UNIVERSITY OF CAMBRIDGE
Electricity Policy Research Group

2010 EPRG Public Opinion Survey:

Policy Preferences and Energy Saving Measures

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Keywords Public opinion survey, Electricity policy, Smart meters, Smart appliances, Community energy, Time-of-use tariffs, Supplier switching, Energy efficiency.

JEL Classification Q40, Q48, Q42, L94

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EPRG WP 1122

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This paper presents results of the 2010 Electricity Policy Research Group (EPRG) public opinion survey. The survey examines energy policy preferences and attitudes of the British public, the potential for consumer engagement and consumer acceptance of various energy demand response activities. Wherever possible, comparisons were made to EPRG public opinion surveys from 2006 and 2008. Since the global financial crisis of 2008, energy and environmental concerns have decreased in priority, and respondents are more sceptical about government interventions in electricity markets. The share of individuals reporting that they are experiencing serious hardship due to energy prices has gone down from the 2008 level. While roughly half of the respondents would agree to have detailed metered consumption information recorded by their energy providers, they are even more wary of having data available to other entities. Local ownership is a potential motivating factor for public support for local small-scale energy plants. Energy efficiency measures had higher uptake than in previous years, but the widespread measures are typically cheaper and easiest to implement. There is scope for shifting discretionary electricity load to off-peak hours through both Time-of-Use tariffs and smart appliances that require limited user intervention.

[1] The authors acknowledge the support of the ESRC Electricity Policy Research Group and the EPSRC Flexnet project.

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1. Introduction

Using energy more efficiently is a pressing issue in light of global climate change in general, and energy challenges in the United Kingdom (UK) in particular. The UK has committed to cutting its greenhouse emissions by 80% from 1990 levels by 2050, as well as generating 15% of all energy from renewable sources by 2020. In the policy-making arena, there has been increasing interest in the roles of individuals and communities in moving towards a low-carbon economy, as well as increasing awareness of the potential of different tools aimed at reducing energy consumption in the home (DECC, 2009b; DEFRA, 2008a,b). In the UK, the Carbon Emissions Reduction Target (CERT), which runs from 2008 to 2011, requires suppliers to promote carbon emissions reductions in the household sector (DEFRA, 2008b). The Energy Market Assessment of March 2010 stated that better demand side response (DSR) should be pursued in all options set out for energy market reform (DECC, 2010e; Ofgem, 2010).

Demand-related policies are traditionally referred to as demand side management (DSM) and aim to influence quantities and patterns of energy use. These policies include both energy efficiency and DSR. DSM is not a new concept. Policies and measures that target demand originated in 1970 in response to the oil shocks. Subsequently, members of the Organisation for Economic Co-operation and Development (OECD) used DSM policies due to concerns about oil dependency and energy prices. Today, DSM is increasingly being used to respond to climate change challenges through reduction of greenhouse gas emissions. (Brophy Haney et al., 2011). The UK Department of Energy and Climate Change (DECC) envisions a transition towards secure, affordable, low-carbon energy on the way to meeting emissions reduction and renewable goals (DECC, 2010a). Wind energy is expected to make a significant contribution to the renewable energy targets, producing as much as 36% of total electricity generation by 2020, versus 6.6% in 2009 (DECC, 2010b). Renewable energy sources such as wind are intermittent by nature, and require a more flexible demand to match variable energy supplies. This challenge has generated increased interest in studying the potential for DSM in energy consumption in the UK.

In the UK, industrial and commercial (I&C) consumers are currently participating in DSR more actively than other consumer segments. I&C customers can provide DSR through interruptible contracts, and are rewarded with reduced energy bills or levies for limiting their energy use when the system is tight. In addition, the supply for most large I&C customers is metered every half hour, and many are billed variable rates for the electricity by the time of day, encouraging them to shift demand to off-peak hours. The main reason that DSR is prevalent in I&C is that electricity is usually a significant share of their costs, and large interruptible or manageable

loads can be more easily administered by the system operator (Ofgem, 2010). Currently, domestic consumer participation in DSR in the UK is limited, and most consumers pay a flat rate for their electricity regardless of time of use. Expanding opportunities to actively engage the domestic sector in DSR has recently received increased attention from researchers and policy makers. The reason for this increased interest is that the UK domestic sector is a significant source of energy and electricity consumption, as well as carbon dioxide (CO_2) emissions. In 2009, final domestic energy consumption amounted to 30.3% of the UK's total final energy consumption, 38% of total UK electricity consumption (DECC, 2010c), and 15.6% of total UK CO_2 emissions (DECC, 2009a).

The role of the individual in energy policy is important as both citizen and consumer (Brophy Haney et al., 2011). It is important to study public opinion of citizens in order to understand potential support for and opposition to specific national energy policies. In addition, to understand whether DSM programmes will be effective, it is important to understand consumers' attitudes and behaviour, in particular the level of acceptance of various energy consumption scenarios. As a consumer, the role of the individual is reflected through consumption of energy services, and as the principal investor of energy efficiency (EE) improvements at home.

The study of energy demand is complicated by the various market failures that are not unique to the energy sector, but are particularly acute. Brophy Haney et al. (2011) list imperfect information, split incentives, and negative externalities as some of the market failures affecting energy consumption and demand response in the residential sector. Traditional metering practices lead to problems of *incomplete information* regarding real-time pricing and quantity of energy consumed. *Split incentives* come into play in the landlord-tenant relationship, when landlords are the principal investors in energy efficiency, but tenants incur the energy cost and enjoy the benefits of efficiency improvements. The split incentives are also a problem when some members of the household are responsible for the energy bill, but others have to make behavioural changes that reduce energy costs. *Negative externalities* arise when the damages associated with CO_2 emissions are not included in fuel prices, or when benefits of research and development (R&D) investments are not captured by private investors.

The underlying question that forms the motivation of this study is the following: to what extent might energy saving measures be accepted, used, and achieve behavioural change? To address this question, the Electricity Policy Research Group (EPRG) conducted a public opinion survey in September 2010. The use of public opinion surveys in the area of energy and climate change has become more prevalent in the UK and internationally in recent years (Akcura et al., 2011). The UK Department for Environment, Food and Rural Affairs (DEFRA), and its predecessors have

run surveys on public attitudes and behaviour towards the environment, including their 2010 Omnibus Survey (DEFRA, 2010). The European Commission has undertaken regular opinion surveys regarding energy policy since the 1980s, and uses this research to support policy development and implementation.

The EPRG survey of 2010 includes innovative features, such as question on factors affecting respondent's acceptance of community energy schemes, attitude to sources of energy advice and willingness to accept a discount on electricity bill in exchange for usage modification and restriction through smart appliances. We are not aware of previous opinion surveys that have explored these topics in this format. In addition, a range of questions of EPRG survey of 2010 was also asked in surveys of 2010 or 2008, such as question on energy and electricity policy priorities, supplier switching information, energy efficiency investments. This allows examination of change of opinions on policy issues and energy usage.

The rest of the paper is organized as follows: section 2 presents an overview of the survey; section 3 presents the survey results, including policy priorities, subjective perception of hardship, utility contracts and metering information, attitudes towards community energy projects, energy efficiency, and willingness to accept changes in appliance usage; and finally, section 4 offers some concluding remarks.

2. Survey Overview

In August 2010, the EPRG commissioned the market research agency Accent to conduct a public opinion survey on attitudes towards energy and the environment. This was the third EPRG survey in a series of regular opinion polls on public attitudes towards electricity and individual energy consumption behaviour (previous surveys were conducted in May 2006 and October 2008). The 2010 survey involved 2,038 residents from England, Scotland, and Wales age 18 and over. The survey questionnaire was designed by EPRG, while Accent programmed and hosted the online survey. The panel of respondents was supplied by polling firm ToLuna.

The 2010 EPRG survey was conducted using quota sampling. Quotas were set for age, gender, occupation code, and government office regions based on UK National Statistical Office projections for 2010. Respondents were invited randomly by email to participate in the survey, and quotas within categories were enforced while accepting responses. Respondents received a small monetary incentive for completing the survey, worth approximately 50 pence. Table 1 presents the quotas that were used to administer the survey and how they compare to UK National Statistical Office projections. Table 2 presents descriptive statistics of the sample.

Survey-sampling methodology choice often involves a tradeoff between the rigor of probability samples and the convenience of quota samples. Although a properly administered survey based on probability sampling provides a representative sample of the population of interest, in practice it is prone to non-response bias. As the public has been subjected to an increasing number of surveys from all sectors, large non-response bias has become problematic in probability samples, and recently market research has begun to rely more heavily on quota sampling. Quota sampling ensures that responses meet pre-assigned quotas across predetermined groups. Non-response is not easily defined in quota-based survey conducted online, as quota sampling substitutes an alternative respondent for an unavailable or unwilling respondent (Kalton, 1983).

Table 1. Sample Quotas and UK National Statistical Office Projections (2010)

Quota category		Survey sample (%)	UK National Statistical Office 2010 projections (%)
Gender	Male	50	51
	Female	50	49
Age	18–39	37	37
	40–59	35	34
	60+	28	29
Social Grades[3]	AB	25	22
	C1C2	50	45
	DE	25	33
Region	East Midlands	7	7
	East of England	8	9
	London	10	13
	North East	4	4
	North West	13	12
	South East	15	14
	South West	9	8
	West Midlands	9	9
	Yorkshire and the Humber	9	9
	Scotland	9	9
	Wales	5	5

Source: EPRG Survey of UK households 2010 and UK Office for National Statistics (2009a)

To the extent that surveyed individuals are systematically different from those who would have been picked at random, a quota-based survey may be biased, even if it meets required

[3] Social Grades refer to classification developed by National Readership Survey (NRS) as follows: AB - professional/managerial occupations; C1C2 - Supervisory, clerical, Junior managerial, Skilled Manual Occupations; DE - semi-/unskilled manual occupations.

distribution across quota controls. Sources of this bias depend on the survey medium and on the method used to recruit potential respondents. Since the EPRG survey was conducted online through a panel of respondents who had signed up to participate in surveys, the under-represented individuals are those who do not have access to the Internet and those who avoid participation in online surveys on social websites. On the other hand, overrepresented individuals might be the senior citizens who respond to online surveys. ToLuna tries to minimize the source of this bias by recruiting members through a variety of media sources.

Bias in the 2010 EPRG survey from not including individuals who do not have access to the Internet is likely to not be substantial, as most of the adult population in the UK does access the Internet regularly. According to the UK Office for National Statistics (2010), 77% of UK population aged 15 and over had used the Internet during the three months preceding the interview for their study, and 60% of adults access the Internet almost every day. A bigger concern for the bias in the EPRG survey is access to social networking sites and online surveys that varies by demographics and lifestyle of individuals. While the use of social networking sites is growing, still less than half (43%) of all Internet users participate in some form of social networking site, and this usage varies by age group: 75% of users 16 to 25 years old actively use networking sites, but only 31% of users 45 to 54 years old do so (UK Office for National Statistics, 2010).

Table 2 shows how descriptive statistics of the survey compare to official figures. Shares of respondents in the EPRG survey by party affiliation are remarkably close to the shares from a recent political poll taken by ICM Research (2010). However, it appears that educated individuals were oversampled: 16% of adults in the UK have a bachelor-degree level of education or higher, but the corresponding share in the EPRG survey is 35%. When newspaper readership of the EPRG survey respondents is compared to the national readership survey figures, it appears that readers of *Daily Mail*, *Daily Telegraph*, and *Guardian* were oversampled. This paper will use standard significance tests when presenting the findings; however, these significance tests assume that the data are drawn through a random selection mechanism. Robustness of the findings and their generalization to the UK population were sensitive to the extent that the resulting sample deviates from the probability sample (Berinsky, 2006; Gschwend, 2005).

