

Learning about energy – how will low-impact energy use become a way of life?

Sarah Darby

Lower Carbon Futures
Environmental Change Institute, University of Oxford
c/o Department of Zoology
South Parks Road
Oxford OX1 3PS
UK

Keywords

Social learning, tacit knowledge, demand reduction, electricity disclosure, tipping point

Abstract

Consumers are never *just* consumers. In this paper, they are viewed as learners and citizens – and sometimes as producers – who make energy-related choices with personal and social implications. These choices are based on tacit knowledge or ‘know-how’, which is seen as being constructed from three main sources: (1) generally-available information; (2) their experiences of taking action; and (3) feedback on their energy consumption. Knowledge and action are developed through synergies, rather than from linear processes, and this is something that can be difficult to capture in theoretical and experimental terms.

The concept of a tipping-point is discussed – the point at which a combination of factors becomes powerful enough to cause significant, self-generating change. Analysis of these factors shows connections with learning processes: a tipping point can be seen as a critical point along a social learning curve. Some recent research findings from the UK and elsewhere are considered in relation to learning theory, the tipping point and the power of context in influencing energy-related decisions. Examples from studies of learning about domestic energy use and electricity disclosure are given, showing some of the synergies involved.

The paper shows that there is scope for research into how people learn more sustainable patterns of energy production and use, along the lines suggested by the metaphor of the ‘social epidemic’. Some of this research needs to venture further into political and structural considerations than has

been usual in the past, in recognition of the many concerns that a single individual may believe to be important. It is realistic to acknowledge the role of crises and unexpected events in changing behaviour, but that does not diminish the importance of more predictable, if complex, processes in spreading ideas, habits and technologies.

Introduction

To call the individuals who use and pay for energy services ‘consumers’ is useful for some purposes, but it obscures many realities. These same consumers are also the individuals who, between them, carry out a wide range of functions in relation to energy use. At work and at home, they design, install, adjust and repair energy-using equipment and energy-conserving measures. They think about, discuss and decide what to do about their fuel consumption and also, increasingly, whether to produce some of their own energy. As citizens, they absorb or reject ideas concerning energy supply, use and impact, and may debate and vote on policy at local, regional or national level. All this happens within the context of what they already know from their life experience: they relate to energy use on a number of dimensions, emotional and cultural as well as technical and economic (Dake and Thompson 1993; Shove and Wilhite, 1999). Energy is rarely thought of solely in simple functional terms, but in terms of the daily conduct of life and users’ sense of their own identity, or the aesthetic and ethical choices facing policy makers (Bartiaux, 2003; Oreskes, 2004).

Interpersonal and structural relationships are significant factors in learning – for example, people want to trust the accuracy and motives of a source of knowledge before acting

on that knowledge. Willingness to engage in public debate (a form of social learning) can affect readiness to adopt a new form of electricity generation, which is in itself an experimental, learning process (Ek, 2005). What we observe as energy-related behaviour is part of what may be a long sequence of mental processes and social interactions, and the learning that takes place in relation to such behaviour is well worth study if we wish to understand behaviour better.

In studying consumption, we are in fact caught up with millions of other learners in a constantly changing situation. In this paper, I develop the proposition that we are all engaged in building a body of 'tacit knowledge', a fundamental ability, gained from experience, that allows us to select what it is that we want to know, and to interpret and use new information (Polanyi 1969). Tacit knowledge about energy may be acquired by study or by working in the energy industry, but it does not need to be intellectualised or specialised: it is also gained from daily life, for example by operating a heating system. Everyone has a body of tacit knowledge that forms the choices they make and the behaviour they adopt (Darby, 2003a). The aim here is to capture some of the processes going on, rather than the attributes of learners (socio-economic, attitudinal, etc). In doing so, I take a broadly constructivist view of learning – that is, taking into account that learning has both cognitive (critical and analytical) and affective (emotional and relational) aspects; and that individuals interpret new information from their environment in the light of previous experience (Wadsworth, 1996). This approach to learning is discussed in connection with the notion of 'social epidemics' that can produce 'tipping points' beyond which there is a marked, large-scale change in behaviour. It is appealing to think of the possibility of reaching a tipping point beyond which low-impact energy use would become a way of life, but is it mindlessly optimistic? This question is approached by looking at synergy in learning about energy, or in moving towards a tipping point in behaviour.

