

A Review of Consumers' Attitudes to Energy
Report for the Sustainable Development Commission

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1. Introduction

1. This review has been prepared for the Sustainable Development Commission as part of its study into the role of Ofgem in delivering a sustainable energy system.

2. The review uses the body of published primary research since 2000 to assess the evidence for the way consumers understand the energy system and how far they are willing to engage with it more sustainably, thereby reducing their greenhouse gas emissions.

3. Most of the research takes the form of opinion surveys, though there is also some notable focus group work. Other findings are based on deliberative techniques which have the potential to explore and probe consumer attitudes in more depth. The research includes domestic consumers as well as small and medium-sized enterprises.

4. The review ends with conclusions and recommendations for areas in which further research could usefully be carried out. This could shed light on consumers' attitudes to energy and, in the light of climate change, help us to understand better what the levers are for motivating consumers' to change to more sustainable patterns of behaviour.

2. The research base

5. For the purposes of this review, the principal research studies carried out since 2000 have been identified and analysed. The majority of the research looked at was carried out in the UK, though some research from other countries is also referred to. A full list of the research is contained in the Bibliography.

2.1 Literature reviews

6. There are several helpful literature reviews which identify relevant research sources. Each of these reviews contains an extensive bibliography of sources. Among them are:

- a review of literature on consumers' interests in sustainable energy, carried out by the Centre for Sustainable Energy for energywatch in 2004 (CSE 2004b);
- a review of the literature on metering, billing and direct displays, carried out for Defra by the Environmental Change Institute (ECI 2006);
- a report by DTI on the impact of energy on environment and society, which drew in part on a literature review (DTI 2006);
- a review of evidence on consumer behaviour and behavioural change carried out by Tim Jackson at the University of Surrey in 2004;
- a review of the evidence for influencing public behaviour in favour of environmental goals carried out for Defra by Green Alliance and Demos in 2006.

2.2 Research studies

7. The body of research evidence that exists about consumer attitudes to energy consists of some major studies and a number of others that are relevant in parts¹. Most of the research takes the form of opinion surveys, though there is also some notable focus group work. Other findings are based on deliberative techniques which have the potential to explore and probe consumer attitudes in more depth.

¹ This review does not include surveys of actual behaviour in relation to their energy use, such as the English House Condition Survey, for example. Rather, it is limited to consumers' attitudes to their energy use.

Government departments and agencies

8. There are several useful regular surveys undertaken by different Government departments. For example:

- Defra commissioned an important survey of public attitudes to quality of life and to the environment based on a carefully controlled study of in-home face-to-face interviews based a standard questionnaire (Defra 2002). This survey is one of a regular series of surveys carried out every three to four years.
- the Central Office of Information with the Energy Saving Trust commissioned research into the potential of energy service companies (EST 2004).
- the Energy Saving Trust regularly commissions opinion surveys to determine their attitudes to energy efficiency (EST 2005, 2006).

Ofgem

9. In the past, Ofgem commissioned annual surveys of consumers' attitudes to their energy supply as part of the process of setting supply price controls. These surveys provided a wealth of detail on how individual consumers interacted with their energy supply. The last of these annual surveys, carried out by MORI, was published in 2001.

- In 2003 Ofgem published a report on developments in supply competition following the lifting of supply price controls (Ofgem 2003).
- As part of the recent Distribution Price Control Review, an extensive survey was carried out by Accent which looked at how much extra, if anything, different groups of consumers were prepared to pay in order to reduce the periods of time they were without supply and how much they valued their natural amenity (Ofgem 2004).
- Ofgem also commissions one-off research studies. An important example of this are the literature review and structured focus group research to test the evidence that consumers respond to feedback on their energy use provided to them on their bills. This was carried out by the Centre for Sustainable Energy (CSE 2003, 2004a).
- Ofgem has recently announced its "Consumers First" initiative. Through a series of deliberative interviews carried out in the first half of 2007, Ofgem intends to examine the key issues for consumers of electricity and gas. The interviews are

intended to cast the net widely and consider a range of issues affecting energy. The Authority will consider the results of this work, and decide whether they are relevant for the way it interprets the interests of consumers in its decision-making process going forward.

