (6)
- ☐ London (7)
- ☐ South East (8)
- ☐ South West (9)
- ☐ Scotland (10)
- ☐ Wales (11)

Thank you for taking part in this research. The survey is conducted by a research group at Cardiff University. We expect the survey will take about 25 minutes of your time. The questions ask about your views on a range of energy issues, such as how we should produce, use, and pay for energy. There are no right or wrong answers; all views are important to us, so please answer all questions as best as you can.

A few pieces of information before you start: Your participation is voluntary. If you decide you do not want to complete the survey, you are able to withdraw by closing the browser and the data will not be collected. Your responses are anonymous and cannot be traced to you individually. The data collected as a result of this survey may be held indefinitely. The data will be used to produce reports and academic publications and presentations. You will be provided with further information about the research at the end of the survey.

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Professor Nick Pidgeon pidgeonn@cardiff.ac.uk

Please click the circle below to continue.

☐ I consent to participate in this survey

Q1

What is the first thing that comes to mind when you hear 'energy system change'?

There is no right or wrong answer; we are just interested in your first thoughts.

Several changes have recently been discussed in relation to how energy is produced and used in the UK for a range of reasons. The next few questions ask about your views on these.

Q2

How important do you feel it is that energy is affordable for all UK households?

- ☐ Not at all important (1)
- ☐ Not very important (2)
- ☐ Somewhat important (3)
- ☐ Important (4)
- ☐ Very important (5)
- ☐ Extremely important (6)

Q2.1-Q2.4

Several types of households and individuals struggle at times to pay for energy. How important do you feel it is that the following groups receive help paying for their energy?

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
People with disabilities (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elderly people (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low-income families WITH children (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low-income families WITHOUT children (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3

How important do you feel it is that the UK reduces the use of fossil fuels (like coal, gas, and oil) and increases the use of low-carbon energy sources?

(Note: by 'low-carbon' we mean energy sources that produce minimal emissions that damage the environment)

- ☐ Not at all important (1)
- ☐ Not very important (2)
- ☐ Somewhat important (3)
- ☐ Important (4)
- ☐ Very important (5)
- ☐ Extremely important (6)

Q3.1-Q3.7

Low-carbon energy sources include different types of energy technologies. How important do you feel it is that the UK pursues each of the following goals:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
To increase electricity production from renewable sources generally (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To increase electricity production from solar power (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To increase electricity production from ONSHORE wind energy (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To increase electricity production from OFFSHORE wind energy (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To increase electricity production from marine energy (tidal, wave) (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To build nuclear power stations to replace old ones soon to be retired (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To build new nuclear power stations in addition to replacing old ones (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4

How important do you feel it is that overall energy use in the UK is reduced?

- ☐ Not at all important (1)
- ☐ Not very important (2)
- ☐ Somewhat important (3)
- ☐ Important (4)
- ☐ Very important (5)
- ☐ Extremely important (6)

Q4.1-Q4.3

Reductions in energy use can be achieved in several ways. Please let us know how important you feel it is to reduce energy use via each of the following:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
Through actions people take in their daily lives (e.g., using less electricity, heat, or water) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Through energy-saving technologies used in industry and business (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Through energy efficiency measures in homes (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5

Some discussions have focused on how to ensure enough energy is always available in the UK (for example, to keep the lights on and keep homes

warm in winter). How important do you feel it is that a reliable energy supply is continuously available?

- ☐ Not at all important (1)
- ☐ Not very important (2)
- ☐ Somewhat important (3)
- ☐ Important (4)
- ☐ Very important (5)
- ☐ Extremely important (6)

Q5.1-Q5.2

Some people have suggested that the following actions contribute to a reliable energy supply. Please let us know how important you feel each of the following actions is:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
Increase the amount of energy produced in Britain (and reduce energy imports) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Invest in key energy infrastructure (e.g., the electricity and gas grids, new power stations) (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6.1-Q6.15