Table 2.Descriptive Statistics of the Sample (%)

	Category	Share in EPRG survey	95% confidence interval	Comparable official estimates
Education	No bachelor degree	64.6	62.6–66.7	83.7[4]
	Bachelor degree or higher	35.4	33.3–37.5	16.3
Party affiliation	Conservative Party	25.7	23.8–27.6	26[5]
	Labour Party	23.6	21.7–25.4	23
	Liberal Democrat	14.6	13.0–16.1	15
	Regional Party	2.7	2.0–3.4	NA
	Other	5.3	4.3–6.2	NA
	None	28.2	26.2–30.1	NA
Newspaper readership[6]	*Daily Mail*	16.1	14.5–17.6	9.5[7]
	Sun	15.0	13.4–16.5	15.5
	Daily Telegraph	6.3	5.3–7.4	3.5
	Mirror	5.6	4.6–6.6	6.3
	Times	5.5	4.5–6.5	3.2
	Guardian	5.4	4.3 – 6.3	2.3
	Daily Express	3.4	2.6–4.2	2.9
	Independent	2.4	1.7–3.1	1.1
	Star	1.7	1.1–2.2	3.1
	Financial Times	0.9	0.5–1.3	0.8
	Other	7.9	6.7–9.0	NA
	None	30.0	28.0–32.0	NA
Income group	Up to £500	6.3	5.7–7.4	
	£501–£900	10.0	8.7–11.3	
	£901–£1200	12.0	10.6–13.4	
	£1201–£1500	11.4	10.0–12.8	
	£1501–£2000	13.3	11.9–14.8	
	£2001–£2600	13.7	12.2–15.2	
	£2601–£3000	6.7	5.6–7.9	
	£3001–£4000	7.2	6.0–8.3	
	£4001–£5300	4.7	3.7–5.6	
	Over £5300	3.7	2.9–4.6	
	Declined to Answer	10.8	9.4–12.1	
Home ownership	Rent	27.6	25.7–29.6	
	Own	64.9	62.8–66.9	
	Other	7.5	6.3–8.6	

Sources: EPRG Survey of UK Households 2010, and UK Office for National Statistics, 2010

[4] Educational estimates are from the UK Office for National Statistics (2010)

[5] Party affiliation statistics are from an ICM Research (2010) survey, based on the question "If there were a general election tomorrow, which party do you think you would vote for?

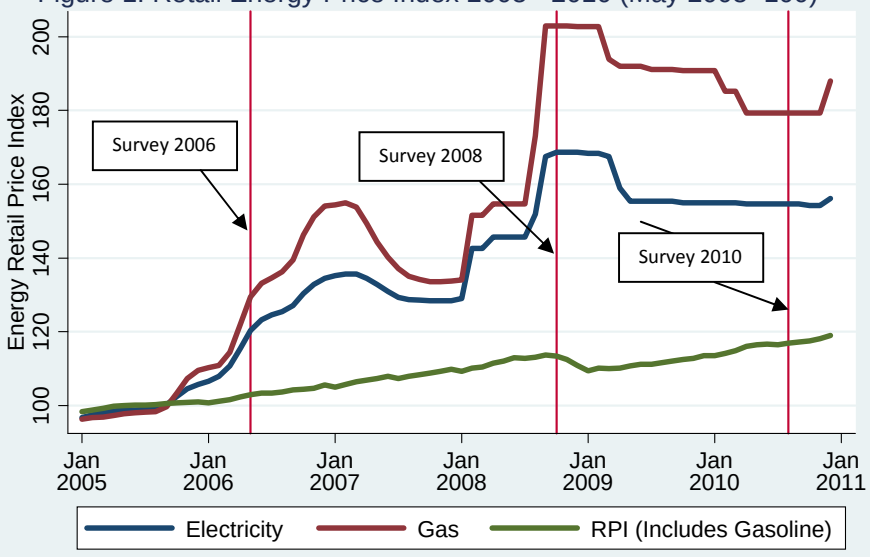
[6] The survey questionnaire asked the question "Which of the following newspapers do you read most often", and respondents could choose one option only from the list provided.

[7] Newspaper readership estimates are from the National Readership Survey (NRS, 2010)

The 2006 EPRG survey was conducted by YouGov, a leading market research and opinion polling firm in the UK. For its survey, YouGov contacted 2,254 individuals from its panel of 200,000, out of which 1,019 replied. Respondents were provided with a small monetary incentive in the range of 50 pence to a pound. Responses were weighted by age, region, and other key variables, such as newspaper readership. The 2008 EPRG survey (as 2010 EPRG Survey) was conducted by Accent. The survey covered 2,000 individuals, and was based on quotas that correspond to data from the UK National Statistical Office for 2008 (Akcura et al., 2011). The disclaimer on representation of quota-based surveys applies to the cross-year comparisons of EPRG surveys 2006, 2008, 2010, as all these surveys were based on quota samples, rather than probability samples. However, we do not believe there is a systematic difference in the samples for the EPRG surveys of 2006, 2008 and 2010.

Figure 1 presents the time series for the retail price index of electricity and gas, as well as the combined retail energy price index in the UK from 2005 through 2010. The figure also indicates when EPRG surveys were conducted in 2006, 2008, and 2010. The 2008 survey was conducted when energy prices were at their peak, after electricity prices increased by around 15% from July to October. From the winter of 2009 until the 2010 EPRG survey was conducted, energy prices fell but were still around 40% higher than in May 2006, when the first EPRG survey was conducted. The collapse of Lehman Brothers and the onset of the economic crisis of 2008 took place just prior to the 2008 survey. As expected, the changes in energy prices have influenced responses on energy priorities and preferences.

Figure 1. Retail Energy Price Index 2005 - 2010 (May 2005=100)



Source: Department of Energy and Climate Change

Topics covered in the survey included the following: general opinions about governmental policies; energy costs; contract types and payment methods for mobile phones, electricity, and natural gas; attitudes towards energy efficiency; willingness to accept demand response activities; community energy and smart meters. The next section presents results for each of these topics.

3. Survey Results

3.1. Public Opinion on Policy Priorities

The first part of the 2010 EPRG survey questionnaire dealt with the national policy priorities of respondents. It tried to estimate where the energy and environmental priorities lay in relation to other UK public policy concerns, and inquired about public opinion on energy policy in general and electricity policy in particular.

3.1.1. National Priorities

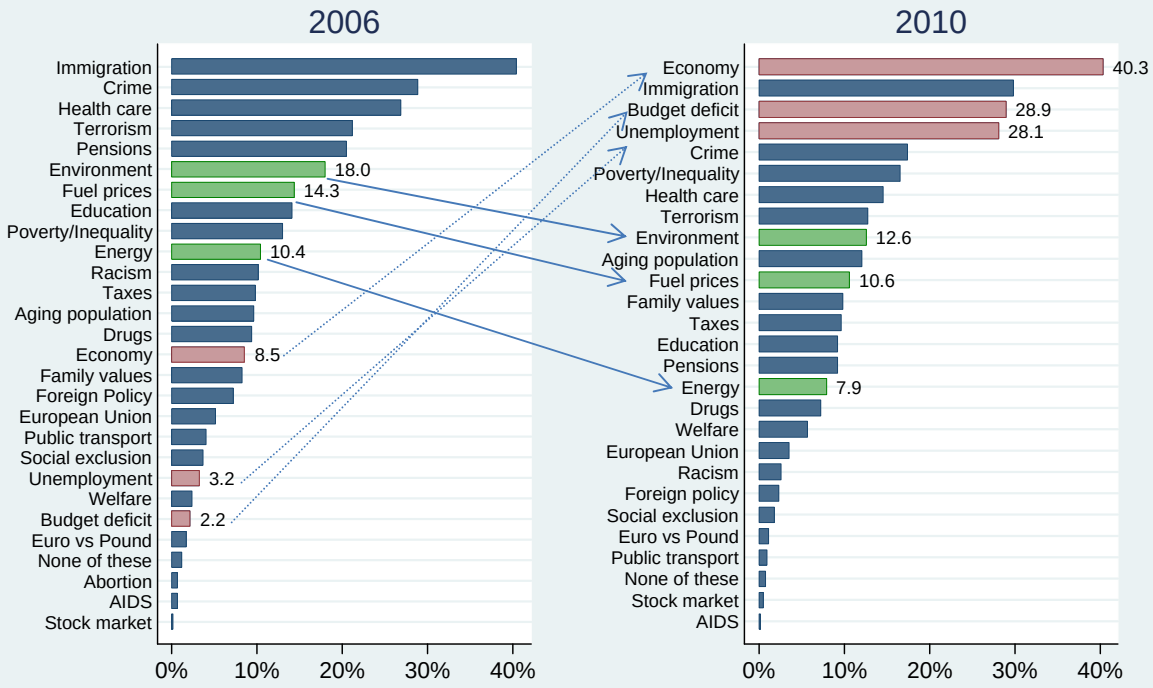
In the 2010 EPRG survey, respondents were presented with a list of potential issues for the UK, and were asked to choose three that needed urgent attention and improvement. Since this question was also asked in EPRG survey of 2006, it is possible to compare the responses between the two surveys (Figure 2). After the 2008 financial crisis, and during the recession that followed, preoccupation with economic issues such as unemployment and the budget deficit has increased markedly. It appears that preoccupation with economic issues has decreased the priority that respondents attribute to environmental and energy issues. The share of respondents that named energy or environment as one of their top three national concerns decreased between 2006 and 2010, while the share naming environment as national priority decreased from 18.0% to 12.6%. The share of respondents naming fuel prices as a priority decreased from 14.3% in 2006 to 10.6% in 2010, even though fuel prices in 2010 were higher than in 2006. The share of respondents naming energy as a priority decreased from 10.4% in 2006 to 7.9% in 2010. This highlights the importance of external context in the attention the public devotes to energy and environmental issues among other policy priorities.

Opinion polls inquiring about policy priorities of British citizens were also recently conducted by Ipsos Mori and Eurobarometer. Ipsos Mori conducts monthly opinion polls that cover policy priorities, and askes UK adults over the age of 18 to choose the top issue facing the UK from the list of potential issues given to them. Between May 2006 and August 2010, share of British

adults in Ipsos Mori surveys that named economy as the top priority in the UK has increased from 4% to 42%. Meanwhile, share of adults in their surveys that named environment or pollution as the top priority decreased from 6% to 2% (Ipsos MORI, 2006, 2010). However, the EPRG Ipsos Mori surveys are not directly comparable. The list of choices given to the respondents in the two surveys was different, which might have influenced the selections made. Eurobarometer's public opinion surveys asked UK residents to choose from the list given to them the most serious problem facing the world as a whole (Eurobarometer, 2009). Between Eurobarometer surveys of 2008 and 2009, the share of respondents that chose global economic downturn increased from 25% to 55%, while the share that chose climate change went down from 57% to 46%.

Table 3 presents shares of respondents that named energy as one of the top three national priorities according to respondent's education level, subjective perception of energy-related hardship, and party affiliation. Similarly, Tables 4 and 5 show shares of respondents that chose environment or energy prices as one of the top three national priorities. Respondents with bachelor-degree level of education or higher were more likely than the rest of the respondents to choose energy or environment as one of national priorities, but less likely to choose fuel prices as a priority. Not surprisingly, respondents experiencing moderate or severe hardship were more likely to name fuel prices as a national priority. Respondents who self-identified as supporting the Labour Party were more likely than Conservative Party supporters to name environment as a priority. Women were less likely than men to name energy as a national policy concern. When comparing responses of individuals 35 years of age and younger to those of individuals 50 years of age and over, younger respondents were more likely to name environment as one of the national priorities, while the older respondents were more likely to name fuel prices as a priority.

Figure 2. Choice of Respondents on Areas Most in Need of Urgent Attention and Improvement in UK - 2006, 2010



Source: EPRG Survey of UK Households 2010

Note: Choices for national policy priorities in EPRG Surveys of 2006 and 2010 were identical, except for abortion, which was not included as one of the choices in the EPRG survey of 2010.

Table 3. Shares of Respondents (%) That Named Energy as One of Three Top National Priorities, by Category

Category	Share (%)	T-test
No bachelor degree	7.0	-2.1**
Bachelor degree or higher	9.7	
Male	9.7	2.9***
Female	6.2	
Age 18–35[8]	6.7	-1.6
Age 50 and over	9.1	
Experiencing moderate/serious hardship due to energy prices	8.2	0.3
Experiencing slight or no hardship due to energy prices	7.8	
Income per capita £500 or less[9]	5.5	-1.84*
Income per capita £1500 or more	8.5	
Conservative Party	7.1	-0.1
Labour Party	7.3	
Overall	8.0	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK households 2010

[8] Individuals 18–35 years old constituted 22% of all respondents of the 2010 EPRG survey. Individuals 50 years old or older were 47% of all respondents.

[9] Income per capita is equal to estimated household income divided by number of individuals in the household. Estimated income is the median value for the self-reported monthly income range selected by the respondent. For those respondents reporting that their monthly income was over £5300 (3.7% of respondents), the upper income bracket was set as £6,000. For households that reported having more than six members (2% of respondents), the number of members was set as 6. These calculations apply to income per capita figures in all subsequent tables. 28% of respondents have estimated household income per capita of £500 or less, while 13% of respondents have estimated household income per capita of £1500 or more.