Ofcom

10. Ofcom, the telecoms and broadcasting regulator, commissioned a survey to develop its understanding of consumer and citizen attitudes to digital terrestrial television, mobile TV, mobile broadband, improved mobile phone coverage and wireless home networks (Ofcom 2006).

Energy supply companies

11. Energy supply companies have their own research into consumer attitudes to energy. Much of this is not in the public domain, though there is one notable study that is:

- The most comprehensive recent research was commissioned by Powergen in 2003 and carried out on their behalf by the University of East Anglia. It was based on a survey of 1,800 households and 12 focus groups, together with a review of literature. The research investigated attitudes towards domestic energy and environmental issues, energy use behaviour, views on information and advice and links between these topics. The results are set out in the Powergen Energy Monitor report of 2003 (Powergen 2003).
- The following year Powergen commissioned the University of East Anglia to carry out further research. This was designed to probe the types of policies and incentives that people feel would be effective and acceptable in promoting energy efficiency, and at the ways that information could be presented to engage with consumers more effectively. The research was based on, for domestic consumers, six focus groups and a face-to-face survey with almost 2,000 respondents; and for SMEs, 30 in-depth interviews and a telephone survey with over 500 respondents. The results were published in the Powergen Energy Monitor report of 2004 (Powergen 2004).

- Scottish Power carried out qualitative and quantitative work in 2005 on awareness of and attitudes to fuel poverty.

Consumer bodies

12. Consumer bodies have looked particularly closely at the issues surrounding sustainable consumption, for example:

- The Sustainable Consumption Roundtable commissioned a sophisticated deliberative forum, the results of which were fed into its final report, *I will if you will* (SCR 2006).
- National Consumer Council has published several studies. One looks at consumer attitudes to sustainable consumption (NCC 2003), another looks at ways to engage with domestic consumers more effectively in order to persuade them to change their behaviour (NCC 2005).
- National Consumer Council looked at green supply tariffs in 2006. This research included some omnibus survey questions (NCC 2006).
- energywatch commissioned research into consumer attitudes to energy to inform its mission, objectives and work programme in 2005 (energywatch 2005).
- Consumer Council for Water with the Water Research Council commissioned a survey of consumer attitudes to water efficiency, published in 2006 (CCW 2006).

Research bodies

13. Many of the studies listed above were carried out by research bodies. Of those not already listed, there are several of note, including:

- MORI Social Research Institute published in 2004 a summary of its recent research findings that relate to climate change (MORI 2004).
- The National Centre for Social Research carried out surveys of British Social Attitudes in 2001 and 2003.
- Focus groups were used as the basis for an important study sponsored by the Joseph Rowntree Foundation that looked at the relationship between disadvantaged groups and environmental issues (Burningham and Thrush 2001).

2.3 Important caveats

14. There are some important caveats to bear in mind when interpreting the findings of primary research studies. These are set out in considerably more detail in the literature review carried out by the Centre for Sustainable Energy (CSE 2004b).

15. One problem is the fact that stated attitudes do not automatically translate into observable behaviours. This is described by some as the 'value-action gap', and is itself the subject of some of the research cited. This gap is also the basis of concerns with the 'willingness to pay' research technique which asks people whether they would be willing to pay an additional sum for enhanced goods or services, and if so how much. Generally, people over-estimate their willingness to pay when questioned, and this does not translate into actual behaviour. In the words of one economist: 'The values obtained from contingent valuation are artifacts of the research process and have no independent significance outside of that' (Bowers 1997).

16. Another problem is that, where research relies on opinion polling, the phrasing and context of the questions asked is exceptionally important. Asking the same questions in different ways can elicit completely different, and at times even opposing, answers. Some of the research studies reveal somewhat contradictory findings, and these can be accounted for by the context and form of the questions being asked. It is also important to keep in mind that people do not want to appear ignorant or stupid when responding to questions, and this can skew the responses.

17. A final important point that Roberts makes is that asking a series of questions of somebody and examining an issue in a research setting will, in itself, impart knowledge and create a sense of importance (and, potentially, interest). In this way, 'the act of measuring of itself causes changes to that which is being measured' (CSE 2004b).

3. Understanding of the system

Objective: To understand consumers' attitudes towards the current energy system and how this can be improved from a sustainable development perspective.

18. This section of the report explores the evidence that exists for understanding the way consumers think about their energy supply. It includes both domestic and small and medium-sized enterprises.