Listed below are a number of items that have been identified as important when deciding on the UK's energy future. Please let us know to what extent you feel each of the following is important:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)
To reduce carbon (greenhouse gas) emissions (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To reduce pollution that could harm human health (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To protect the environment (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To strengthen the UK economy (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To create new job opportunities (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To consider the effects on future generations (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To prevent power cuts (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To ensure the UK is independent from the influence of other nations (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Equitable cost sharing between the general public and industry (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The public having a voice in decision making (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoiding expensive changes (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fair and transparent decision making processes (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To ensure people's lifestyles do not change too much (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To consider local issues in decision making (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (write in): (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7.1-Q7.3

To what extent do you agree or disagree with the following statements:

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)
Being able to live in a warm house is a basic right. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to energy is a luxury. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Society would not function without constant access to energy. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8.1-Q8.4

To what extent do you agree or disagree with the following statements: When it comes to the process that the energy industry uses to make decisions about the energy system, I ...

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)	Don't know (7)
Believe that there are opportunities for people like me to have a say. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Think that the energy industry is willing to listen to people like me. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do not think that the decision making process is fair. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Think the energy industry does what it wants to, regardless of what the public think (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

We now will ask about several organisations that have varying levels of control over energy use and production in the UK.

Q9.1-Q9.6

To what extent would you say you are informed about the following:

	I've never heard of this organisation (1)	I've heard of it, but know nothing about it (2)	I know a little (3)	I know a fair amount (4)	I know a great deal (5)
Energy supply companies in the UK (electric and gas) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electricity and gas transmission and distribution network operators (e.g., National Grid) (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UK Government (in general) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DECC (Department of Energy and Climate Change) (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ofgem (Office of Gas and Electricity Markets) (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your local council (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q10.1-Q10.6

To what extent do you think each organisation below has the expertise to make effective changes to the UK energy system:

	Not at all (1)	A little (2)	A fair amount (3)	A great deal (4)	Don't know (5)
Energy supply companies in the UK (electric and gas) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electricity and gas transmission and distribution network operators (e.g., National Grid) (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UK Government (in general) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DECC (Department of Energy and Climate Change) (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ofgem (Office of Gas and Electricity Markets) (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your local council (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

QII.1-QII.6

To what extent do you think each organisation below will do what is right for society regarding the UK energy system:

	Will not do what is right (1)	Will partially do what is right (2)	Will mostly do what is right (3)	Will always do what is right (4)	Don't know (5)
Energy supply companies in the UK (electric and gas) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electricity and gas transmission and distribution network operators (e.g., National Grid) (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UK Government (in general) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DECC (Department of Energy and Climate Change) (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ofgem (Office of Gas and Electricity Markets) (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your local council (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Now we would like to ask what you think about energy companies and the UK government in more detail. Although multiple energy companies operate in the UK, please provide us with your overall impression of energy companies generally. Similarly, the UK government consists of numerous departments and agencies, but please provide us with your overall impressions of the government.

Q12.1-Q12.5

To what extent do you think energy companies find each of the following goals important:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)	Don't know (7)
Increasing the use of low-carbon energy sources (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making energy affordable for all UK households (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helping vulnerable and disadvantaged people pay for energy (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reducing overall energy use in the UK (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensuring a reliable supply of energy is continuously available (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13.1-Q13.5

To what extent do you think the UK Government finds each of the following goals important:

	Not at all important (1)	Not very important (2)	Somewhat important (3)	Important (4)	Very important (5)	Extremely important (6)	Don't know (7)
Increasing the use of low-carbon energy sources (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making energy affordable for all UK households (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helping vulnerable and disadvantaged people pay for energy (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reducing overall energy use in the UK (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensuring a reliable supply of energy is continuously available (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14.1-Q14.5

To what extent do you think energy companies can take effective action on the following:

	Not at all (1)	A little (2)	A fair amount (3)	A great deal (4)	Don't know (5)
Increasing the use of low-carbon energy sources (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making energy affordable for all UK households (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helping vulnerable and disadvantaged people pay for energy (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reducing overall energy use in the UK (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensuring a reliable supply of energy is continuously available (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15.1-Q15.5

To what extent do you think the UK Government can take effective action on the following:

	Not at all (1)	A little (2)	A fair amount (3)	A great deal (4)	Don't know (5)
Increasing the use of low-carbon energy sources (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making energy affordable for all UK households (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helping vulnerable and disadvantaged people pay for energy (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reducing overall energy use in the UK (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensuring a reliable supply of energy is continuously available (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q16.1-Q16.5

To what extent do you agree or disagree with the following statements:

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)	Don't know (7)
In general, energy companies treat people like me with respect (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy companies generally communicate openly about their decisions and actions (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The UK Government generally communicates openly about its decisions and actions (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are procedures in place to ensure energy companies are honest about their actions (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are procedures in place to ensure the UK Government is honest about its actions (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

We will now ask for your thoughts about regulation of the energy system.