Table 4. Shares of Respondents (%) That Named Environment as One of Three Top National Priorities, by Category

Category	Share (%)	T-test
No bachelor degree	10.6	-3.6***
Bachelor degree or higher	16.4	
Male	11.8	-1.1
Female	13.4	
Age 18–35	15.6	2.7***
Age 50 and over	10.7	
Experiencing moderate/serious hardship due to energy prices	11.63	-1.3
Experiencing slight or no hardship due to energy prices	13.52	
Income per capita £500 or less	10.72	-1.6
Income per capita £1500 or more	14.13	
Conservative Party	8.0	-2.7***
Labour Party	13.4	
Overall	12.6	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK Households 2010

Table 5. Shares of Respondents (%) That Named Fuel Prices as One of Three Top National Priorities, by Category

Category	Share (%)	T-test
No bachelor degree	11.5	1.9*
Bachelor degree or higher	8.9	
Male	10.7	0.2
Female	10.5	
Age 18–35	8.9	-2.0**
Age 50 and over	12.1	
Experiencing moderate/serious hardship due to energy prices	13.9	4.6***
Experiencing slight or no hardship due to energy prices	7.6	
Income per capita £500 or less	11.9	0.6
Income per capita £1500 or more	10.7	
Conservative Party	9.4	0.0
Labour Party	9.4	
Overall	10.6	

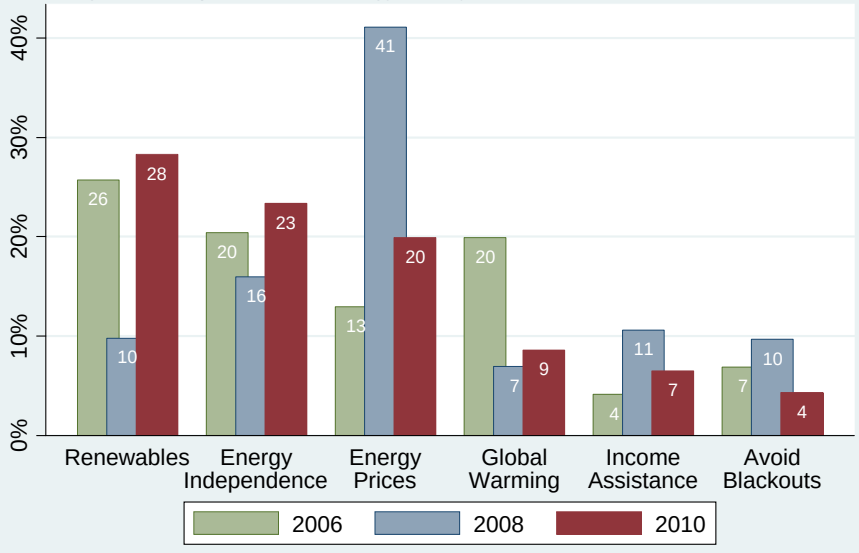
Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK households 2010

3.1.2. National Energy Priorities

In the 2006, 2008, and 2010 surveys, respondents were asked to name their top two national energy priorities. In 2008, when energy prices were at their peak, over 40% of respondents named energy prices as their top national energy policy priority. During the two years that followed, energy prices decreased slightly. In the 2010 survey, the share of respondents that named energy prices as a priority declined to less than 20% (Figure 3). In contrast, support for renewable energy sources and energy independence increased to levels even higher than that in 2006.

Overall, of the other national energy policy choices offered for consideration in the 2010 survey, support for renewable energy sources was highest, followed by energy independence and energy prices. Renewable energy is a hot topic that has received considerable media attention in recent years. On the other hand, global warming was listed as a concern by less than 9% of respondents, whereas it was over twice that level in 2006.

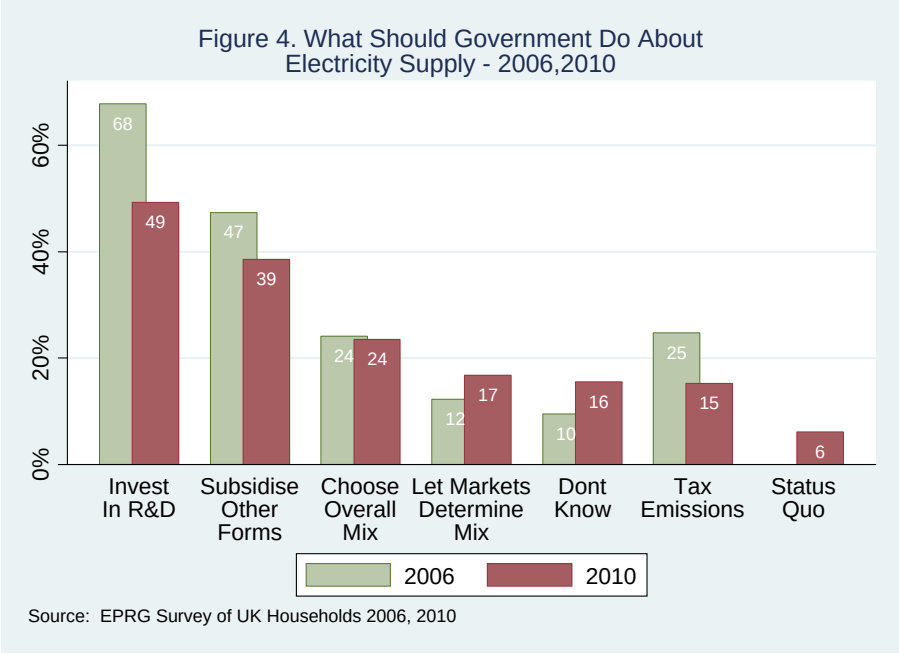
Figure 3. Top National Energy Policy Priorities - 2006, 2008, 2010



Source: EPRG Survey of UK Households 2006, 2008, 2010

3.1.3. Electricity Policy Priorities

The 2010 EPRG survey, like the 2006 survey, asked respondents what they thought the UK government should do about electricity supply. The respondents could choose more than one option out of the choices presented to them (Figure 4). In 2010, respondents appear more sceptical about government intervention in electricity markets. There was less support for investment in research and development and subsidies compared to 2006. On the other hand, there was an increase in the share of respondents that do not know what government should do about electricity, or believe that markets should determine the mix (increase from 12% to 17%).



Note: "Status Quo" was not one of the choices presented in EPRG survey of 2006

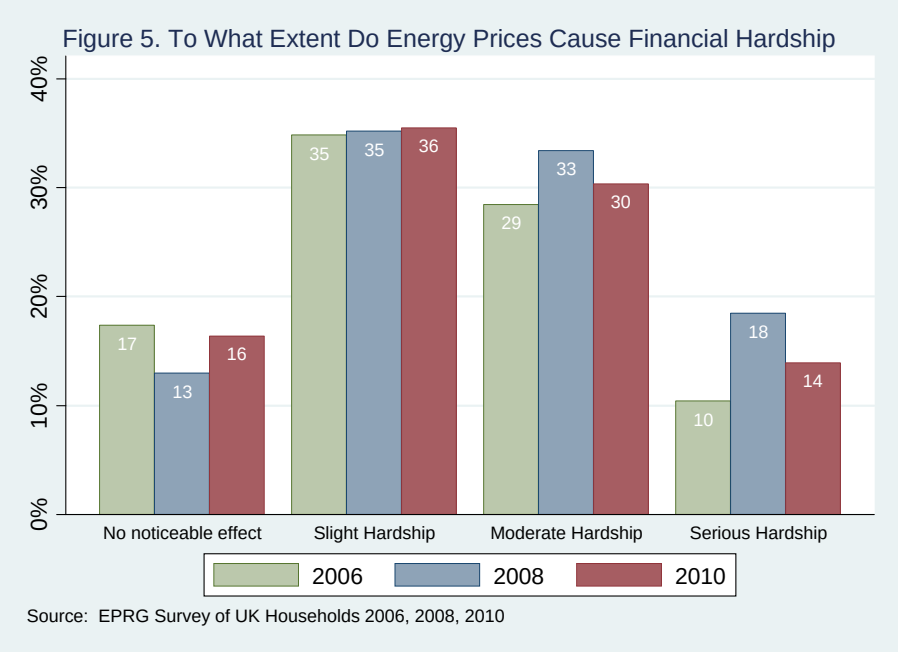
3.2. Subjective Perception of Energy-Related Hardship

Fuel poverty in the UK has received increased attention in recent years in the energy policy debate (Jamasb and Meier, 2011). According to the official definition of fuel poverty in the UK, *fuel poor* describes a household whose expenditure on fuel necessary for comfort (power, lighting, and heat) is over 10% of income (DECC, 2010a). Adequate comfort is usually defined as 21 degrees for the main living area at home. When estimating fuel poverty, it is the *need* to

spend 10% of income on energy for adequate comfort that has to be taken into account, and *not the actual expenditure*. If the household underheats the home and does not meet an adequate level of comfort due to financial hardship, the household will be considered fuel poor, even if its expenditure on fuel is less than 10% of income. *Subjective fuel poverty*, a related concept, assesses the perception of hardship due to energy prices. A household is subjectively fuel poor, if the members feel that they cannot afford to heat their home adequately. How households feel about the affordability of energy and perceived hardship due to energy costs are important factors in meeting the government's targets through lower household demand while avoiding fuel poverty (Waddams Price, 2011; Wilson and Waddams Price, 2007).

To assess the extent of subjective energy-related hardship, respondents of the EPRG surveys were asked to indicate the level of hardship experienced due to energy prices as either slight, moderate, or serious hardship, or as having no noticeable effect (Figure 5). In soliciting the response to this question, the questionnaire stressed that all types of energy uses should be considered, including gas, electricity, heating oil, and fuel for cars. This question was also asked in the EPRG surveys of 2006 and 2008. The share of respondents that reported experiencing moderate to serious hardship due to energy prices declined from 2008, when the energy prices were at their peak. The share of respondents reporting serious or moderate hardship in 2010 was 14% and 30% respectively, down from 18% and 33% respectively in 2008.

The 2010 EPRG survey asked respondents to indicate their estimated monthly electricity and gas bill, as well as their income range. This information allows us to estimate the share of income spent on electricity and gas. Table 6 presents the average shares of electricity and gas bills in estimated household income. The share is regressive: the average share of a utility bill in household income for individuals claiming not to be experiencing hardship due to energy prices is 5%. However, this share is almost 13% for individuals who report experiencing serious hardship. Even so, this estimate is an imperfect proxy for fuel poverty. Gasoline expenditure is not normally included in the definition of fuel poverty. Gasoline expenditure was not asked specifically in the survey, although the question on subjective hardship included expenditure on all fuel sources, including gasoline.



Note: The shares for each year may not add to 100% if some respondents chose the option "not applicable" (not shown in the graph).

Table 6. Average Shares of Electricity and Gas Bills in Estimated Household Income, by Subjective Hardship Experienced

Level of hardship experienced	Household electricity and gas bills as percentage of estimated income[10] (%)	95% confidence interval
No noticeable effect	5.0	4.4–5.5
Slight hardship	6.7	6.1–7.2
Moderate hardship	8.7	7.9–9.5
Serious hardship	12.8	10.9–14.8
Overall	7.9	7.4–8.3

Source: EPRG Survey of UK households 2010

[10] Estimated income is the median value for the self-reported monthly income range selected by the respondent. For the respondents reporting that their monthly income was over £5300 (3.7% of respondents), the upper income bracket was set as £6,000. The estimated energy bill is the total of the estimated monthly electricity and gas bills reported by the respondent (this value does not include gasoline). The table reports the average value of the ratio of estimated combined electricity and gas bills to estimated income per category.

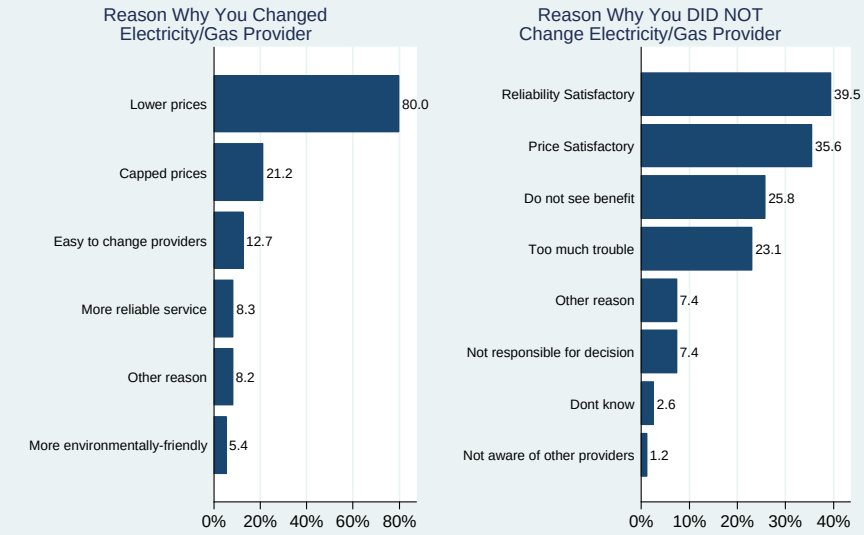
3.3. Utility Contracts and Metering Information

3.3.1. Supplier Switching Information

Since 1998–99, UK residents have been able to change suppliers of domestic energy (electricity and gas) without moving to other homes. The 2010 EPRG survey included questions regarding consumer switching behaviour and their reasons for switching or not switching suppliers (Figure 6). In 2010, around 47% of respondents reported having changed electricity or gas suppliers during the previous five years without moving. It is interesting to note that the share of respondents that reported having switched suppliers during the previous five years in the EPRG survey of 2008 was 52%, while the rate was 48% in the EPRG survey of 2006. This suggests that the peak electricity prices in 2008 encouraged more consumers to be proactive and switch suppliers, and since then incidences of switching have decreased. The reason for switching cited most often in the EPRG survey of 2010 was price-related: 80% of respondents cited lower prices as the reason for switching, with 21% specifying the reason as capped prices. Around 5% of respondents cited greener electricity as one reason for switching suppliers. However, less than 1% of respondents reported having switched suppliers solely for environmental reasons.