3.1 Perceptions of how the energy system works

Awareness of and importance attached to the environmental consequences of electricity and gas

19. One research study shows that, though people are generally concerned about climate change, they do not necessarily understand how they can contribute to mitigating it (Defra 2002). Another study found that, 'though there is evidence of broadly-formed attitudes to environmental issues on the part of domestic consumers, a link [with this] to energy efficient behaviour is not clear' (Powergen 2003). A further study found that over half of those surveyed thought trying to tackle warming in Britain was a waste of time without international agreement (MORI 2004). Echoing this, another survey found that one in five people did not think their individual actions could make a difference to the environment (EST 2005).

20. In one study one third of all respondents said had tried to reduce the amount of electricity or gas used in their home, typically by installing insulation or double glazing. However, when asked what their motive for doing this was, fewer than one in 10 mentioned the environment. One in three gave the main reason as 'increased comfort' (Powergen 2003). Half of the domestic consumers questioned in a follow-up survey had made some form of energy efficiency improvement to their home, though most cited cost savings as the main motive (Powergen, 2004).

21. On the other hand, in a recent survey of domestic consumers' attitudes to water efficiency most of those questioned claimed to undertake 'environmentally aware

activities', the most common of which were 'switching off lights' and 'recycling plastic bags'. When asked to rank environmental issues in terms of their importance, respondents considered energy conservation, air pollution and climate change to be the highest, ahead of water conservation, recycling, waste disposal and sustainable transport (CCW 2006).

22. Other studies have found that people are aware of how to reduce their energy use, but do not necessarily turn their knowledge into action (NCC 2003 and CSE 2004). A further study found that people are reluctant to install major measures, such as cavity wall insulation, because they think it is expensive, cowboy-ridden and disruptive (EST 2004). Water efficiency research backed this finding up, with respondents listing barriers to the uptake of water efficiency measures as 'perceived interruptions of privacy and dislike of strangers in the home' (CCW 2006).

23. One study probed the attitudes of small and medium-sized enterprises (SMEs) to energy efficiency. It found that 'most SMEs seem to pay scant attention to their energy consumption and are unable to think of many, or indeed any, occasions on which a decision has been motivated by a desire to improve energy efficiency' (Powergen 2003).

24. A further survey looked at the attitudes of SMEs to the business opportunity of products and services which help to reduce greenhouse gas emissions. Two thirds of respondents said they knew 'little or nothing' about the issue of climate change in relation to their business (MORI 2005). Only one in five respondents said they planned to introduce products and services to reduce greenhouse gas emissions in the next five years. Most of the others thought it was 'not relevant for their business'.

The effect of using different domestic appliances in terms of efficiency

25. Very few people consider energy efficiency as a factor when buying new appliances, according to the survey research available. Respondents in one survey were surprised when told how much electricity televisions and similar appliances use when on 'standby' (Powergen 2003). Once they knew this, there was considerable support for Government action to impose minimum standards in this area.

26. In other research 85 per cent of respondents claimed to have turned appliances such as televisions off stand-by, while just 14 per cent admitted they never had. The research also found that almost half of people in the UK believe 'green' products and services are prohibitively expensive and two in five find being green is 'too time-consuming' (EST 2005).

27. In research into water efficiency most people said they only use the dishwasher when it is full, and only fill the kettle with as much water as they need. When asked the main reason they do this the majority said it was for energy or cost saving reasons rather than to save water (CCW 2006).

3.2 The availability of consumer information on energy use and its impact

Are consumers able easily to access information to help inform their decisions?

28. The lack of impartial information was one of the main points of consensus across all participants in the focus groups in Powergen's research. But while most of those who took part said they would welcome more information, 'few were inclined to seek it out' (Powergen 2003). NCC also found that fewer than one in five domestic consumers had actively sought out more information on how to save energy (NCC 2005). This figure contrasts with much higher figures for those who had sought out information on how to live more healthily (75 per cent); and on pensions and savings (63 per cent).

Does more information lead to greater awareness and a demand for a more sustainable system?

29. One study found that people who had received advice about their energy use were much more likely to make improvements (Powergen 2004). This research echoes earlier research which found that 'the simple fact of discussing energy issues was enough to trigger greater interest in energy saving' (CSE 2001).