Q17.1-Q17.3

To what extent do you agree or disagree with the following statements:

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)
We should let the market decide which changes will be made to the energy system (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The UK Government should regulate the energy industry to ensure the industry does what is best for society (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is appropriate for the UK Government to require people to adopt energy saving and efficiency measures (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Ask the following one question, if agree with: The UK Government should regulate the energy industry to ensure the industry does what is best for society

Q18

You indicated that you agree with regulation of the energy industry. To what extent do you think the industry should be regulated?

☐ Minimal regulation (1)

- ☐ Moderate regulation (2)
- ☐ Heavy regulation (3)
- ☐ The UK Government should produce and provide energy via a state-run organisation (nationalisation) (4)

In the following section we would like to know your opinions about different ways of paying for changes to how we produce and use energy. In the next four questions, you can assign 100% responsibility to one group / organisation or share responsibility between them by assigning a different amount to each (with the total adding up to 100% in each question).

Q19.1-Q19.4

To what extent do you feel each group below should be responsible for costs associated with...

	General public (through new taxes or fees on energy bills) (1)	Energy companies in the UK (2)	UK Government (with existing taxes) (4)	Future UK residents (through public borrowing, government debt) (5)
Increasing the use of low-carbon energy sources (1)				

Q20.1-Q20.4

To what extent do you feel each group below should be responsible for costs associated with...

	General public (through new taxes or fees on energy bills) (1)	Energy companies in the UK (2)	UK Government (with existing taxes) (3)	Future UK residents (through public borrowing, government debt) (4)
Helping vulnerable and disadvantaged people pay for energy (1)				

Q21.1-Q21.4

To what extent do you feel each group below should be responsible for costs associated with...

	General public (through new taxes or fees on energy bills) (1)	Energy companies in the UK (2)	UK Government (with existing taxes) (3)	Future UK residents (through public borrowing, government debt) (4)
Funding programmes to reduce energy use in the UK (1)				

Q22.1-Q22.4

To what extent do you feel each group below should be responsible for costs associated with...

	General public (through new taxes or fees on energy bills) (1)	Energy companies in the UK (2)	UK Government (with existing taxes) (3)	Future UK residents (through public borrowing, government debt) (4)
Ensuring a reliable supply of energy is continuously available (1)				

Time_1.1 – Time_1.4

Timing on the above four questions: First Click (1), Last Click (2), Page Submit (3), Click Count (4)

Q23.1-Q23.6

Please indicate the extent to which you are familiar with the following programmes that fund energy projects in the UK:

	I've never heard of this programme (1)	I've heard of it, but know nothing about it (2)	I know a little (3)	I know a fair amount (4)	I know a great deal (5)
Non-Fossil Fuel Obligation (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy Company Obligation (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Domestic renewable heat incentive (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feed-in tariff (FIT) scheme (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Renewables Obligation (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UK North Sea oil and gas trust (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q24.1-Q24.2

To what extent do you agree or disagree with the following statements:

	Strongly disagree (1)	Disagree (2)	Slightly disagree (3)	Slightly agree (4)	Agree (5)	Strongly agree (6)
The benefits and burdens of paying for energy are currently distributed fairly in society. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People with low incomes should pay less for energy than people with high incomes. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q25.1-Q25.3

Assuming some of the cost associated with changes to the energy system will have to be paid for by the general public (as users of energy), to what extent would you support or oppose the following approaches:

	Strongly oppose (1)	Oppose (2)	Slightly oppose (3)	Slightly support (4)	Support (5)	Strongly support (6)
Increases in energy bills (electricity and gas) (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional taxes (paid to government) (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public borrowing (government debt to be paid for in future years) (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The next set of questions ask about a range of costs reported on household energy bills.