The switching rate is not statistically significantly different by educational attainment, party affiliation, or expressed concern for environment or fuel prices. Younger respondents are less likely to have switched suppliers during the five years preceding the survey, probably reflecting shorter histories of independent home ownership. Respondents from households that have lower per capita income, as well as those respondents who reported experiencing moderate to severe hardship, have a lower switching rate (Table 7). Causal interpretation warrants caution. It is possible that households that experience hardship have already secured the most affordable tariff. On the other hand, it is also possible that lack of proactive action to seek out a better electricity or gas tariff contributes to the hardship. Wilson and Waddams Price (2007) have looked at the consumer switching behaviour and found that 50% of consumers have not switched suppliers, even if they could have saved money by doing so. Customers exhibit inertia, are prone to miscalculations, face confusing information from suppliers, and may value non-monetary aspects of energy service (i.e., reliability) (Platchkov and Pollitt, 2011). These factors may exacerbate energy-related hardship, as the vulnerable households may be locked into more expensive contracts.

Figure 6. Reasons for Provider Switching Behaviour



Source: EPRG Survey of UK Households 2010

Notes: Reasons for supplier switching behaviour relate to changing electricity/gas suppliers within the last five years without moving to other homes. In the 2010 EPRG survey, 47.4% of respondents stated that they switched suppliers within five years without moving.

Table 7. Share of Respondents (%) That Have Switched Energy Suppliers within Last Five Years without Moving to Other Homes, by Category

Category	Switched Suppliers	T-test
No bachelor degree	46.2	-1.3
Bachelor degree or higher	49.4	
Male	49.1	1.5
Female	45.6	
Age 18–35	35.2	-6.1***
Age 50 and over	51.4	
Experiencing moderate/serious hardship due to energy prices	45.0	-2.0**
Experiencing slight or no hardship due to energy prices	49.5	
Income per capita £500 or less	44.8	-1.7*
Income per capita £1500 or more	50.5	
Mentioned environment as a national policy concern	46.7	-0.1
Did NOT mention environment as a national policy concern	47.4	
Mentioned fuel prices as a national policy concern	48.8	0.5
Did NOT mention fuel prices as a national policy concern	47.2	
Conservative Party	50.5	1.2
Labour Party	46.7	
Overall	47.4	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK households 2010

3.3.2. Smart Meter Information

The UK Government has committed to provide smart meters to all households by the end of 2020 (DECC, 2010c). While traditional meters display consumption in kWh only and record consumption cumulatively, smart meters are capable of displaying and recording real-time, or near-real-time, energy consumption. Smart meters make it technically possible for the energy consumption to be recorded either by the energy provider or a third party. Availability of the recorded consumption information may help in devising tariffs better suited for the energy usage patterns, and may also make it possible for demand to be better measured and monitored. Some advanced smart meters may also make the electricity consumption data available disaggregated by appliances (DECC, 2009d; Ofgem, 2010; BERR, 2008).

Smart meters may provide both operational savings (i.e., through avoided meter reading by suppliers because consumption information will be transferred electronically), as well as

savings through better consumption information and demand response. As of 2010, there was large-scale deployment of smart (or semi-smart) meters in Italy, Ontario, and Northern Ireland. In addition, pilot trials of smart meters have been conducted in the UK and internationally. A survey of the international studies shows that smart meters sometimes lead to dramatic behavioural changes in response to real-time displays, resulting in average reduction in consumption of 10% (DECC, 2009a1). However generalization of the findings from the pilot studies and international experiences warrants caution, as circumstances of deployment, consumption patterns, and prevalence of particular appliances (i.e., air conditioning) are location- and context-specific. Because of the uncertainty regarding the UK-specific behavioural response to the rollout, official estimates for the UK context have been conservative: Ofgem assumes 1% of energy (electricity and gas) will be saved due to better feedback, while DECC (2009a1) assumes that 2.8% of electricity will be saved due to the improved feedback. In addition, DECC (2009a1) assumes that smart meters will facilitate implementation of Time-of-Use (ToU) tariffs, which will have 20% uptake and will result in a 3% electricity bill reduction and 5% peak reduction.

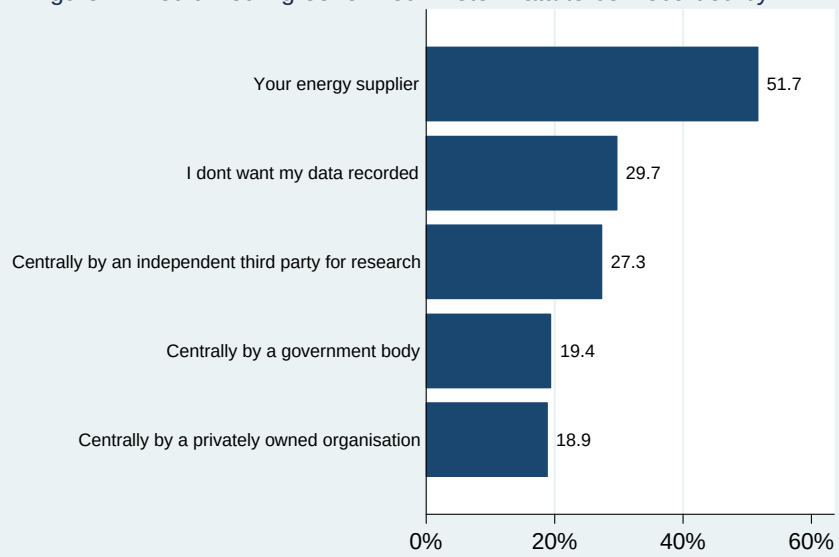
Faruqui et al. (2010a) suggest that tapping potential savings from the smart meters in the EU will depend on the extent that the policy makers overcome the barriers to their deployment and adoption. One potential barrier is the privacy concerns expressed by customer groups (US Department of Commerce, 2010). Privacy concerns have derailed or delayed introduction of the rollout of smart meters in other countries. For instance, in 2007, the government of the Netherlands proposed to make smart meters mandatory in all homes in the country. However, due to concerns about consumer privacy expressed by consumer groups, the government had to reconsider introducing mandatory smart metering and instead made them voluntary.

The 2010 EPRG survey included a question that assessed the respondent's attitude towards providing access to the recorded consumption information. While only around half of the respondents would agree to have their consumption data recorded by their energy providers, they are even more wary of having the data available to other entities. Less than 20% would agree to have data recorded centrally by either a government body or private organization on behalf of utility companies, while around 27% would agree to have the data recorded by an independent third party but for research purposes only (Figure 7). Almost 30% of respondents would not want the consumption data to be recorded at all.

Table 8 presents the share of respondents that do not want their consumption data recorded broken down by education, subjective energy-related hardship, party affiliation, and concern expressed for the environment and energy prices. Respondents with a bachelor degree or higher have significantly less resistance to having their consumption data recorded than those

without a bachelor degree. Female respondents are less likely to be against having their consumption data recorded. Younger respondents are less likely to oppose having the consumption data recorded, probably reflecting better familiarity with the latest technologies, as well as higher importance given to environmental issues (section 3.1.1) and fewer entrenched habits. Interestingly, households that reported experiencing hardship due to energy prices were more opposed to having the data recorded, but households with lower per capita household income were less opposed to having the data recorded. Respondents who named the environment as a national concern were less opposed to having their consumption data recorded, possibly because of increased awareness of the importance of demand-side participation for meeting environmental targets.

Figure 7. Would You Agree for Your Meter Data to be Recorded by...



Source: EPRG Survey of UK Households 2010

Table 8. Shares of Respondents (%) That Would Not Want Their Meter Data Recorded, by Category

Category	Share (%)	T-test
No bachelor degree	32.6	3.9***
Bachelor degree or higher	24.6	
Male	26.2	-3.5***
Female	33.3	
Age 18–35	35.2	-6.1***
Age 50 and over	51.4	
Experiencing moderate/serious hardship due to energy prices	32.7	2.8***
Experiencing slight or no hardship due to energy prices	27.0	
Income per capita £500 or less	29.4	-2.4**
Income per capita £1500 or more	36.5	
Mentioned environment as a national policy concern	23.0	-2.6**
Did NOT mention environment as a national policy concern	30.7	
Mentioned fuel prices as a national policy concern	34.3	1.5
Did NOT mention fuel prices as a national policy concern	29.2	
Conservative Party	30.0	1.7
Labour Party	25.3	
Overall	29.7	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK Households 2010

3.4. Attitudes Towards Community Energy

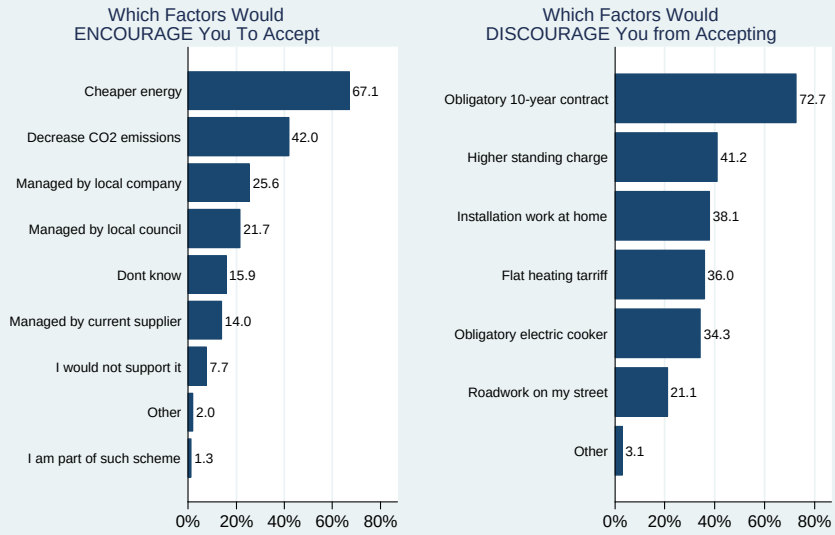
Policies aimed at emissions reductions typically promote renewable energy sources and more efficient ways to meet local demand while minimizing distribution- and transmission-related losses. Some countries have actively promoted the policy of decentralization: in Denmark, local governments have considerable power in energy markets, almost all heating networks are served by Combined Heat and Power Plants (CHP), the majority of which are locally owned (Kelly and Pollitt, 2011). The UK government has also recognized that distributed generation can make a significant contribution to reducing carbon emissions (Woodman and Baker, 2008). Since traditionally energy generation was managed centrally, acceptance of local, small-scale energy plants is a novel issue for the public, and considerable uncertainty remains regarding its acceptance of these plants. Public attitude towards local energy plants has been subject to research in recent years (Walker et al, forthcoming; Kelly and Pollitt, 2011; Devine-Wright, 2009).

Studies indicate that public attitudes towards local energy plants would be more positive if energy plants were owned by local communities. Warren and McFadyen (2010) discuss the results of a study of public attitudes to onshore wind farm development in southwest Scotland, and compare the influences of different development models: a community-owned wind farm (Isle of Gigha) with a developer-owned wind farm (on the adjacent Kintyre peninsula). Their findings support the contention that a shift of development models towards community ownership could have a positive effect on public attitudes towards wind farm developments in Scotland. The hypothesis that local ownership would increase acceptance of small-scale plants was also suggested by Devine-Wright (2005a), Loring (2006), and Toke et al. (2006).