30. However, to take energy efficiency into account, consumers must be convinced of its direct, tangible benefits and have relevant knowledge that informs their decisions (Powergen 2004). Another study found that consumers will seek information more

readily if it delivers on their immediate priorities – including tangible, close-to-home benefits, convenience and fitting in with existing routines. But further research is required on the relationship between seeking information and taking action: 'Have consumers who seek information already decided to take action? Or do they seek information with an open mind, and then act as a result of what they find?' (NCC 2005).

3.3 Who do consumers think should be leading the way to a sustainable energy system?

Do consumers want to choose a sustainable energy option or do they want the choice to be made for them?

31. Government should have principal responsibility for energy efficiency policy according to the majority of respondents in one study, though half of all respondents thought that Government, individuals and companies should work in partnership to deliver energy efficiency policy (Powergen 2003). As a participant in a separate consumer forum put it: 'it is not just about the Government, it is about us as well, but you need a leader' (SCR 2006).

4. Engagement in the energy system

Objective: to understand what consumers know about sustainable options and what information is needed to better promote them/make it easier to switch.

32. This section of the report explores the evidence that exists for understanding the way consumers engage with the energy system. It includes both domestic and small and medium-sized enterprises.

4.1 Consumer demand for sustainable options

Do consumers value sustainable options? How important is it to consumers that their supply is from a sustainable source?

33. Research shows considerable support for 'green' sources of energy. However, the majority of respondents in one study were of the view that renewable energy should be cheaper than more polluting forms of energy (Powergen 2003). In recent research two in five respondents said they would be willing to switch to a green tariff, and many of these would be prepared to pay more to do so (NCC 2006b), while in a further study three in five respondents said they would consider switching to a green company for their gas and electricity (Observer 2006). This suggests many consumers do find it important that their energy supply is from a sustainable source. Yet, to date, only some 200,000 have actually switched (NCC 2006).

What information or other action is needed to make things easier for consumers to switch to a sustainable supplier? Do consumers choose the most sustainable tariff on offer from their supplier? If not, why not?

34. Research indicates that there is no objective measure of what constitutes a 'sustainable supplier'. Most consumers are unaware that they are already paying £7 a year for renewable electricity through their bills. The regulatory context is immensely complex, and many suppliers are making misleading claims about their products. Consumers therefore lack the necessary information on which to base their decision to choose a sustainable supplier. Therefore the research concludes that independent

accreditation of green tariffs is a pre-requisite if consumers are to have confidence in this area (NCC 2006).

35. A different study concluded that Government and business should focus their attention on mainstream consumers 'rather than expecting the heroic minority of green shoppers to show society's way out of unsustainability' (SCR 2006).

Do consumers find it easy to switch?

36. Over four million consumers switched their energy supplier during 2006. In the first ten months of 2006 750,000 more households switched than for the same period in 2005 (Ofgem 2007). These record numbers of consumers switching in response to high gas and electricity prices suggest that consumers find it easy enough to switch suppliers. Research carried out before the price rises found that one in two consumers had compared prices, and that, of these, 7 in 10 found it 'easy' (Ofgem 2003).

37. On the other hand, qualitative research found 'a general attitude that switching is a lot of "hassle"', with the onus being placed squarely on consumers themselves to ensure that they are getting the best price (energywatch 2005). Participants said they were 'reluctant to engage with the market'². The same research found a lot of inertia in the market, with 'almost three-quarters of SME consumers unlikely to switch in the near future'.

Do consumers trust their suppliers?

38. There is a strong and deep level of cynicism about energy suppliers as purveyors of energy saving, according to participants in focus groups carried out by CSE. On the other hand, participants' attitudes changed once they learned that energy suppliers were obliged to assist them with energy saving measures through the Energy Efficiency Commitment (CSE 2004).

² Electricity and gas suppliers still retain around 50 per cent of customers in the areas in which they were formerly the incumbent suppliers, and this allows them to pursue differential pricing strategies.

4.2 Consumer energy bills as a means for promoting engagement in the market

Do consumers understand their energy bills? How can bills be improved to make consumers more aware of the effect of their consumption?

39. Several studies show that feedback, both direct and indirect, can provide an impetus for reducing energy use. Furthermore, persistent feedback appears to promote persistent reductions in energy use (ECI 2006).