Q26

What percent of your energy bill do you think currently goes to social and environmental levies? If you are unsure, simply provide your best guess.

Levies are portions of the bill earmarked for particular purposes (e.g., to pay for programmes that increase low-carbon energy and help people in energy poverty). Note: on questions with a sliding bar, if you wish to answer 0%, you need to click the bar and leave the slider at zero.

_____ Levies (1)

Q27

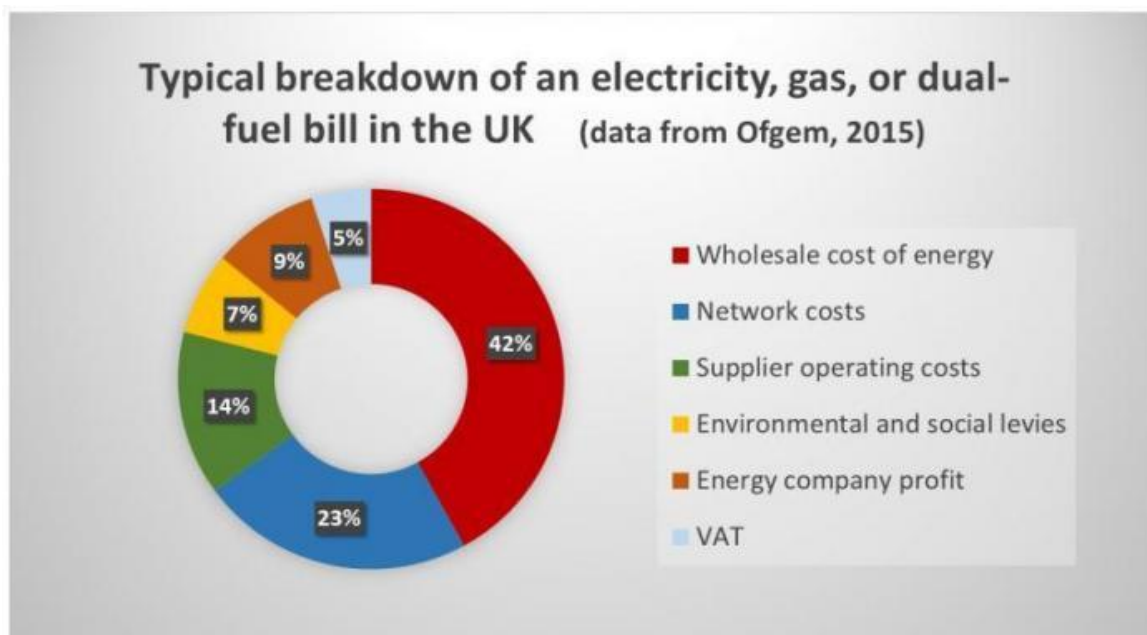
What percent of your energy bill do you think are company profits? If you are unsure, simply provide your best guess.

_____ Company profits (1)

Time_2.1 – Time_2.4

Timing on the above two questions: First Click (1), Last Click (2), Page Submit (3), Click Count (4)

The chart below provides data on typical energy bills for homes in the UK. The data is the most recent available; it comes from Ofgem (Office of Gas and Electricity Markets), the UK government's independent energy industry regulator.



Explanation of the above-listed costs: Wholesale cost of energy – cost to energy supplier of buying the gas or electricity they then deliver to homes and businesses Network costs - includes the cost of building, maintaining, and operating the gas pipes and electricity wires that deliver energy to homes and businesses Supplier operating costs - costs associated with running a retail energy business, including sales, metering, and billing Environmental and social levies - costs of government programmes to save

energy, reduce emissions, encourage uptake of renewable energy, and help low income and elderly people pay for heat Energy company profit – after accounting for costs, this is the energy company’s profit margin before they pay tax

Q28.1-Q28.4

Approximately 7% of energy (electricity and gas) bills currently go to social and environmental levies. Listed below are a range of goals that environmental and social levies could fund. What percent of your total energy bill do you think would be reasonable to be used for each of the following: (please answer by sliding the bar below; numbers represent percent of your total combined bill) Note: on questions with a sliding bar, if you wish to answer 0%, you need to click the bar and leave the slider at zero.