The 2010 EPRG survey explored factors that motivate acceptance of small-scale, low-carbon local plants (such as photovoltaics, CHPs, and wind farms). Respondents were asked to choose from a list the factors that might encourage or discourage them from accepting a local plant. Over two-thirds of the respondents indicated that energy prices being cheaper was a motivating factor for supporting such a plant (Figure 8). Interestingly, the fact that it is managed or owned by either local council or a local company is a motivating factor by itself for just over half of the respondents, implying that local ownership could encourage demand for such plants.

When asked about factors that would discourage respondents from accepting a small-scale plant in their district, the need for an obligatory 10-year contract was given as the main disincentive. Other negative factors included higher standing charges, installation works at home, the need for a flat tariff, and an obligatory electric cooker were all listed by at least one-third of the respondents. Installation work in the neighbourhood, as well as buildings would indeed be necessary for connection to a district heating network.

Figure 8. Small Scale Low Carbon Energy Plant in your District



Source: EPRG Survey of UK Households 2010

The 2010 EPRG survey did not ask respondents directly if they would accept a local, low-carbon power plant – it only inquired about motivating factors. The factors chosen as a response to this question cannot be taken as indicators of their support or opposition to such a plant. However, one of the choices was "I would not support such a plant", which was chosen by 7% of respondents. Table 9 presents shares of respondents that chose this option according to education level, subjective level of energy-related hardship, party affiliation, age, gender, income, and concern about energy-related issues. Younger respondents are less likely to oppose having a local energy plant in their districts, probably reflecting familiarity with latest technologies and higher awareness of environmental issues. Respondents with a bachelor level of education or higher are less likely to oppose to a local power plant. Not surprisingly, respondents who named environment as one of the top national concerns were less likely to oppose a local plant. Interestingly, those who named fuel prices as a priority were more likely to oppose it. Support was also lower from Conservative Party members. There is no difference in the shares of respondents that chose the option "I would not accept such a plant" according to gender, income, or subjective energy-related hardship.

Table 9. Shares of Respondents (%) That Would Not Support Small-Scale, Low-Carbon Plants in Their Districts, by Category

Category	Share (%)	T-test
No bachelor degree	8.7	2.3**
Bachelor degree or higher	6.0	
Male	7.7	0.0
Female	7.7	
Age 18–35	4.6	-4.2***
Age 50 and over	10.0	
Experiencing moderate/serious hardship due to energy prices	7.6	-0.2
Experiencing slight or no hardship due to energy prices	7.8	
Income per capita £500 or less	8.0	0.7
Income per capita £1500 or more	6.7	
Mentioned environment as a national policy concern	4.7	-2.4**
Did NOT mention environment as a national policy concern	8.1	
Mentioned fuel prices as a national policy concern	11.1	1.7*
Did NOT mention fuel prices as a national policy concern	7.3	
Conservative Party	10.5	2.7***
Labour Party	5.9	
Overall	7.7	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1

Source: EPRG Survey of UK households 2010

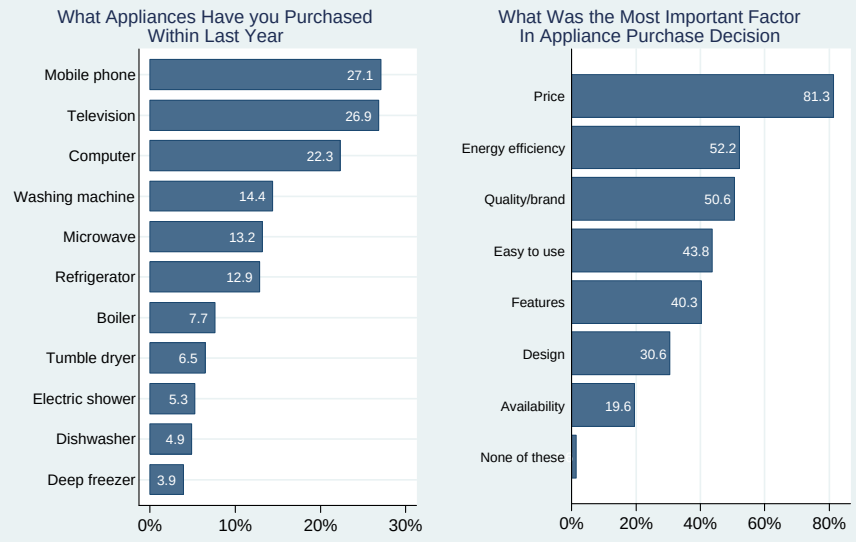
3.5. Energy Efficiency

Energy efficiency is considered to have the largest potential for reducing energy consumption, (Stern, 2007). According to a 2009 report by the UK Committee on Carbon Change (CCC, 2009, p. 22), residential energy efficiency measures could reduce CO_2 emissions by 50 million tons per annum (10% of the UK's total current emissions) by 2022. Achieving these emission reductions therefore depends on consumers' willingness and ability to make energy-efficient investments and behavioural changes (IEA, 2009). This section of the questionnaire inquired about energy-efficient purchases and the acceptance of energy-efficient behaviour on behalf of consumers.

3.5.1. Efficiency Considerations in Appliance Purchases

Home appliances represent around 11% of total UK final energy consumption (DECC, 2010f, Tables 3.1, 3.10). Appliance purchase decisions are one way that consumers can influence their energy consumption. In the 2010 EPRG survey, respondents were asked about electronic devices purchased during the previous year and the factors that influenced their purchasing decisions (Figure 9). As expected, price is the main factor in the purchasing decision: it was a significant factor for 81.3% of respondents, followed by energy efficiency and quality, which were each listed by just over half of the respondents.

Figure 9. Factors Considered in Appliance Purchasing Decision



Source: EPRG Survey of UK Households 2010

3.5.2. Support for Energy Efficiency Standards

As most energy-efficient appliances are usually more expensive, the importance of energy efficiency in a purchase decision might be cancelled out by price criteria. One way to overcome this short-sighted investment tendency in consumers is through better appliance labelling and appliance efficiency standards. Respondents to the 2010 EPRG survey were asked if they believed that governments should make laws that increase energy efficiency of appliances (Figure 10). Over 73% of respondents agree that governments should make laws that require manufacturers to include energy-saving features. Just under half of the respondents would support such laws even if appliances become more expensive. However, only 27% of respondents would support these laws if appliances start working slower. This implies that consumers are more willing to compromise on price than on performance. It is interesting to note that when a similar question was asked in the EPRG survey of 2006, 82% of respondents thought the government should make laws that force manufacturers to include energy-saving features. Support for government-imposed energy efficiency standards has gone down since 2006. This is consistent with general increased scepticism about government intervention in electricity markets since 2006, mentioned in section 3.1.3.

Table 10 presents the shares of respondents that believe government should make laws that compel manufacturers to include energy-saving features. Responses are presented based on education level, subjective experience of energy-related hardship, party affiliation, and priority that respondent gives to energy and environment. Younger respondents are more likely to support environmental standards in appliances. Those who report experiencing moderate to serious hardship due to energy prices are more likely to support appliance efficiency standards. Respondents who named environment as one of the top national priorities are also more likely to agree that the governments should make energy efficiency laws. However, the responses are not significantly different by education level or party affiliation of the respondents.

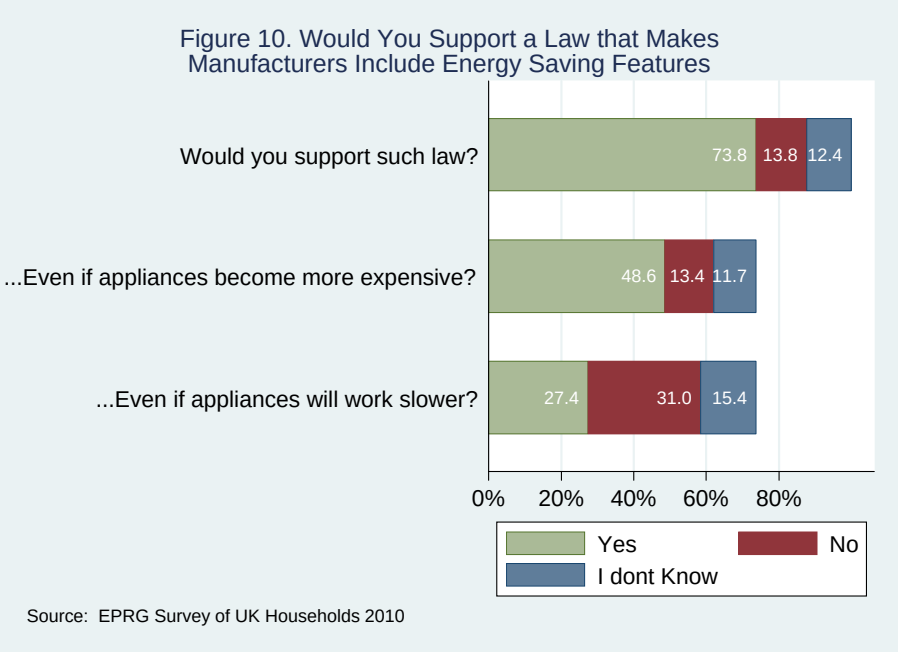


Table 10. Shares of Respondents (%) That Would Support a Law That Requires Manufacturers to Include Energy-Saving Features in Appliances, by Category

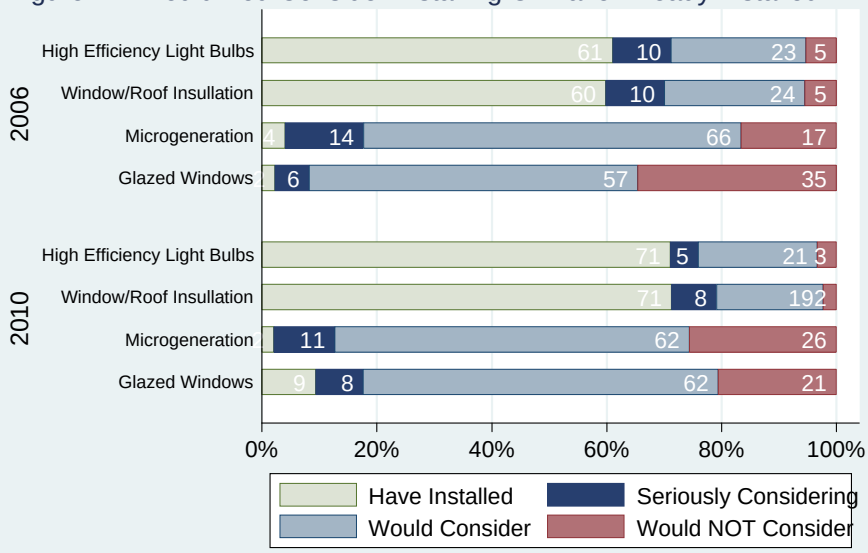
Category	Share (%)	T-test
No bachelor degree	73.6	-0.3
Bachelor degree or higher	74.2	
Male	70.4	-3.5***
Female	77.2	
Age 18–35	76.6	2.4**
Age 50 and over	710	
Experiencing moderate/serious hardship due to energy prices	76.6	2.8***
Experiencing slight or no hardship due to energy prices	71.2	
Income per capita £500 or less	74.9	0.6
Income per capita £1500 or more	73.2	
Mentioned environment as a national policy concern	83.2	4.2***
Did NOT mention environment as a national policy concern	72.4	
Mentioned fuel prices as a national policy concern	71.2	-0.8
Did NOT mention fuel prices as a national policy concern	74.1	
Conservative Party	70.0	-3.3***
Labour Party	79.1	
Overall	73.8	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK Households 2010

3.5.3. Uptake of Energy-Efficient Technologies

Investments in better insulation or glazing windows have similar effects on central heating in raising ambient temperature in the home (Platchkov and Pollitt, 2011, p. 41). Figure 11 presents the uptake of energy-efficient technologies among respondents of EPRG surveys in 2006 and 2010. In 2010, roughly 10% more respondents claimed to have installed compact fluorescent (high efficiency/long life) light bulbs or window and roof insulation, and the share of respondents with glazed windows increased severalfold from 2% to 9%. Uptake of microgeneration is still very limited and less than 2% of respondents reported in 2010 that they had installed technologies such as solar and wind generation, or heat pumps.

Figure 11. Would You Consider Installing Or Have Already Installed...?



Source: EPRG Survey of UK Households 2006, 2010

Table 11 presents shares of respondents that have installed advanced window or roof insulation. Not surprisingly, respondents who are renters are less likely to have these types of insulation. Older respondents and those responsible for paying the energy bills are more likely to have houses insulated. Interestingly, a higher share of male than female respondents report having insulation, even though these efficiency measures are household-level improvements. Unfortunately, the survey did not inquire about marital status of the respondents or about identity of the head of the household to shed light on why males report having this efficiency

improvement more often than females. Respondents with lower per capita household income and respondents experiencing hardship due to energy prices were also less likely to have window/roof insulation.