40. Research in Stavanger in Norway studied the effects of requiring households to send their electricity meter readings to their utility company regularly in return for a very comprehensive bill which was easily to understand. Three years after the trial started the households in the study were consuming 8 per cent less electricity than the general population of households in the area. Their consumption had fallen by 4 per cent compared with what it had been before the trail started, while that of the control group had risen by 4 per cent during the same period (Wilhite 1997 reported in CSE 2003 and ECI 2006).

41. Focus groups designed to test reactions to indirect feedback on bills found that there was a high degree of acceptance for including historical consumption information on bills, for example in the form of simple bar charts. However, the research found a lower level of acceptance for other forms of benchmarking, for example against the consumption levels of neighbours, similar household-types or 'average' consumers (CSE 2004).

42. Given that estimated bills are themselves based on historical consumption information, it is unlikely that bar charts based on estimated bills will show any change in the level of consumption over the previous year. They would therefore appear to be very unlikely to provide consumers with any motivation to change their behaviour (energywatch 2007). A requirement by the Swedish regulator that utility companies send domestic consumers monthly bills based on accurate meter reads meant that the business case for installing smart meters capable of remote reading became positive (ECI 2006).

Is the price signal clear (e.g. is the bill sufficiently itemised to give a clear signal for behaviour change to progress a more sustainable system? Is price alone a clear signal or is other information such as CO₂ emissions, required?)

43. There is a plethora of information set out on domestic electricity and gas bills, for legal, regulatory and commercial reasons³. Bills therefore cannot be said to provide a clear message for consumers, particularly since one in three bills is based on an estimated read. Even where the bill is based on an accurate meter read, the information is provided in terms of kilowatt hours, for both electricity and gas. This is a unit that is not readily meaningful to most consumers (energywatch 2007). There is no benchmark against which to judge this level of consumption, and no indication of what the environmental impact of this level of use might be. For example, this could be based on the national fuel mix, or suppliers' own fuel mix.

4.3 The role of local councils and sustainable energy

Does the engagement of a local authority improve the perceptions of, attitude towards and demand for sustainable options?

44. Local authorities are well-placed to influence and affect the day-to-day behaviours of domestic households. They are responsible for the environment in which people live⁴, and for providing the goods and services that they require. Yet two in five people questioned in one recent survey did not think they had adequate access to local green services, such as recycling facilities, and 34 per cent did not think they had enough information about how to be more environmentally friendly (EST 2005).

³ For example, bills need to include VAT details, Distribution Network Operator/Gas Transporter contact numbers for safety purposes, contact details for energywatch, the customer account number, Meter Point Administration Number/Meter Point Registration Number, meter readings (whether estimated, actual or customer own read), conversion of the meter readings into kilowatt hours, an explanation of the gas calorific value computation, as well as the amount the customer has to pay and the means by which they can do so. Traditionally, bills have also included the supplier's sales material promoting other products or services they offer.

⁴ Environmental protection legislation is enforced by the Environment Agency in England and Wales and by the Scottish Environmental Protection Agency in Scotland.

45. Focus groups carried out in a project funded by the Joseph Rowntree Foundation explored the environmental concerns and interests of disadvantaged groups. One of the study's main findings was that environmental policies with a strong local focus are more likely to attract interest and engagement in disadvantaged communities than those which rely on a global consciousness. Further findings were that local environmental improvements must be tackled in tandem with social and economic improvements, and that careful evaluation of the social equity implications of planning, transport and environmental policy is crucial (Burningham and Thrush 2001).

What are the major barriers preventing the engagement of local authorities in the provision of sustainable energy?

46. Local authorities and housing providers have an important role in reducing energy use in domestic housing. They have legal responsibilities under the Home Energy Conservation Act for this, not only in social housing, but in all housing in the area covered by the local authority. They can also set a good example themselves in using energy responsibly (LGA 2007).

47. By developing a sustainable energy 'strategy', local authorities can reduce energy use in domestic housing, tackle local road transport emissions and deploy renewable energy solutions. To date, over 100 local authorities have signed the Nottingham Declaration, thereby committing themselves to developing a coherent approach to reducing greenhouse gas emissions and adapting to the changes in climate that occur (EST 2007).

4.4 Consumer metering as a means for promoting engagement in the market

Are consumers satisfied with current metering arrangements? How easy is it for consumers to get smart meters?