- _____ Increasing the use of low-carbon energy sources (1)
- _____ Helping vulnerable and disadvantaged people pay for energy (2)
- _____ Funding programmes to reduce energy use in the UK (3)
- _____ Ensuring a reliable supply of energy is continuously available (4)

Q29

Approximately 9% of energy (electricity and gas) bills currently go to energy company profits. What percent of your total energy bill do you think would be reasonable to go to company profits?

- _____ Energy company profits (1)

Time_3.1 – Time_3.4

Timing on the above two questions: First Click (1), Last Click (2), Page Submit (3), Click Count (4)

Q30.1-Q30.2

To what extent are you concerned about how much you currently pay for the following:

	Not at all concerned (1)	Not very concerned (2)	Somewhat concerned (3)	Concerned (4)	Very concerned (5)	Extremely concerned (6)	Not applicable (7)
Electricity (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gas (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q31

How often do you think about energy costs?

- ☐ Never (1)
- ☐ Rarely (2)
- ☐ Sometimes (3)
- ☐ Often (4)
- ☐ Very often (5)

Q32

How often do you discuss the issue of energy costs with your family or friends?

- ☐ Never (1)
- ☐ Rarely (2)
- ☐ Sometimes (3)
- ☐ Often (4)
- ☐ Very often (5)

Q33.1-Q33.5

Please indicate the extent to which you agree or disagree with the following statements:

	Strongly agree (1)	Agree (2)	Slightly agree (3)	Slightly disagree (4)	Disagree (5)	Strongly disagree (6)	Don't know (7)
Switching energy supplier is a real hassle (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Switching energy supplier can make a real difference (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is little difference between energy suppliers (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are many things I can do to control my energy bill (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel completely powerless when it comes to managing my energy bill (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q34.1-Q34.10

Please indicate whether you have taken any of the following actions:

	Yes (1)	No (2)
Switched to a different energy supplier in the last 12 months (1)	<input type="radio"/>	<input type="radio"/>
Switched to a different price tariff (but stayed with your energy supplier) in the last 12 months (2)	<input type="radio"/>	<input type="radio"/>
Installed insulation in your home (wall, roof, floor) (3)	<input type="radio"/>	<input type="radio"/>
Exchanged an old boiler for a more energy efficient one (4)	<input type="radio"/>	<input type="radio"/>
Installed double- or triple-glazed windows (5)	<input type="radio"/>	<input type="radio"/>
Installed your own energy supply (e.g., solar panels) (6)	<input type="radio"/>	<input type="radio"/>
Taken part in a community energy scheme or collective switching scheme (7)	<input type="radio"/>	<input type="radio"/>
Installed energy efficient appliances (8)	<input type="radio"/>	<input type="radio"/>
Installed energy efficient lighting (9)	<input type="radio"/>	<input type="radio"/>
Other action to manage energy bills or increase energy efficiency (write in) (10)	<input type="radio"/>	<input type="radio"/>

These final questions ask for some background information so we can compare responses across different groups of people.

Q35

Do you own or rent your home?

- ☐ Own (outright or with a mortgage) (1)
- ☐ Rent (including rent paid by housing benefit) (2)
- ☐ Other (3)

Q36

Which company is your current electricity provider?

- ☐ Centrica (1)
- ☐ SSE (including SSE Atlantic, SSE Scottish Hydro, SSE Southern Electric, and SSE SWALEC) (2)
- ☐ npower (3)
- ☐ EDF Energy (4)
- ☐ E.ON (5)
- ☐ Scottish Power (6)
- ☐ British Gas (7)
- ☐ Other (please write-in): (8) _____

Q37

Which company is your current gas provider?

- ☐ Centrica (1)

- ☐ SSE (including SSE Atlantic, SSE Scottish Hydro, SSE Southern Electric, and SSE SWALEC) (2)
- ☐ npower (3)
- ☐ EDF Energy (4)
- ☐ E.ON (5)
- ☐ Scottish Power (6)
- ☐ British Gas (7)
- ☐ Other (please write-in): (8) _____
- ☐ I do not have gas (9)

Q38

Please estimate your annual household income in Pounds Sterling (£) before tax.