Table 12 presents shares of respondents that were seriously considering installing window and roof insulation. Younger respondents and supporters of the Labour Party were more likely to be seriously considering the extra insulation for their homes. However, they are also less likely to have window and roof insulation currently. Respondents who named environment or fuel prices as a national priority were less likely to have window insulation, or be seriously considering insulation their homes compared to the rest of the respondents.

Table 11. Shares of Respondents (%) That Have Installed Window/Roof Insulation, by Category

Category	Share (%)	T-test
No bachelor degree	63.8	1.4
Bachelor degree or higher	60.7	
Male	69.5	6.4***
Female	55.9	
Age 18–35	40.1	-15.4***
Age 50 and over	78.9	
Experiencing moderate/serious hardship due to energy prices	58.8	-3.5***
Experiencing slight or no hardship due to energy prices	66.4	
Income per capita £500 or less	56.5	-2.6***
Income per capita £1500 or more	64.8	
Mentioned environment as a national policy concern	60.1	-0.1
Did NOT mention environment as a national policy concern	63.1	
Mentioned fuel prices as a national policy concern	62.5	-0.1
Did NOT mention fuel prices as a national policy concern	62.7	
Conservative Party	72.7	4.5***
Labour Party	59.3	
Rent	39.1	-14.1***
Own	72.9	
Responsible for the energy bill	64.2	4.5***
Not Responsible for the energy bill	47.1	
Overall	62.7	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1

Source: EPRG Survey of UK Households 2010

Table 12. Shares of Respondents (%) That Are Seriously Considering Installing Window/Roof Insulation, by Category

Category	Share (%)	T-test
No bachelor degree	6.2	-1.6
Bachelor degree or higher	8.2	
Male	6.0	-1.6
Female	7.8	
Age 18–35	11.2	5.4***
Age 50 and over	3.3	
Experiencing moderate/serious hardship due to energy prices	7.6	1.1
Experiencing slight or no hardship due to energy prices	6.3	
Income per capita £500 or less	8.0	1.2
Income per capita £1500 or more	6.1	
Mentioned environment as a national policy concern	9.3	1.4
Did NOT mention environment as a national policy concern	6.6	
Mentioned fuel prices as a national policy concern	7.4	0.3
Did NOT mention fuel prices as a national policy concern	6.9	
Conservative Party	5.0	-2.8***
Labour Party	9.6	
Rent	6.5	1.0
Own	7.8	
Responsible for the energy bill	6.6	1.6
Not Responsible for the energy bill	10.3	
Overall	6.9	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1

Source: EPRG Survey of UK Households 2010

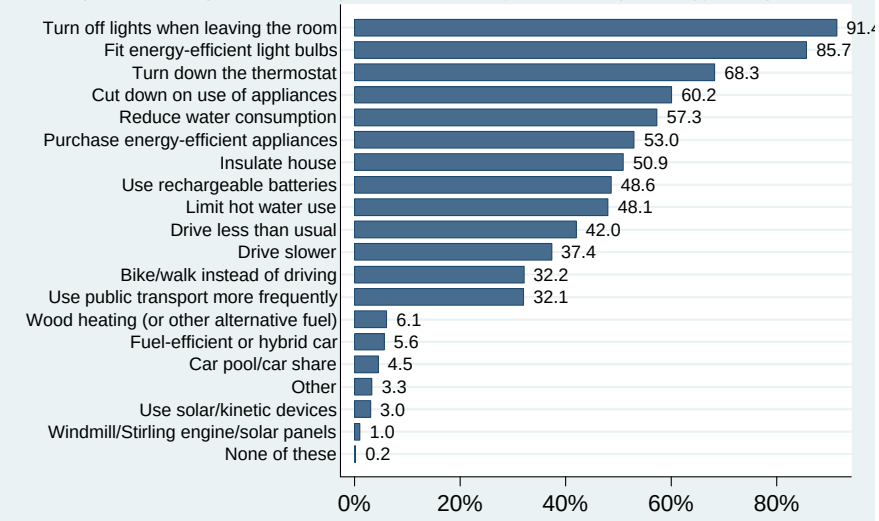
3.5.4. Uptake of Energy-Saving Measures

In the 2010 EPRG survey, almost 90% of respondents stated that they were deliberately taking measures to reduce their energy consumption. The measures to reduce energy consumption were also reported by 90% of respondents of the EPRG survey of 2008, while the share in 2006 was 75%. This indicates a significant increase in the uptake of energy-saving measures during the peak energy prices of 2008, and these measures persist to this day. In all three surveys, the measures that had the highest uptake were those that are easily implemented, and do not involve substantial investment or lifestyle modification. Measures that involve significant lifestyle changes, such as carpooling or using public transport more frequently, have much lower uptake (Figure 12).

Table 13 presents shares of respondents that reported not taking any measures to deliberately reduce their energy consumption. Overall, men and members of the Conservative Party are less likely to take energy-saving measures. As expected, those experiencing hardship from the energy prices, as well as respondents with lower household per capita monthly income are more likely to take energy-saving measures, as are those respondents who named environment as one of the national policy concerns.

Table 14 presents shares of respondents that reported using public transportation and carpooling to save energy. Respondents with a bachelor level of education or higher are more likely to carpool or use public transport. This could be explained if individuals with a higher education level live or work in urban areas, where public transport is an attractive option. Respondents who named environment as one of the national concerns were more likely to take public transport or carpool. Interestingly, individuals who named fuel prices as a national priority were also less likely to use public transport or carpool, while respondents with lower per capita income or those experiencing hardship due to energy prices were less likely to use public transport or carpool.

Figure 12. Measures Taken To Deliberately Reduce Use of Energy
(89% of respondents report deliberately Reducing Energy Use)



Source: EPRG Survey of UK Households 2010

Table 13. Shares of Respondents (%) That Do Not Take Any Measures to Deliberately Reduce Use of Energy, by Category

Category	Share (%)	T-test
No bachelor degree	9.3	0.8
Bachelor's degree or higher	8.2	
Male	11.2	3.7***
Female	6.2	
Age 18–35	11.7	2.4**
Age 50 and over	7.8	
Experiencing moderate/serious hardship due to energy prices	7.0	-2.8***
Experiencing slight or no hardship due to energy prices	10.1	
Income per capita £500 or less	8.2	-2.1**
Income per capita £1500 or more	12.4	
Mentioned environment as a national policy concern	2.7	- 3.7***
Did NOT mention environment as a national policy concern	9.8	
Mentioned fuel prices as a national policy concern	11.2	1.3
Did NOT mention fuel prices as a national policy concern	8.6	
Conservative Party	12.0	2.2**
Labour Party	7.9	
Overall	8.9	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK Households 2010

Table 14. Shares of Respondents (%) That Carpool or Use Public Transport More Frequently to Reduce Energy Use, by Category

Category	Share (%)	T-test
No bachelor degree	28.5	-3.0***
Bachelor degree or higher	35.0	
Male	30.5	-0.2
Female	31.0	
Age 18–35	32.2	-0.3
Age 50 and over	33.1	
Experiencing moderate/serious hardship due to energy prices	30.2	0.5
Experiencing slight or no hardship due to energy prices	31.3	
Income per capita £500 or less	31.6	1.1
Income per capita £1500 or more	28.5	
Mentioned environment as a national policy concern	38.9	3.0***
Did NOT mention environment as a national policy concern	29.6	
Mentioned fuel prices as a national policy concern	22.2	-3.1***
Did NOT mention fuel prices as a national policy concern	31.8	
Conservative Party	29.4	-0.9
Labour Party	32.1	
Overall	7.7	

Note: Two-sided T-test significance levels indicated by *** for p<0.01, ** for p<0.05, and * for p<0.1
Source: EPRG Survey of UK Households 2010

3.5.5. Energy-Saving Advice

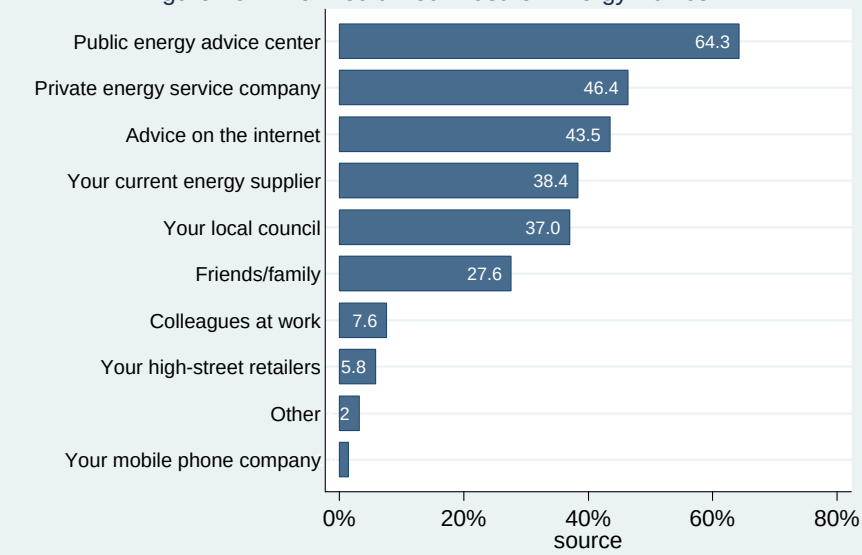
Providing energy-saving advice may be one of the most effective ways of encouraging energy efficiency. However, not all information sources are perceived with the same level of trust by consumers. Studies indicate that consumers may be more distrustful of information provided by a commercial company than a public body. For example, Devine-Wright and Devine-Wright (2004) demonstrated that when identical letters were presented to consumers from the energy company, from a local authority, and from a local authority co-sponsoring an energy company, the letter from the local authority alone had 25% higher impact.

The Energy Saving Trust (EST) is the main public provider of advice to the domestic sector on energy efficiency and microgeneration technologies in the UK. Some other sources of energy advice are interactive websites, such as the "Act on CO_2 calculator" (part of the government's Climate Change Communications Initiative) and "Big Green Switch" (DEFRA 2008b). In addition,

energy suppliers usually provide on-line calculators to estimate potential energy savings, and give energy-saving advice (i.e., EDF "Online Energy Adviser", British Gas "Energy Savers Report", and others).

The results of the 2010 EPRG survey bear out the premise that consumers trust a public advice centre. In the EPRG survey, respondents were asked whom they would trust for energy advice, and could choose more than one option from the choices presented to them (Figure 13). Over 64% of respondents stated that they would trust a public energy advice centre. The share of respondents that would trust their current energy supplier for energy-saving advice is 38%. Telecommunications companies and high-street retailers appear to be perceived as particularly untrustworthy, which provides them with an unfavourable starting point, as some leading retailers have recently entered the energy services market through the provision of energy advice (e.g., Tesco Greener Living).

Figure 13. Who Would You Trust for Energy Advice



Source: EPRG Survey of UK Households 2010

3.6. Willingness to Accept Changes in Appliance Usage for Load-Shifting off Peak

In addition to reduction of the overall electricity consumption, the domestic sector can also contribute to mitigating the UK energy challenges by shifting electricity loads off peak. The domestic sector accounts for about 28% of the electricity consumption at peak times: 17 GW

versus a total peak of 60 GW in 2009 (IHS Global Insight, 2009). Peak electricity loads occur in the morning, 7–9 AM, and in the evening, 5–7 PM. Wholesale prices fluctuate according to the time of day and the day of the year. On peak days, which generally occur in winter in the UK, generators incur substantial additional costs. As an example, on 5 January 2009 the price of a megawatt-hour of electricity (£/MWh) went from £39.72 (4–4.30 AM) to £794.08 at peak times (around 5–5.30 PM) (APX, 2011). The latter price reflects more fuel needed to generate electricity from less efficient power plants, which in turn require generators to buy additional EU ETS allowances to compensate for the increase in CO_2 emissions.

Load shifting aims to smooth the demand and to shift the load to other times of the day, when electricity networks are less "congested". Even a modest demand response leading to a marginal decrease in the evening peak could have a significant impact on electricity markets and networks. According to estimates by IHS Global Insight, 6%–37% of household peak load could be time shifted (1GW–6GW of 17GW). This load shifting is estimated to have a value of £60m–£90m/year, due to lower fuel costs, fewer EU ETS allowances needed, and deferred infrastructure investments (IHS Global Insight, 2009). Currently, some incentives are already in place to encourage load shifting, such as with ToU tariffs, e.g., Economy 7. However, these types of financial incentives are still limited (Ofgem, 2010).