48. There is no evidence that consumers are strongly aware of their current metering arrangements. There is evidence that shows that consumers do not like to receive

estimated bills, particularly if this results in arrears leading to the build-up of debt (energywatch 2007).

49. There is no evidence of significant consumer demand for 'smart' meters, probably because consumers have no way of assessing their relative costs and benefits. Consumers are free to purchase 'smart' meters themselves, and request their meter operator to install it for them. However, the costs are considerable. One study has estimated that the cost of a two-way meter together with a communications medium ranges from £32 to £80, not including the cost of installation, which could range from £20 to £30, or the cost of a separate display, which could range from £28 to £45 (Sustainability First 2006).

What impact could smart meters have on consumers' behaviour?

50. There is a clear association between the level of energy awareness of householders, the likelihood that they have installed efficiency measures, and whether they check their meters (ECI 2007). Feedback via the meter is categorised as 'direct' feedback, whereas feedback that is interpreted and then provided on bills or through other media is 'indirect' feedback. Research suggests that, ideally, it is desirable for consumers to have access to a combination of direct and indirect feedback.

51. Some research studies have explored the potential for changing consumer behaviour using existing, simple meters without separate display panels. A programme run by the West Lothian District Council in Scotland, for example, provided residents with energy efficiency advice and asked them to submit their meter readings on a weekly basis. After three months savings of 10 per cent were reported, and the new behaviours were judged to be entrenched (WLEAP reported in ECI 2006). These results were achieved despite the fact that the meters were often situated in inaccessible places and reading them required considerable effort.

52. Research from other countries shows that considerable savings can be achieved from direct displays and monitors separate from the meter. Three studies, one very recent one carried out in Canada, have concluded that 'savings are typically of the order of 10 per cent for relatively simple displays' (Mountain 2006 reported in ECI 2006).

There are also promising indications from research into providing feedback via TVs and PCs. For example, a study in the Netherlands over nine months with 137 households using interactive web pages found energy savings of 8.5 per cent (Benders et al. 2005, reported in ECI 2006). A trial to test the effectiveness of feedback by digital TV is being run in the UK by the Market Transformation Programme (ECI 2006).

53. The most significant benefits from the installation of two-way meters⁵ in all households are likely to be their potential to encourage lower energy consumption and a shift in consumption from peak to off-peak periods, according to one study. However, the quantification of these benefits requires further testing since existing research ‘tends to be small-scale and almost exclusively focused on electricity rather than gas’ (Ofgem 2006). Other research concluded that consumer benefits from the installation of two-way meters would be ‘likely to result in a reduction in demand in the region of one to three per cent’ (Sustainability First 2006).

54. Experience in Northern Ireland with keypad prepayment meters⁶ suggests that energy use has been cut by around 3 per cent in the households in which they are installed (NIE 2003). It is not yet clear whether this level of reduction has been sustained over time, but the results of further research designed to test this are due shortly⁷. Research in Ontario using similar meters found savings of between 15 and 25 per cent. The difference may be accounted for by the type of information presented to consumers, and requires further testing (ECI 2006). It may also be accounted for in part by the circumstances of the households in which they are installed. Low income households may not have the same potential for reducing energy use as other households, and in fact households in fuel poverty may well need to increase their energy use just in order to maintain an adequately heated environment.

⁵ ‘Smart’ meters fall broadly into two categories: one category allows for one-way communication from the meter to the data collector – as a minimum enabling automated meter reading or ‘AMR’; a further category allows for two-way communication between the meter and the supplier – enabling a wider range of functions known as automated meter management (AMM). A further refinement of the second category is an Interval Meter, which is a two-way meter with the capability to store and communicate consumption data by time-of-use, for example at half-hourly intervals (Sustainability First 2006).

⁶ Keypad meters use a dedicated, encrypted code which is issued to consumers either by telephone or at designated outlets. The meters have a clear display and are can be situated anywhere in the home. Tariffs changes can be made remotely, and the meters are theft proof.

⁷ Keypad meters are now installed in over 200,000 homes, or one third of the total.

55. Research into water efficiency compared attitudes and behaviour among consumers with and without water meters. This revealed a greater inclination amongst metered consumers to undertake water-efficient activities (CCW 2006). Furthermore, most respondents, both those with meters and those without, said they would be more likely to reduce their water consumption if they had a display in the home that showed their water usage in real time. The circumstances of water metering are of course different from electricity and gas metering, but the research findings nevertheless tend to re-enforce findings from other studies.