Energy and synergy: technological regimes, infrastructures and personal routines

Energy research into demand-side issues has tended to concentrate at the extremes of the decision spectrum: policy-making at one end and individual consumer choices at the other. This has led to strange omissions, as though energy policymakers were immune to behavioural or emotional considerations when carrying out their work, and consumers were incapable of innovation or involvement in policy debate as they go about the business of consuming. It has also meant that relatively little attention has been given to intermediate processes, such as the organisation of energy services (Shove and Wilhite, 1999) and to the significance of whole technological regimes and the possibilities for change from one regime to another (Berkhout, 2002).

Yet all these need bringing together: *'consumption is not the isolated act of an individual ... the policies to deliver ... potential savings depend on a society with shared environmental concerns and commitments and an institutional framework which clearly encourages sustainable choices'* (Fawcett et al, 2000). Breaking out of high-consumption technological regimes into a lower-

consumption and low-carbon regimes requires many changes, some of which may have to be slow and incremental, some that we cannot imagine at present and some which could be large-scale and radical. It is the synergy between these changes, and what we learn from them, which will determine how sustainable our ways of life become.

Attention to synergistic effects in connection with learning is becoming more noticeable in energy research. There is increasing interest in the role of knowledge or awareness, not just actions or physical changes, in relation to policy interventions or programmes – for example, when studying the impact of the EU Energy Label, or the changes in behaviour that might result from installing photovoltaic panels on domestic roofs (Winward et al, 1998; Haas et al, 1999). The description and analysis of actor-networks that can bring about widespread adoption of condensing boilers shows an institutional framework with several intermediaries between policymaker, producer and consumer (Banks, 2001). Work on the combination of influences that led to large-scale uptake of low-energy lighting in Hungary shows how aesthetic and structural factors together overcame what might have been a standard 'rational-economic consumer' response, that the new lights were too expensive to be worth buying (Urge-Vorsatz and Hauff, 2001). Fischer (2003) points out the significance of collective, co-ordinated action for energy sustainability as something more than the sum of each individual action – and the social learning that can take place in the course of collective action.

The tipping point

The 'tipping point' is a phrase that has passed into general use over the last few years since the book of the same name was published (Gladwell, 2000). It is the point at which an idea (or a form of behaviour) is adopted by enough people to reach a 'critical mass' beyond which it becomes mainstream, as a virus might spread among a population to cause an epidemic. Gladwell applies this epidemiological metaphor to a variety of phenomena such as fashion trends, crime rates in New York City, the design of TV programmes to promote child literacy, teenage suicide in Micronesia and anti-smoking campaigns in the USA. The metaphor is more convincing for some of these than others, but Gladwell's three central conditions for the spread of an epidemic are well worth considering from the point of view of energy use. These are set out below.

THE LAW OF THE FEW

This might also be called the 'agent factor'. According to this, major changes rely on relatively few people who infect others with an idea. Between them, they need to be clear-sighted about what needs doing (whether this be to start a fashion or to found a new social movement), charismatic, trusted, influential and good at networking. Leadership is important, but the prime movers in a social epidemic will not necessarily be those in established positions of power. Examples of 'positive deviance' in health promotion show that, at a local level, a few individuals can raise the health status of whole communities by passing on their know-how about infant nutrition, hygiene or safe sex (Marsh et al, 2004). The importance of personal communication and

trusted individuals, even in large-scale energy conservation campaigns, was noted many years ago by Costanzo et al (1986) and was analysed and discussed recently by Fischer (2003).

THE ‘STICKINESS FACTOR’

This refers to the message that is being conveyed and the extent to which it will be clearly enough understood to ‘stick’ in people’s minds. The message, or the new type of behaviour, must be coherent and must make sense in the context into which it is delivered. Gladwell points out that successful messages tend to involve something unusual, off-beat or counter-intuitive. They may be arrived at by accident, but are often the result of painstaking experiment.

There is some experience to draw upon in energy research. ‘Stories’ containing concrete, vivid material that is integrated with common experience are often the most powerful and effective means of conveying messages about how to live in more environmentally-friendly ways in an industrial or post-industrial society (Kearney, 1994; Lindseth, 2003). An analysis of environmental concern in the UK concludes that too much effort has been expended on the ‘romantic notion’ that scientific knowledge, rather than social connectedness, leads to changed behaviour. Debate might be more fruitful if it explicitly linked environmental with social concern and a sense of collective identity (Witherspoon, 1994). And belief in the effectiveness of personal action is vital for the development of environmentally-sound behaviour (Wilhite and Ling, 1992; Eden, 1993).

There are not many documented examples of successful ‘sticky’ messages in energy conservation, though ‘Aus. Wirklich Aus?’ seems to be one (Wortmann and Moehring-Hueser, 2003). In this campaign, humour, surprise and professional advertising skills were used to make the audience receptive to a very simple message about their standby power. They were unsettled at the thought that they were paying for wasted energy, and this made them curious to know more. It is possible to evaluate the extent to which they understood and acted on the *direct* message of the campaign, but the authors comment that it is impossible to know how broadly the message spread to other related issues of energy efficiency and climate protection. The message ‘stuck’, but

had not yet become part of an epidemic of changed behaviour. For that, more is needed.

THE POWER OF CONTEXT

However persuasive the agents and however clear the message, an idea or a form of behaviour will not take root unless the context is favourable. Anyone advocating large-scale energy demand reduction in the countries where this is an urgent matter needs to take into account a context in which consumption is continually promoted, where ‘sticky’ messages about what it is desirable to consume are everywhere, and where it is difficult for most people to imagine it being otherwise without unemployment, discomfort and other hardships. There are clearly parallels between the power of context in generating a tipping point and the technological regime under which people are living at a given time. Once it has become normal to rely on frozen convenience foods, for example, it becomes harder to change eating habits to those which do not require freezers and microwave ovens.

Synergistic learning about energy – an example

An example from a survey of householders in an English village illustrates the synergies that can occur between general information, action and feedback, and also the way in which a householder’s perception of him/herself as energy conscious is likely to be supported by the extent to which s/he is using taking action and using information and feedback. All the data come from Darby (2003b).

The householders were asked a range of questions about their homes, energy expenditure and the energy efficiency measures they had installed and planned to install. They were also asked about whether they had sought advice on energy-related issues in the home, about the formal and informal sources of help and information that they used, and about whether they checked their meters and fuel bills. Finally, they were asked about whether they considered themselves to be energy-conscious, and whether they thought that they were careful in their day-to-day fuel use.

Interpreting the dataset gave some valuable clues as to how people learn about their energy use: how an epidemic of useful knowledge and action on energy might spread.

Table 1. Self-assessment of energy-consciousness and indicators of learning about energy.
Table 1: self-assessment of energy-consciousness and indicators of learning about energy

	‘Strongly energy-conscious’ (n=21)	‘Fairly energy-conscious’ (n=148)	‘Not really energy-conscious’ (n=51)
Self-assessment as ‘very careful’ with fuel use ***	76	24	6
Solar water heating planned or installed ***	48	17	10
Discussion of energy-related issues in the home ***	86 (12/14)~	57 (65/115) ~	29 (11/38) ~
Monitored electricity usage (read meter, checked & kept bills) *	52	31	18
Had asked for energy advice*	38	19	10
Read meter regularly *	57	38	24

~ only those in households with two or more adults were counted.
 *** differences significant at p<0.001, χ^2 test
 * differences significant at p<0.05

Table 2. Self-assessed energy-consciousness and installation of energy efficiency measures among householders in an English village.

	Strongly energy-conscious (n=21)	Fairly energy-conscious (n=147)	Not really energy-conscious (n=51)
Mean number of energy-related alterations since moving into dwelling	3.19 ¹	2.43	2.12

¹different from column 4 (not really energy-conscious) at $p < 0.05$, Mann-Whitney U test

Notes: (1) the figures given are means; however, the significance test used relates to the median figures for each column. (2) non-respondents to the question on energy consciousness are omitted from the table.

Table 3. Energy-related alterations made by DIY enthusiasts and others.

	DIY often (n=80)	DIY occasionally (n=92)	DIY seldom/never/no response (n=60)
Mean number of energy-related alterations since moving in	2.84 ^{1,2}	2.26	2.00
Mean number of energy-related plans for next two years	0.64	0.47 ²	0.17

¹different from column 2 (occasional DIY) at $p < 0.05$, Mann-Whitney U test.

²different from column 3 at $p < 0.01$

Note: the figures given in the table are means; however, the significance test used relates to the median figures for each column.

The usage of general information – including knowledge that burning fossil fuels was a major contributor to accelerated climate change – turned out not to be particularly important, although the more energy-conscious respondents did remember using more sources of general information about energy than the less energy-conscious. But the more significant elements in becoming energy-conscious were more specific, sometimes involving interactions with others: being careful about fuel usage through daily housekeeping actions, monitoring electricity use, discussing energy use with others in the home and seeking energy advice (Table 1). The more energy-conscious respondents also had the curiosity and the willingness to plan ahead, with several considering solar water heating or (in two instances) installing it.

Self-reporting of a quality such as energy-consciousness is of course open to question. However, the energy-conscious householders did have something objective to show for their claim. Those who thought themselves to be most energy conscious had installed more efficiency measures than those who did not see themselves as very energy-conscious (Table 2). Some of these households were visited a few months after the survey, and it was possible to check that the claimed measures had been installed.

The installation of efficiency measures, and the willingness to think ahead about them, appeared to be rooted in wider abilities: there was a correlation between those who did and planned the alterations that were directly linked to energy use (insulation, new heating systems, use of renewables) and those who practised Do-It-Yourself in the home (Table 3). In learning theory terms, they had practical skills that formed a part of their body of tacit knowledge or know-how, and these skills contributed to making them able to plan (think about acting), as well as to act. In terms of tipping points, these were people whose life-context made them more receptive to messages about energy efficiency or conservation.

While these findings above do not necessarily show individuals reaching a tipping point, they do illustrate synergies in learning between information and action taken, and between the use of feedback (bills and meters), action and knowledge. They also demonstrate a social dimension to learning, when energy awareness is linked to a willingness to discuss energy and to seek out information and advice. The study also demonstrated how this information and advice often came from informal sources and was assembled sporadically and often almost randomly: as du Pont and Egan showed (1999), people frequently use heuristics, or rules of thumb, in making decisions – not a formal mode of learning.

Tipping points and learning about energy

We are not particularly interested in the idea of a tipping point or social epidemic in relation to short-term fashions, but in relation to longer-lasting processes that are set in motion as a response to intractable social problems, such as crime or smoking-related diseases. Do the three tipping point factors given above apply to consumer societies with a limited understanding of how to use energy sustainably, and what looks like an even more limited collective ability to bring about sustainable use?

Broadly, yes. It is not difficult to interpret all three 'tipping point' factors in terms of social learning. The message that is 'sticky' enough to succeed if promoted by a suitable agent is a message (or a form of behaviour) that makes sense in the context of people's life experiences in a given society. These life experiences may be very different, even the context for the learning may be the same for all: a major energy conservation campaign during the recent Californian energy crisis demonstrated that a message may have to 'stick' in a variety of ways if it is to make sense to most members of a culturally diverse population (Bender et al, 2002).

At the level of the individual rather than the society, as illustrated above, there is evidence that people can and do

learn about energy and other issues in a cumulative way that ‘takes off’ after a critical point. Beyond this, they have the basic knowledge that allows them to seek out information, select what is useful and relevant, make sense of it and act upon it. Effective learning about personal energy consumption involves the use of information, taking action of some sort to improve the home or alter the energy arrangements, and the use of feedback on consumption. Different people will use different combinations of these elements, but all are vital in the development of the ability to use energy efficiently and to start thinking ahead to possible futures. Some individuals will need help in the early stages, however – hence the importance of personal contact through well-resourced energy advice programmes (Darby, 2003a).

Building awareness of energy use and environmental impact

Moving outwards from energy use in the home, a large number of surveys now show that there is considerable concern about environmental issues among European householders in a general sense. But the signs are that many people do not yet see a clear link between energy-conserving behaviour at home and lessening their impact on the environment. If they do, they are not automatically willing to act on that knowledge (Lofstedt, 1993; Tinch et al, 2003).

While 81% of respondents in a recent survey of the UK public claimed to know something about climate change 90% expected it to affect the UK, and 92% said that they would be prepared to spend money insulating their home, install more efficient heating or use less energy, in order to reduce the impact of climate change. Yet 44% thought that changing their own behaviour would make no impact (ICM, 2004). These responses are probably not as contradictory as they may seem. They could well show an understanding that there is far more to energy conservation than individual action, and a willingness to cooperate that would be strengthened if demand reduction became normalized and received strong institutional support. In the UK, the government is widely seen as holding the primary responsibility for energy efficiency, with some support for carbon taxes and subsidies for green energy (Tinch et al, 2003).

The evidence from surveys, broadly, is that while sometimes an energy awareness *message* is widely acknowledged, there is still a lack of the *social connectedness* that could bring about substantial and lasting change. Above all, there is not as yet the *context* in which energy use for sustainability makes enough sense to bring about concerted action on a daily basis. The following research findings show how context and life experience affect individuals’ views of what is possible and desirable in reducing the environmental impact of the electricity they use.

Synergies in learning about the environmental impacts of electricity

The ‘4CE’ project – Consumer Choice and Carbon Consciousness: electricity disclosure in Europe – set out to promote electricity disclosure in order to assist consumers to make an informed choice in a liberalised electricity market.

The central idea was to allow for consumer choice based on the fuel mix used in generating a particular electricity ‘product’ from a supplier, and its environmental impact. The educational tool of disclosure would give buyers the option of contributing towards a market ‘pull’ towards electricity from renewables, at the same time as national government policies were moving in that direction by encouraging more generating capacity.

The project developed various disclosure information systems and label designs; it also investigated what the labels would mean to consumers and what they wished to know, through a combination of telephone surveys, focus groups and interviews (Boardman and Palmer, 2003). The surveys, of 200 respondents and 100 SMEs in each of 10 European countries, showed very clearly that while around 80% were aware that the use of fossil fuels contributes to climate change, they did not necessarily understand the mechanism by which this happened or the significance of fossil fuels relative to other contributory factors. In this, they were in line with many other surveys. However, the 4CE surveys showed the strongest levels of concern about the impact of radioactive waste, and the preferences for fuel mix reflected these dual concerns about climate change and nuclear power. 82% of householders and 85% of SMEs said that they would prefer to buy electricity whose generation had a low impact on climate change and produced no nuclear waste.

So far, so good. The respondents, interviewed in their capacity as consumers, had spoken about their knowledge of electricity generation, climate change and preferences for fuel mix if they could choose electricity in the same way that they can buy a jar of sauce, on the basis of the ingredients on the label. But the focus groups carried out for the 4CE study in five countries demonstrated that it was necessary to go beyond a simple view of ‘the consumer’ in order to understand what was happening in people’s minds and what the potential for electricity disclosure might be. Their responses are summarised in Arvidson et al, 2003.

First, it was clear that some customers needed a compelling mental picture of what was going on when they bought their electricity, in order to be convinced that it was possible to buy different ‘types’ of what they saw as an undifferentiated stream of electrons. A participant in one of the UK focus groups argued that:

If I had a jug of beer and a jug of whisky and I put it all into one, where’s it come from? ... You are buying electric, some is being fed from wind farms, some from gas, some nuclear, some from coal – or some electricity comes across from France... when it comes down the wire into your TV set, you can’t get a label and say “This has come from a wind farm”, because it hasn’t.

(This opinion came from a country with several years’ experience of a liberalised electricity market. Similar views were expressed more strongly in Hungary, which at the time of the research had no such experience. The Hungarian companion study of focus groups discussing electricity disclosure, part of the same 4CE project, concluded that consumers were not yet ready to turn down their consumption as a consequence of fuel mix disclosure. They needed the *experience* of choice, along with clear, specific, information about something that they were concerned about. Electricity disclosure would not have a rapid impact on customer

choices in a newly-liberalised market because the consumers, as learners, would need time to get used to having a choice at all, and to develop trust in their supplier. They would have to think through whether it was possible to choose electricity that was in some way different from the stream of electrons that flowed into their neighbour's home. And they would have to be convinced that buying green electricity was a worthwhile way of translating their environmental concern into a practical choice for environmental health. However, if these conditions were met, it seemed likely that disclosure would be valuable as much because it contributed to a broader stream of learning and energy-awareness as because it meant that demand for green electricity would increase: it might assist energy-conserving behaviour (Soos and Urge-Vorsatz, 2003.)

The 'consumers' in the English focus groups also responded as citizens in their consideration of possible consequences of switching supplier on the basis of fuel mix. Could individuals realistically be given the power of choice of their fuel mix?

What would happen if [information] is presented to people in this format [a pie chart showing the fuel mix, on a bill] and people ... switch to suppliers that are more coal-orientated so that nuclear power stations go bust and there's over-emphasis on coal? ... I just think that too much information can be a little bit dangerous because if we all had a choice of saying... coal is damaging, but it's better than nuclear – then we could have major problems in supply in the future.

Some saw fuel choices in ethical terms:

...for me, the ethics would be quite important but we're not given that information. I mean, if there's an easy way of looking at all the competitors and seeing who is actually ... investing in wind farms and who's investing in nuclear energy, that might well have a very significant effect on who I choose to use.

It mattered to one participant whether the coal came

From a coal supplier from a decent working mine, or is it cheap imported coal from Eastern Europe, where life expectancy is very low for miners?

There were political questions of autonomy and accountability:

I think that we ought to be self-sufficient as an island particularly, and I think there are complications with reliance on Europe [sic]. It's partly political, but I think it rather sad that we ...allowed our basic resources to be managed from abroad – there is something that just goes against the grain for me personally, an emotional reaction.

Also, not everyone was convinced that competition was a useful way of supplying a basic commodity such as electricity, which performs the same function regardless of who it comes from:

I have never been dissatisfied with either the gas or the electricity supply and I find it, compared to what we were paying 20 or 30 years ago, ridiculously cheap but ... I hate being hassled [by salesmen].

Between them, the members of the focus groups discussed the extent to which individual choice was possible and realistic. Some argued for choice:

One of the reasons why fresh organic produce wasn't available to buy is because people didn't quite realise the differ-

ence at that time.... They didn't stock it because it was perceived to be not profitable. Now it's the complete other way round....people are demanding more organic food because they're much more informed and want more natural produce so now there's a market for it, now they're stocking it and they're making money from it so it could be that people will demand to have clean [power]

This was balanced by awareness of the political dimensions of their energy supply, where the choices were made not by them, but by their government:

A: We could get rid of this nuclear ...tomorrow if the British government would not subsidise nuclear energy...

B: And that won't make any difference to the Grid?

A: It won't make any difference to the supply because they're over-supplied at the moment... Sorry, it's a bit of politics...

Did actual choices square with what respondents said in these groups? In the UK, pre-disclosure, fewer than 100,000 householders have so far chosen a green electricity product. Yet the 4CE survey found that 40% of the 200 householders interviewed would be willing to pay 5% or more extra for electricity with a low impact on climate change (Arvidson et al, 2003). There is a large mismatch between expressing interest and taking the simple steps necessary to change to a renewable supply of electricity, and it cannot simply be explained by a lack of information.

Is this situation likely to improve once we have disclosure throughout the European Union and it becomes normalised? We have yet to find out. But at this point, it is clear that the consumers who took part in the focus groups also saw themselves as citizens who take an active part in production, management and decision making at some level within their society, and that some of them did not believe that environmental choices should be aimed primarily at the individual. Disclosure is a means of making information available to the citizen that previously was only available to government and to energy industry insiders. It is a means of engaging individuals in choices and adding to other forms of learning, at the same time as it reminds them that their government is primarily responsible for generation fuel mix and that there are public policy choices to be made.

In terms of reaching a tipping point, beyond which renewable electricity becomes mainstream, some of the *context* appears promising at first: people express their concern about climate change and radioactive waste, their goodwill and even their willingness to pay for electricity from renewables. The *message* could become 'sticky', although the testing of label designs on focus groups showed that it is not easy to convey the information in a way that is easily understood. There is, so far, a lack of '*people factor*,' which could be overcome given sufficient demonstrations of renewable technology and people willing to talk about them. However, the focus group findings show how participants resisted the idea that it is worth investing too much hope in individuals to bring about a substantial change in electricity supply mix. The nature of electricity (uniform flows of electrons) and the scale of the issue convince many individuals that their actions are of little consequence compared with those of government. They raise issues of credibility, accounting for the origins of the supply, and the adequacy of renewable generating capacity to meet demand. Individual learning is

cumulative and electricity disclosure looks likely to aid individual learning; the context is improving, but not yet close to a tipping point.

What possibilities of reaching a tipping point towards a low-impact energy future?

To go back to the beginning – consumers are never just consumers. Talking about them as such ignores issues that in fact we must not ignore: the limitations on choice that are set by political decision on energy supply and use, the role of individuals and collectives in making those decisions, and the context in which decisions are made. It also closes off a useful line of inquiry into the building of tacit knowledge, by limiting the importance of ‘know how’. The more we take into account aspects of life other than consumption, the more we open up the possibilities for changes in behaviour.

The importance of synergy in learning was demonstrated and discussed. A second type of synergy is at work in changing behaviour: that identified in ‘The Tipping Point’, between context, message and the people who generate and spread a message. This paper has reviewed evidence that, while there may be some generalised willingness to change habits in response to environmental dangers, we are usually still far from a tipping point in the direction of sustainability. This is at least partly because of a lack of connectedness between the global and the immediate and local in most of the messages that we absorb in a consumer culture; partly because of a lack of experience in the day-to-day practical and political realities of living sustainably that can be transmitted from person to person, formally or informally. The findings from the electricity disclosure investigation show that people view energy not only as consumers but also as citizens. In order to translate environmental concern into a change in the fuel mix of ‘their’ electricity, a number of conditions have to be met: they have to have clear messages about their electricity, and they need to be satisfied that they are not on the end of some accounting trick that makes it appear that they are buying ‘green’ electricity (and in control), when in reality they may not be. For greater credibility, their government needs to be seen to be bringing about changes in greening the supply mix. Until electricity labelling has been in force for a few years in the EU, it will not be possible to know how effective it has been in changing perceptions and actions, contributing to social learning along with other initiatives such as informative billing.

Disclosure is not demand reduction – just a potential step along the way, an element in a process of changing thinking and behaviour. But the members of the focus groups remind us that, as citizens, they are concerned, they are curious, and some, at least, expect and want their government to give a lead on major issues such as electricity.

Low-impact energy use will only become a way of life through being normalised, to state the obvious. In looking at how normality might change in a low-impact direction, we can usefully adopt the metaphor of the social epidemic and ask whether messages are getting clearer? Is the context more supportive to efficiency and demand reduction than it used to be? Is the leadership emerging? All these have to be taken into account in looking at the prospects for low-impact

energy use. Changes in the incidence of smoking and drink-driving show that it is possible to change ingrained habits when enough people see the cost of certain types of behaviour as too high; and the experience of the Californian energy crisis of 2000 shows that, in extraordinary conditions, substantial changes can be made in energy use in an industrialised nation (Bender et al, 2002).

Because of what we know about the nature of learning and the conditions for ‘social epidemics’, it becomes possible to imagine a benign tipping point when science and social concern can both be used to generate a clear message, put forward persuasively by trusted individuals and backed by reliable technology, adequate training and infrastructure. The idea of a tipping point in energy use is not a piece of wishful thinking – it can be based on what we know about learning and about social organisation. The synergies involved make it impossible to predict tipping points with any accuracy, but analysis of what factors are necessary in building up new and benign patterns of behaviour prepares the way for encouraging these patterns to emerge.

References

- Arvidson A, Johnson FX, Nordstrom M and Palmer J (2003) *Consumer attitudes to electricity disclosure in Europe*. A report prepared as part of the ALTENER project *Consumer Choice and Carbon Consciousness: electricity disclosure in Europe*. Environmental Change Institute, University of Oxford
- Banks N (2001) *Socio-technical landscapes and the sad case of the condensing boiler*. Proceedings, 2nd International Conference on Energy Efficiency in Household Appliances and Lighting. Italian Association of Energy Economists/EC-SAVE programme.
- Bartiaux F (2003) *A socio-anthropological approach to energy-related behaviour and innovations at the household level*. Proceedings, European Council for an Energy-Efficient Economy, 6.184
- Bender SL, Moezzi M, Gossard MH and Lutzenhiser L (2002) *Using mass media to influence energy consumption behaviour: California's 2001 Flex your Power campaign as a case study*. Proceedings, American Council for an Energy-Efficient Economy, 8.15 – 8.28
- Berkhout (2002) Technological regimes, path dependency and the environment. *Global Environmental Change* 12, 1-4
- Boardman B and Palmer J (2003) *4CE* final report, prepared as part of the ALTENER project *Consumer Choice and Carbon Consciousness: electricity disclosure in Europe*. Environmental Change Institute, University of Oxford
- Costanzo M, Archer D, Aronson E and Pettigrew T (1986) Energy conservation behaviour: the difficult path from information to action. *American psychologist* 41 (5) 521-528
- Dake K and Thompson M (1993) The meanings of sustainable development: household strategies for managing needs and resources. *Human ecology: crossing boundaries*, eds SD Wright, T Dietz, R Borden, G Young and G Guagnano, pp 421-436. The Society for Human Ecology, Fort Collins, CO, USA

- Darby S (2003a) *Making sense of energy advice*. Proceedings, European Council for an Energy-Efficient Economy, 6.076
- Darby S (2003b) *Awareness, action and feedback in domestic energy use*. Unpublished DPhil thesis, Environmental Change Institute, University of Oxford
- Du Pont P and Egan C (1999) *Consumer information processing and effective program design*. Proceedings, European Council for an Energy-Efficient Economy, 2.13
- Eden SE (1993) Individual environmental responsibility and its role in public environmentalism. *Environment and Planning A* 25, 1743-1758
- Ek K (2004) Public and private attitudes towards "green" electricity: the case of Swedish wind power. *Energy Policy* 33, 1677-1689
- Fischer C (2003) *Beyond households: discovering the collective consumer*. Proceedings, European Council for an Energy-Efficient Economy, 6.050
- Gladwell M (2000) *The tipping point: how little things can make a big difference*. Abacus, London
- Fawcett T, Lane K and Boardman B (2000) *Lower carbon futures*. Environmental Change Institute, University of Oxford
- Haas R, Ornetzeder M, Hametner K, Wroblewski A and Hubner M (1999) Socio-economic aspects of the Austrian 200kWp photovoltaic rooftop programme. *Solar Energy* 66 (3), 183-191.
- ICM (2004) Poll of British adults on climate change
- Kearney A and Kaplan S (1997) Towards a methodology for the measurement of knowledge structures of ordinary people. *Environment and behavior* 29 (5), 579-617
- Lofstedt RE (1993) Hard habits to break: energy conservation patterns in Sweden. *Environment* 35 (2), 11-36
- Marsh DR, Schroeder DG, Dearden KA, Sternin J and Sternin M (2004) The power of positive deviance. *British Medical Journal* 329, 1177-1179
- Oreskes N (2004) Science and public policy: what's proof got to do with it? *Environmental Science and Policy* 7, 369-383
- Polanyi M (1969) *Knowing and being*. Routledge and Kegan Paul, London, UK
- Shove (2003) *Comfort, cleanliness and convenience: the social organization of normality*. Berg, Oxford, UK
- Shove E and Wilhite H (1999) *Energy policy: what it forgot and what it might yet recognise*. Proceedings, European Council for an Energy-Efficient Economy, 1.16
- Soos R and Urge-Vorsatz D (2003) *Turning down demand through electricity disclosure: are consumers ready? A survey of Hungarian residences and business*. Proceedings, European Council for an Energy-Efficient Economy, 6.210
- Tinch R, Peters M, Diaz-Rainey I, Monahan J, Waddams C and Tovey K (2003) *Powergen Energy Monitor 2003*. Powergen/University of East Anglia
- Urge-Vorsatz D and Hauff J (2001) Drivers of market transformation: analysis of the Hungarian lighting success story. *Energy Policy* 29, 801-810
- Wadsworth BJ (1996) *Piaget's theory of cognitive and affective development*. 5th edition, Longman, White Plains, New York
- Wilhite H and Ling R (1992) *The person behind the meter; an ethnographic analysis of residential energy consumption in Oslo, Norway*. Proceedings, American Council for an Energy-Efficient Economy, 1992, 10.177-10.185
- Winward J, Schiellerup P and Boardman B (1998) *Cool Labels: the first three years of the European Energy Label*. Energy and Environment Programme, Environmental Change Unit, University of Oxford.
- Witherspoon S (1994) The greening of Britain: romance and rationality. In *British Social Attitudes*, 11th Report, ed R Jowell. Social and Community Planning Research, London, UK
- Wortmann K and Mochring-Hueser W (2003) *Long term effects of an energy efficiency advertising campaign*. Proceedings, European Council for an Energy-Efficient Economy, 6.076