Load shifting will result in energy savings as well as in CO_2 reductions because more expensive and inefficient "peaking" plants will not be used. In addition, less generating capacity will be required to ensure supply during annual peak. If the change in demand is sustainable over time, reduced capacity requirements will need smaller investment (DEFRA, 2008b). Flexible demand will become even more critical with the introduction of renewable energy sources, such as wind and solar, as they are intermittent by nature (Silva et al., 2011). Shifting loads to the times of sufficient supply might significantly affect behavioural patterns of the users (Hong et al., 2011).

Faruqui et al. (2010b) surveyed empirical evidence of pilot programs in the US (where air conditioning is an important part of many peak loads). They find that on average, ToU programs are associated with a mean reduction of 4% in peak usage, Critical Peak Price (CPP) programs reduce peak usage by 17% and a 95 confidence interval ranges from 13% to 20%. CPP programs supported with enabling technologies reduce peak usage by 36% and a 95 confidence interval ranges from 27% to 44%. Their study suggests that the scope to shift the load is significantly higher through using enabling technologies (e.g., smart appliances), rather than through ToU or CPP tariffs alone. In order to investigate the scope for load shifting, the EPRG survey of 2010 inquired about the willingness of respondents to shift appliance usage as a response to ToU tariffs. It also asked about their willingness to accept four hypothetical load-shifting scenarios through smart appliances in exchange for discounts on the total electricity bill.

3.6.1. Potential for Load Shifting through Time-of-Use Tariffs

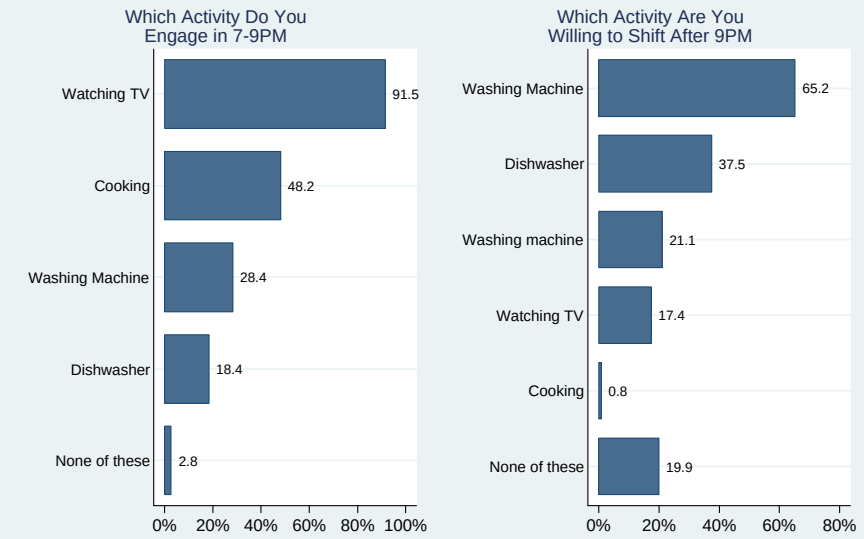
ToU tariffs facilitate demand management through making electricity more expensive during times of peak demand, when electricity generation is more expensive. These tariffs are already being used to shift electricity consumption to off-peak in the UK: over 20% of consumers have chosen to subscribe to the Economy 7 tariff, which provides cheaper rates for electricity consumed during seven hours at night. The subscribers are typically consumers who use electricity for heating. In the future, ToU tariffs could be more widely applied and better tailored to consumption preferences. The EPRG survey of 2010 investigated customer's flexibility to shift usage of major appliances to off hours in response to ToU tariffs. These modifications do not necessarily involve smart appliances, even though the timer function on appliances would make these changes easier to implement.

In the EPRG survey of 2010, respondents were asked which appliances they are using 7–9 PM. Subsequently, respondents were presented with the hypothetical scenario that the electricity provider offered them a discount for consuming electricity after 9 PM (ToU tariff).The survey asked them which of the activities they typically performed 7–9 PM would they be willing to delay till after 9 PM.

Figure 14 indicates the share of respondents that perform a particular activity, as well as shares that are willing to postpone these activities until after 9 PM. Over half of the respondents presently using dishwashers and washing machines 7–9 PM would shift their usage to after 9 PM if electricity were cheaper at that time. However, only a quarter of the respondents are currently using their washing machines 7–9 PM, and only 18% of respondents indicate that they use their dishwashers 7–9 PM. On the other hand, the activity that over 90% of respondents engage in between 7 and 9 PM is watching TV, and almost half of the respondents cook at these times. Less than 20% of those individuals who cook or watch TV 7–9 PM, would willingly postpone these activities till after 9 PM. Overall, respondents are least flexible to change their cooking habits in response to the incentives of a lower tariff. In terms of the number of respondents stating they would delay usage of the appliances listed, the TV and washing machine are the highest contributors to load-shifting, while the dishwasher is the least[11].

[11] The number of respondents willing to shift appliance usage is calculated as the total number of respondents in the survey, multiplied by the share of respondents indicating they used each of the appliances in the 7–9 PM timeslot, multiplied by the share of respondents willing to delay usage of these appliances.

Figure 14. Potential for Load Shifting through TOU Tariffs



Source: EPRG Survey of UK Households 2010

3.6.2. Potential for Load Shifting through Smart Appliances

With the use of the smart grid combined with smart appliances, it is possible to devise incentives to move appliance usage from the period of high peak to lower usage times. Pilot studies have shown that the potential for load shifting is highest through the use of facilitating technologies, when the user does not have to actively intervene (Faruqui et al., 2010b). The EPRG survey of 2010 aimed to assess the potential of load shifting through smart appliances. The survey presented four hypothetical scenarios of load shifting using smart appliances and dynamic supplier intervention (Table 15). The respondents were first asked if they would accept each of these four scenarios (which were presented in random order) if they received a 5% discount on their total electricity bill. If they did agree, they were asked if they would be willing to accept a 2% discount, and if yes, then if they would be willing to change for a 1% discount. If respondents did not accept the 5% discount, they were offered a 10% discount, and if they still refused, were finally offered a 20% discount.

The first and second scenarios (having wet appliances run longer and having white appliances interrupted) do not appear to be very disruptive a priori, as they take place in the background and do not necessarily affect the user, and one would expect that they would have higher acceptance among the respondents. The second measure—interrupting white appliances—is in fact the way many white appliances work already. Most refrigerators and freezers cycle off

periodically in order to keep internal temperature constant. The third and fourth scenarios (presetting white appliances to run only after 9 PM and limiting the use of the cooker to 30-minute intervals) are more disruptive, since they restrict when and how appliances can be used. Table 16 presents estimated acceptance rates for discounts on an electricity bill in exchange for appliance usage modification.

Table 15. Hypothetical Load-Shifting Scenarios through Smart Appliances

Appliance Usage Modification Scenario	Description
1) Run wet appliances longer	Having wet appliances (dishwasher, washing machine, tumble dryer) run for longer periods of time
2) Interrupt white appliances	Having white appliances (refrigerators, freezers) interrupt for 1- to 3-minute intervals
3) Preset wet appliances	Having wet appliances (dishwasher, washing machine, tumble dryer) preset to operate only after 9 PM
4) Limited use of cooker	Having usage of cooker/oven capped, so household would not be able to use it for 30-minute intervals more than 15 times per year during peak demand spikes.

Respondents claim to be willing to accept the proposed changes even for the small discounts. Over 16% of respondents would agree to have wet appliances run longer in exchange for a mere 1% off the total electricity bill. Over 17% of respondent would agree to preset wet appliances to be used after 9 PM for 1% off the electricity bill. Acceptance of having white appliances being interrupted is even higher: over 20% of respondents would agree to this in exchange of only 1% reduction of the electricity bill. It is noteworthy that different demand response activities seem to be perceived in a similar manner, with similar acceptance rates. There is no significant difference between consumer acceptance rates of extending appliance cycles, interrupting white appliances, and presetting wet appliances. By contrast, a cap on energy use of a cooker has lower acceptance rates: around 11% of respondents would agree to limited use of cookers for a 1% discount.

The core questions on willingness to accept demand response activities were deliberately left vague, as researchers wanted to gauge the level of a priori acceptance of respondents, given a diverse range of possible interpretations. As a result, different interpretations might be behind some of the differences in expressed acceptances. While the survey does not let us conclude that the stated acceptance rates would translate into actual acceptances, it nevertheless indicates that consumers are open to considering and agreeing to these dynamic demand management options.

One would expect that respondents who claim to be experiencing hardship due to energy prices would be more willing to modify appliance usage in exchange for a discount. However, surprisingly, acceptance of appliance usage modification in exchange for a discount did not vary by respondents' subjective perceptions of hardship (Table 16.). Similarly, there is no significant difference in acceptance rate when comparing respondents with a bachelor level of education or higher versus overall acceptance rates. Respondents who mentioned environment as one of the top three areas requiring urgent policy attention, had significantly higher acceptance rates for having wet appliances run longer and not being able to use cookers for a 20% discount compared to acceptance rates for all respondents combined. They are also more likely to accept having white appliances interrupted for 1% and 2% discounts. Respondents who were affiliated with the Labour Party were also more likely to accept limiting cooker use for of 1% and 2% discounts. Table 17 presents acceptance rates for smart appliance interventions by gender, age, and income. Men have higher acceptance rates than women. However there is no significant difference in acceptance rates by household per capita income. Younger respondents are more likely to accept having limited access to cookers, but they are less likely to accept having white appliances interrupted.

Professed interest in the environment yields better predictive power for the professed acceptance rates than do the subjective hardship from energy prices or the education level. Party membership is also not a good predictor of acceptance rates. Acceptance rates for Conservative Party supporters are not different from overall acceptances rates. Acceptance rates for Labour Party members are significantly higher in only one scenario—limited access to the cooker.

Table 16. Shares of Respondents (%) Willing To Accept Changes in Appliance Usage by Education Level, Subjective Hardship, Party Affiliation, and Expressed Concern for Environment[12]

	Discount accepted	Bachelor degree or higher	Moderate to serious hardship[13]	Conservative	Labour	Mentioned environment as national priority[14]	Overall
Run wet appliances longer	1%	**18.6** (15.7–21.4)	**14.9** (*12.7–17.1*)	**14.2** (*11.1–17.2*)	**20.5** (*16.8–24.1*)	**19.5** (*14.6–24.3*)	**16.2** (*14.6–17.8*)
	2%	**31.1** (*27.7–34.5*)	**25.8** (*23.1–28.6*)	**27.2** (*23.3–31.0*)	**29.4** (*25.3–33.5*)	**33.1** (*27.3–38.9*)	**27.1** (*25.1–29.0*)
	5%	**58.1** (*54.5–61.7*)	**51.4** (*48.3–54.6*)	**54.5** (*50.2–58.8*)	**55.1** (*50.6–59.6*)	**59.1** (*53.1–65.2*)	**53.4** (*51.3–55.6*)
	10%	**75.9** (*72.7–79.0*)	**70.2** (*67.3–73.1*)	**71.7** (*67.8–75.6*)	**73.9** (*70.0–77.9*)	**77.0** (*71.9–82.2*)	**70.8** (*68.8–72.7*)
	20%	**86.6** (*84.0–89.1*)	**83.1** (*80.7–85.4*)	**85.1** (*82.0–88.2*)	**86.0** (*82.9–89.1*)	**91.1*** (*87.5–94.6*)	**84.2** (*82.6–85.8*)
	Do not accept	**13.4** (*11.–16.0*)	**16.9** (*14.6–19.3*)	**14.9** (*11.8–18.0*)	**14.0** (*10.9–17.1*)	**9.0*** (*5.4–12.5*)	**15.8** (*14.2–17.4*)
Interrupt white appliances	1%	**23.6** (*20.5–26.7*)	**18.8** (*16.32–21.23*)	**19.5** (*16.1–22.9*)	**24.6** (*20.8–28.5*)	**28.4*** (*22.9–34.0*)	**20.7** (*18.9–22.4*)
	2%	**37.5** (*33.9–41.0*)	**33.2** (*30.20–36.13*)	**34.2** (*30.1–38.3*)	**40.1** (*35.7–44.5*)	**44.8*** (*38.6–50.9*)	**34.0** (*31.9–36.1*)
	5%	**63.9** (*60.4–67.5*)	**59.3** (*56.19–62.38*)	**62.1** (*58.0–66.3*)	**63.9** (*59.6–68.2*)	**68.1** (*62.4–73.8*)	**60.5** (*58.4–62.6*)
	10%	**77.1** (*74.0–80.2*)	**72.6** (*69.74–75.36*)	**74.6** (*70.8–78.3*)	**76.6** (*72.8–80.4*)	**80.2** (*75.3–85.1*)	**73.5** (*71.5–75.4*)
	20%	**86.0** (*83.4–88.5*)	**82.5** (*80.05–84.84*)	**86.8** (*83.9–89.7*)	**85.6** (*82.4–88.8*)	**88.3** (*84.4–92.3*)	**83.9** (*82.3–85.5*)
	Do not accept	**14.0** (*11.5–16.6*)	**17.5** (*15.16–19.95*)	**13.2** (*10.3–16.1*)	**14.4** (*11.2–17.6*)	**11.7** (*7.7–15.6*)	**16.1** (*14.5–17.8*)
Preset wet appliances	1%	**18.0** (*15.2–20.9*)	**17.4** (*14.96–19.73*)	**17.0** (*13.8–20.3*)	**22.6** (*18.8–26.3*)	**20.2** (*15.3–25.2*)	**17.8** (*16.1–19.4*)
	2%	**32.2** (*28.8–35.6*)	**30.7** (*27.81–33.62*)	**33.5** (*29.4–37.5*)	**35.1** (*30.8–39.4*)	**37.0** (*31.0–42.9*)	**31.5** (*29.4–33.5*)
	5%	**62.4** (*58.9–65.0*)	**61.0** (*57.95–64.09*)	**60.6** (56.4–64.8)	**62.6** (58.3–67.0)	**61.5** (55.5–67.5)	**59.9** (57.7–62.0)
	10%	**72.8** (*69.6–76.1*)	**71.3** (68.48–74.17)	**72.9** (69.0–76.7)	**73.3** (69.3–77.3)	**73.2** (67.7–78.6)	**70.7** (68.7–72.7)
	20%	**82.8** (*80.0–85.6*)	**81.7** (*79.30–84.17*)	**83.8** (*80.6–86.9*)	**84.1** (*80.8–87.4*)	**83.7** (*79.1–88.2*)	**81.8** (*80.1–83.5*)
	Do not accept	**17.2** (*14.4–20.0*)	**18.3** (*15.83–20.70*)	**16.3** (*13.1–19.4*)	**15.9** (*12.6–19.2*)	**16.3** (*11.8–20.9*)	**18.2** (*16.5–19.9*)
Limited use of cooker	1%	**12.5** (*10.1–15.0*)	**10.8** (*8.86–12.77*)	**8.8** (*6.4–11.2*)	**16.3*** (*13.0–19.6*)	**14.0** (*9.7–18.3*)	**10.8** (*9.4–12.2*)
	2%	**18.3** (*15.5–21.2*)	**18.8** (*16.32–21.23*)	**16.1** (*12.9–19.2*)	**24.0*** (*20.2–27.9*)	**22.2** (*17.1–27.3*)	**17.7** (*16.1–19.4*)
	5%	**38.0** (*34.4–41.6*)	**38.2** (*35.10–41.22*)	**36.3** (*32.2–40.5*)	**44.3*** (*39.8–48.7*)	**41.3** (*35.2–47.3*)	**37.1** (*35.0–39.2*)
	10%	**53.1** (*49.5–56.8*)	**55.4** (*52.28–58.54*)	**53.4** (*49.0–57.7*)	**58.3** (*53.8–62.7*)	**56.8** (*50.7–62.9*)	**52.9** (*50.7–55.1*)
	20%	**66.7** (*63.3–70.2*)	**66.8** (*63.87–69.80*)	**66.2** (*62.1–70.2*)	**70.6** (*66.5–74.7*)	**74.3*** (*69.0–79.7*)	**66.3** (*64.3–68.4*)
	Do not accept	**33.3** (*29.8–36.8*)	**33.2** (*30.2–36.13*)	**33.84** (*29.8–37.9*)	**29.4** (*25.3–33.6*)	**25.7*** (*20.3–31.1*)	**33.7** (*31.6–35.7*)

Notes: 95% Confidence Interval indicated in parentheses. Asterisk (*) indicates acceptance rates that are significantly different from overall acceptance rates by 95% confidence level.

[12] Acceptance rates by category that are significantly different from overall acceptance rates by 95% confidence level are indicated by an asterisk.

[13] Respondents who reported experiencing either moderate or serious hardship due to energy prices.

[14] Respondents who listed "Environment" as one of the areas in UK that need urgent attention.

Source: EPRG Survey of 2010

Table 17. Shares of Respondents (%) Willing To Accept Changes in Appliance Usage by Gender, Income, and Age

	Discount accepted	Male	Female	Income per capita £500 or less	Income per capita £1500 or more	Age 35 years or less	Age 50 years or more
Run wet appliances longer	1%	**86.9** *(84.9–89.0)*	**81.4** *(79.0–83.8)*	**81.7** *(78.3–85.0)*	**82.2** *(78.7–85.7)*	**88.4** *(85.8–91.1)*	**82.8** *(80.4–85.2)*
	2%	**74.9** (72.3–77.6)	**66.5** *(63.6–69.5)*	**68.6** *(64.6–72.7)*	**66.7** *(62.4–71.1)*	**75.0** *(71.4–78.5)*	**68.4** *(65.4–71.4)*
	5%	**58.6** *(55.6–61.7)*	**48.2** *(45.1–51.3)*	**52.0** *(47.7–56.4)*	**51.7** *(47.1–56.3)*	**56.9** *(52.8–61.0)*	**50.6** *(47.4–53.8)*
	10%	**29.6** *(26.8–32.4)*	**24.6** *(21.9–27.2)*	**23.8** *(20.1–27.5)*	**25.9** *(21.8–29.9)*	**26.6** *(23.0–30.3)*	**27.0** *(24.2–29.8)*
	20%	**18.3** *(16.0–20.7)*	**14.0** *(11.9–16.2)*	**15.0** *(11.9–18.1)*	**15.4** *(12.1–18.8)*	**16.8** *(13.7–19.9)*	**15.2** *(12.9–17.5)*
	Do not Accept	**13.1** *(11.0–15.1)*	**18.6** *(16.2–21.0)*	**18.3** *(15.0–21.7)*	**17.8** *(14.0–21.3)*	**11.6** *(8.9–14.2)*	**17.2** *(14.8–19.6)*
Interrupt white appliances	1%	**85.7** *(83.5–87.8)*	**82.0** *(79.7–84.4)*	**80.5** *(77.1–84.0)*	**80.4** *(76.8–84.1)*	**82.7** *(79.5–85.8)*	**84.3** *(82.0–86.6)*
	2%	**75.1** *(72.5–77.8)*	**71.8** *(69.0–74.6)*	**70.6** *(66.6–74.5)*	**68.3** *(64.0–72.5)*	**72.3** *(68.6–76.0)*	**74.9** *(72.1–77.7)*
	5%	**62.9** *(60.0–65.9)*	**58.0** *(55.0–61.1)*	**56.9** *(52.6–61.2)*	**55.4** *(50.9–60.0)*	**56.0** *(51.9–60.1)*	**62.3** *(59.3–65.4)*
	10%	**35.9** *(32.9–38.9)*	**32.1** *(29.2–35.0)*	**31.4** *(27.3–35.4)*	**32.0** *(27.7–36.2)*	**31.3** *(27.5–35.2)*	**35.5** *(32.4–38.5)*
	20%	**22.0** *(19.4–24.5)*	**19.3** *(16.9–21.8)*	**19.3** *(15.9–22.7)*	**20.0** *(16.3–23.7)*	**18.9** *(15.7–22.1)*	**21.4** *(18.8–24.1)*
	Do not Accept	**14.3** *(12.2–16.5)*	**18.0** *(15.6–20.3)*	**19.5** *(16.0–22.9)*	**19.6** *(15.9–23.2)*	**17.3** *(14.2–20.5)*	**15.7** *(13.4–18.0)*
Preset wet appliances	1%	**82.7** *(80.4–85.1)*	**80.8** *(78.4–83.3)*	**81.1** *(77.7–84.5)*	**79.6** *(75.9–83.3)*	**80.9** *(77.7–84.2)*	**81.6** *(79.1–84.1)*
	2%	**72.9** *(70.1–75.6)*	**68.4** *(65.5–71.3)*	**69.4** *(65.4–73.4)*	**67.4** *(63.1–71.7)*	**70.4** *(66.6–74.2)*	**69.6** *(66.6–72.5)*
	5%	**60.2** *(57.2–63.2)*	**59.5** *(56.5–62.6)*	**57.7** *(53.4–62.0)*	**57.8** *(53.3–62.4)*	**57.8** *(53.7–61.9)*	**58.5** *(55.3–61.6)*
	10%	**31.1** (28.3–34.0)	**31.8** (28.9–34.7)	**31.8** (27.7–35.8)	**29.8** (25.6–34.0)	**31.5** (27.7–35.4)	**29.8** (26.9–32.7)
	20%	**18.3** *(16.0–20.7)*	**17.2** *(14.8–19.5)*	**17.9** *(14.6–21.3)*	**16.5** *(13.1–19.9)*	**18.4** *(15.2–21.6)*	**16.9** *(14.6–19.3)*
	Do not Accept	**17.3** *(14.9–19.6)*	**19.2** *(16.7–21.6)*	**18.9** *(15.5–22.3)*	**20.4** *(16.7–24.1)*	**19.1** *(15.8–22.3)*	**18.4** *(15.9–20.9)*
Limited use of cooker	1%	**67.9** *(65.0–70.8)*	**64.8** *(61.8–67.7)*	**66.9** *(62.8–71.0)*	**63.3** *(58.8–67.7)*	**67.8** *(63.9–71.6)*	**64.6** *(61.6–67.7)*
	2%	**55.6** (52.6–58.7)	**50.1** *(47.1–53.2)*	**56.1** (51.8–60.5)	**49.1** (44.5–53.7)	**54.3** (50.2–58.4)	**51.5** (48.3–54.7)
	5%	**39.0** *(36.0–42.0)*	**35.1** *(32.2–38.1)*	**38.6** *(34.4–42.8)*	**34.1** *(29.8–38.5)*	**37.5** *(33.5–41.5)*	**35.7** *(32.6–38.7)*
	10%	**19.1** *(16.7–21.5)*	**16.3** *(14.0–18.6)*	**19.1** *(15.7–22.5)*	**15.9** *(12.5–19.2)*	**18.6** *(15.4–21.8)*	**16.4** *(14.1–18.8)*
	20%	**12.3** *(10.3–14.3)*	**9.3** *(7.5–11.1)*	**13.1** *(10.1–16.0)*	**9.3** *(6.7–12.0)*	**13.1** *(10.3–15.9)*	**9.1** *(7.3–10.9)*
	Do not Accept	**32.1** *(29.2–35.0)*	**35.2** *(32.3–38.2)*	**33.1** *(29.0–37.2)*	**36.7** *(32.3–41.2)*	**32.2** *(28.4–36.1)*	**35.4** *(32.3–38.4)*

Note: 95% Confidence Interval indicated in brackets

Source: EPRG Survey of 2010

4. Conclusions

The results from our 2010 survey indicate that since the global financial crisis of 2008, energy and environmental concerns have decreased in priority in the view of the public, and respondents are more sceptical of government interventions in electricity markets.

The share of individuals reporting that they experience serious hardship due to energy prices has gone down since the peak of energy prices in October 2008. Around 14% of respondents report experiencing severe hardship due to energy prices in 2010 compared to 18.4% in 2008. During the peak energy prices in 2008, there was an increase in switching of energy providers. Since then incidences of switching have decreased.

Energy efficiency measures have higher uptake than in previous years, but the widespread measures are those that are cheaper and easier to implement. Three quarters of the respondents think that government should enforce energy-efficiency standards for appliances. However, they are more willing to compromise on the price than on performance of appliances as a result of such laws. While roughly half of the respondents would agree to have detailed metered consumption information recorded by their energy providers through smart meters, they are wary of having their data available to other entities. Local ownership is a potential motivating factor for public support for local, small-scale energy plants, but construction work at home and in the neighbourhood are the potential discouraging factors from supporting such a plant.

There is scope for shifting discretionary electricity load during off-peak times, both through Time-of-Use tariffs and smart appliances that require limited user intervention. The activity that largest number of respondents will delay till after 9 PM if electricity is more expensive 7-9 PM, are watching TVs and using washing machines. Acceptance of supplier control of smart appliances is high, even for small discounts on the electricity bill, but the least popular measure is having usage of cookers restricted during critical peak times a few times per year. We find little indication that income, education, or the degree of hardship experienced as a result of higher fuel prices impacts willingness to accept a discount in exchange for the ability of the supplier to control appliance usage.

Overall, younger respondents are more likely to name environment as one of the policy priorities. They have less resistance to accepting innovative measures, such as having consumption data recorded through smart meters, and having a small-scale, low-carbon plant in their community. Policy priorities and values influence action: respondents who named environment as a policy priority were more likely to take proactive measures to decrease energy consumption, including carpooling more often or using public transportation.

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