56. Carbon Trust has carried out some field trials on the potential of advanced meters in the SME market. Its early experience indicates that advanced metering, if properly used as a demand management tool, can reduce energy consumption (and costs) by between 10 and 15 per cent. In addition, effective energy and carbon management (i.e. actively managing risks and opportunities associated with climate change and carbon emissions) relies on the availability of appropriate management information (Carbon Trust 2005). Full results are not publicly available yet.

4.5 The effect of microgeneration on consumers' engagement with their energy consumption

What are consumers' perceptions of micro-generation? How does the presence of micro-generation affect consumer behaviour?

57. There is very little published research in this area. This is mainly due to the fact that, until very recently, there have been relatively few micro-generation units installed in domestic premises⁸. Monitoring the units' effect on energy consumption and greenhouse gas emissions will typically require the study of behaviour patterns over at least two winters. However, some research has been carried out in households with solar PV. It shows that, where there is information clearly displayed within the home along with the

⁸ By 2006 there were some 100,000 micro-generation units installed in domestic premises, 80,000 of which were solar water heating panels.

solar PV panel⁹, electricity consumption can be cut by as much as 20 per cent (ECI 2005).

58. There are various user trials in progress designed to evaluate the effectiveness of micro-generation technology. An important element of these trials is to understand how consumers interact with the technology, and how it impacts on the household's energy use and greenhouse gas emissions. For example, the Carbon Trust is carrying out trials of domestic combined heat and power, the Energy Saving Trust is carrying out trials of small-scale wind turbines and the Buildings Research Establishment has evaluated solar PV panels.

⁹ For example, information provided should cover total electricity generated by the solar PV panels, the amount of electricity being exported onto the grid and the amount of electricity being imported.

7. Conclusion and recommendations

59. This review looked at the existing body of primary research in order to understand better consumers' attitudes to their energy use. The review shows that there is a considerable amount of primary research into consumer attitudes to energy, including the environmental aspects of energy. This body of research rewards careful study and interpretation and provides many helpful insights into the links between consumer awareness, consumer behaviour and consumer motivation to act.

60. On the other hand, several of the most important studies are now around five years old. Many things have changed dramatically in that time, particularly in the last year. Consumer awareness of the existence of climate change and of the role of individual behaviour in affecting it has reached a 'tipping point'. It seems logical to assume that, if the same research were carried out again today, the results would be different. There is therefore a strong case for bringing the research up-to-date.

61. Economists find it puzzling that consumers do not appear to act rationally in relation to energy efficiency improvements, given the economic, social and environmental gains that can easily outweigh the costs. Many studies have explored this paradox, and shed some useful light into it. There remains considerable scope for further public engagement work in this area. Behavioural experts suggest that there is considerable potential in using a market segmentation approach to tailor energy efficiency messages carefully for particular groups of consumers. This promising approach needs further investigation.

62. The majority of the research reviewed was carried out among domestic consumers, although some important research has been carried out among SMEs. This group of consumers appears to be particularly disparate, and so hard to reach and to motivate. It would thus reward further understanding and could usefully be an object of further research and engagement work.

63. A new area of interest is that of micro-generation. To date, very little research work has probed consumer attitudes to micro-generation, or has looked at how consumer behaviour might change in the presence of micro-generation. Several user trials are

underway, and these are likely to shed light on consumer behaviour in the presence of micro-generation. Nonetheless, consumer attitudes would merit further investigation.

64. There are several trials underway to investigate how consumers' energy use changes with 'smart' meters and display only units. These build on studies carried out in other countries, but the results will not be available before 2009. The Carbon Trust is investigating whether 'smart' meters can affect the energy use of SMEs, with the results available later in 2007. The evaluation of these trials should provide a wealth of information as to how consumer behaviour changes with direct feedback.

65. Primary research is indispensable for understanding consumers' views and preferences. Despite the many caveats which apply to the methodological approaches used, the body of research builds up a coherent picture of consumers' attitudes to energy. This picture, which is evolving over time, in turn informs the way we define the interests of consumers in relation to energy. Our interests as consumers and as citizens are closely linked, and particularly so in relation to the environmental aspects of energy. This relationship merits further consideration.

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