Q39

The next couple questions ask about how much your household currently pays per month for electricity and gas. Even if you are uncertain, please try to estimate these costs generally. (Think about the monthly average. If you pay your bills quarterly or on a meter, please think about how much this would cost per month.) First, how much do you pay for electricity monthly?

- ☐ Amount in £ (write in): (1) _____
- ☐ I don't know, because my household pays for electricity and gas together (2)
- ☐ Not applicable (my household does not have electricity) (3)

Answer If The next couple questions ask about how much your household currently pays per month for electric... I don't know, because my household pays for electricity and gas together Is Not Selected

Q40

Second, how much does your household pay for gas?

- ☐ Amount in £ (write in): (1) _____
- ☐ Not applicable (my household does not have gas) (2)

Answer If Second, how much does your household pay for gas? Not applicable (my household does not have gas) Is Selected

Q41

If you use neither gas nor electricity to heat your home, please let us know what fuel you use and estimate how much you pay for that fuel monthly (in £).

- ☐ I use electricity for heating (1)
- ☐ List other fuel and amount in £ (2) _____

Answer If The next couple questions ask about how much your household currently pays per month for electric... I don't know, because my household pays for electricity and gas together Is Selected

Q42

In that case, how much does your household pay for your combined electricity and gas monthly?

- ☐ Amount in £ (write in): (1) _____

Q43

The UK's Competition and Markets Authority recently revealed that customers of the six largest energy suppliers (Centrica, EDF Energy, E.ON, npower, SSE, and Scottish Power) overpaid by almost £2 billion in 2015. They concluded that the average customer could have saved between £110 and £245 per year by switching to the best tariff with a different supplier. Based on this information, how likely are you to switch your energy supplier in the next month?

- ☐ Not at all likely (1)
☐ Somewhat likely (2)
☐ Likely (3)
☐ Very likely (4)

Q44

As far as you are aware, are you currently on a 'green' energy tariff (a tariff where a substantial percentage of the energy comes from renewable sources)?

- ☐ Yes (1)
☐ No (2)
☐ Don't know (3)

Q45

If there were a general UK election tomorrow, for which party would you vote?

- ☐ Conservative (1)
- ☐ Labour (2)
- ☐ Liberal Democrats (3)
- ☐ UK Independence Party (UKIP) (4)
- ☐ Green Party (5)
- ☐ Scottish National Party (SNP) (6)
- ☐ Plaid Cymru (7)
- ☐ Other (8) _____
- ☐ Undecided (9)
- ☐ Would not vote (10)

Q46

People sometimes talk of being 'left' (more liberal) or 'right' (more conservative) on the political spectrum. Where would you place yourself?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)
Left:Right (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q47.1-Q47.10

Last week, were you (check all that apply):

- ☐ Working full time (as an employee or self-employed) (1)
- ☐ Working part time (2)
- ☐ On a government-sponsored training scheme (3)
- ☐ Away from work ill, on maternity/paternity leave, or on holiday (4)
- ☐ Retired (5)
- ☐ A student (6)
- ☐ Looking after home or family (7)
- ☐ Long-term sick or disabled (8)
- ☐ Looking for work (9)
- ☐ None of the above (10)

Q48

On 23 June, 52% of UK voters expressed a desire to leave the EU. What, if any, effect do you think this vote will have on your energy bills in the next 5-10 years?

- ☐ Large decrease in bills (1)
- ☐ Small decrease in bills (2)
- ☐ No effect (3)
- ☐ Small increase in bills (4)
- ☐ Large increase in bills (5)

A few final questions about the survey you just completed:

Q49

How interesting did you find the survey?

- ☐ Not at all interesting (1)
- ☐ Somewhat interesting (2)
- ☐ Interesting (3)
- ☐ Very interesting (4)

Q50

How difficult did you find answering the questions overall?

- ☐ Not at all difficult (1)
- ☐ Somewhat difficult (2)
- ☐ Difficult (3)
- ☐ Very difficult (4)

Q51

If there is anything else you would like to say, please do so here: