# Children, parents and home energy use: Exploring motivations and limits to energy demand reduction ☆

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## HIGHLIGHTS

- Separate focus groups were conducted with children and parents on home energy use.
- Children were motivated to save energy by being given responsibility.
- Parents viewed saving energy more positively when framed as educating their child.
- Material and social factors limit children's ability to save energy.
- The method may encourage openness by decreasing power imbalances.

## ARTICLE INFO

## ABSTRACT

While almost 30% of UK households include children, little research has attempted to present children's perspectives on home energy use. This study used focus groups with children and parents at two primary (elementary) schools in London, UK, to explore home energy use and energy feedback. Energy was found to be a little-discussed subject at home. Children derived more motivation to save energy from responsibility conferred by school activities than other (e.g. environmental) concerns, and some connected energy saving with dangers of using electricity (e.g. fire). Material and social constraints (e.g. access to outside space, parents' environmental attitudes) meant that it was sometimes difficult for children to save energy even when motivated. However, parents showed greater inclination to pay attention to energy saving when framed as supporting their child's learning than as a financial or environmental concern. Children were disinclined to reduce energy-consuming activities such as watching television, and while parents complained about children's energy use most saw it as a low priority issue. Policy implications of these findings are considered, and the approach employed is argued to be an effective way of investigating children's perceptions around energy use.

## 1. Introduction

Domestic energy use accounts for 26.5% of total final energy consumption in the UK, and a similar proportion of the country's carbon emissions (DECC, 2012a; DECC, 2013a). Of 26.4 million UK households there are 7.7 million families with dependent children (just under 30% of the total), and over 11 million individuals under the age of 18 (Office for National Statistics, 2012). Little research which has been conducted into energy use has children as its focus, so we have limited understanding of how a significant group of consumers (and the bill payers of tomorrow) think, make and affect decisions about energy use. This paper argues that this is an important deficit and, using findings from an explorative qualitative study into the use of energy feedback in primary school education, suggests some of the insights which can be gained from focusing energy research on children.

The study which informs this paper had as a launching point the use of energy in-home display (IHD) loan schemes in primary schools. Such schemes have been run before (for example the 'Adopt-an-Energy-Monitor' scheme by E.On) and are interesting because their characteristics – their hands-on nature and the fact that they require parental involvement – suggest that they should promote intergenerational learning (that is, both in child and parent) (Ballantyne et al., 2001). The possibility of such learning is an important consideration as real-time energy feedback (through IHDs) will be brought to every home by the end of the decade through the smart meter roll-out to which the UK is committed. However, the findings reported here go beyond this to include

exploration of the ways in which children and parents might be motivated or limited in their desire or efforts to reduce energy consumption.

The next section reviews research relating to children and energy use, with a particular focus on energy feedback. The focus group study is then outlined, followed by a results and discussion section covering views on energy use, energy feedback and motivations and limits to energy saving. The final section draws conclusions and highlights implications for policy and energy research.

## 2. Children in energy research

This brief review focuses on children and energy use in a developed country context, and considers how children have featured in energy research. Families with children generally use more energy in the home than those without and this use tends to increase as children grow older, thought to be due to greater use of information and communications technology (ICT) and consumer electronics by older children (Fritzsche, 1981; Brounen et al., 2012). A study in Japan by Yamaguchi et al. (2012) found children to be relatively low energy users compared to adults, using only a third to a half of the total energy consumed by working adults at home, in transport and at work. The study found children's residential energy use, however, to approach that of adults (although it is not clear how energy use is apportioned between family members and how uses which benefit children but which are not controlled by them, such as home heating, are dealt with). This should be expected to vary across cultures and from home to home, but it is difficult to say how because little research has focused on children as energy users.

Researchers have tended to concentrate their enquiries on the homeowner or 'head of household' as they pay the bills and make decision about efficiency improvements or product purchasing (e.g. Christie et al. (2011)). Recent qualitative studies such as Kidd and Williams (2008), Hargreaves et al. (2010) and Hargreaves et al. (2013) do just this to shed light on people's acceptance on and reaction to energy feedback. However, the insights which this approach can give into sub-household level dynamics can be one-dimensional, originating as they do from a single contact person in each household. Hargreaves et al. (2013, p133) explicitly call for: '… further research on the dynamics of household energy cultures … [employing] more in-depth ethnographic techniques to shed further light on micro-scale household interactions and dynamics …'

It has long been established that children can hold a measure of influence over their parents' purchasing and other behavioural decisions (Jenkins, 1979; Wilson and Wood, 2004). A number of recent energy-related studies have considered children in their design. FDS International (2010), Strengers (2011) and Grønhøj and Thøgersen (2011) employed whole-household interviews, including children where possible, to provide insights around the use of IHDs. Grønhøj and Thøgersen (2011) found that older children paid attention to feedback and did in fact curtail their energy use especially by switching off lights and unused equipment. Strengers (2011) also notes energy conserving behaviour by children, while FDS International (2010) and Grønhøj and Thøgersen (2011) both highlight parents' perceived usefulness of the IHD as a teaching tool. It is noteworthy that no direct quotes from child participants appear in any of these studies, and only Grønhøj and Thøgersen (2011) give any prominence to children's input – so detail is therefore scant. It is also possible that the household interview approach risks introducing power imbalances during the data collection process (such as between adults and children) which are commonly advised against when conducting group interview research (Green and Hart, 1999; Krueger and Casey, 2000). This may have an effect on the data

received if participants feel inhibited from sharing certain information or viewpoints.

Where research has been specifically undertaken into children's role in energy use, it has tended to focus around energy education and learning. DeWaters and Powers (2011) investigated energy literacy of high school students using a questionnaire which was designed to describe, but not explain, students' knowledge of energy use and the issues surrounding it. A study by Bartiaux (2009) looked at the extent to which children carry energy-saving messages home to their families. It investigates how their agency (or, simply put, capacity to act (Barker, 2008)) in the context of energy use affects (and is affected by) their ability to influence their parents. The study found that children who were generally more agentive were better able to influence their parents' behaviour in relation to energy. Such an approach is unusual and valuable in that it views children as actors in relation to energy rather than as passive participants. The researchers used joint parent/child interviews, which were essential in meeting the goal of assessing children's agency but inherently introduce the issue of power imbalance and risk of inhibitions described above. Focus groups made up solely of children have been employed by Heijne (2003), who found participants motivated to save energy by environmental concerns but sometimes speaking of their nervousness about telling parents about energy saving (e.g. a reported quote from one participant: "I felt a bit bossy, telling adults they're doing something wrong, rude if they already knew." (p39)). It is impossible to say whether a frank admission such as this would have been obtained from an interview where parents were also present, but no similar examples were found in the literature reporting household/joint interviews. As only structured interviews (providing mainly quantitative data) rather than focus groups were held with parents it is difficult to compare the detail of these responses with those of the parents (as reported in the study).

It should be clear, therefore, that even those studies which attempt to position children at (or relatively near to) centre stage can struggle to provide us with a rich and valid qualitative understanding of the role of children in home energy use and energy feedback. Using the results of the study outlined in the introduction, the remainder of this paper aims to explore children's perceptions of energy use, saving and feedback.

## 3. Method

### 3.1. Participating schools

This study was conducted in spring 2012. As previous IHD loan schemes were undertaken with children aged 9–11, it was decided to work with this age group and also parents (which term henceforth includes carers) and teachers of children in this range. This paper focuses on the findings concerning children and parents only. Two primary (elementary) schools in the north London area were recruited with the aim of including a range of approaches to environmental education, local household income and housing type.

One school (henceforth 'school 1') has a long-standing environmental education programme with some classes being held in the school's vegetable/nature garden. The school has made other sustainability interventions such as installing solar photovoltaic (PV) panels. The local area is dominated by council and housing association accommodation and the percentage of children entitled to free school meals (65–70%) is considered high by national standards – an indicator that many pupils come from low-income families.

The second school ('school 2') is approximately four miles (6.5 km) from school 1, but significantly fewer pupils are eligible for free school meals than at school 1 (50–55%, medium by national standards) indicating a more affluent local population. The school operates a 'green team' made up of a selection of pupils from every

class who go on trips, attend meetings and fulfil roles like emptying recycling bins and ensuring lights are switched off.

The decision to conduct the study with schools with a demonstrated commitment to environmental education was taken intentionally so as to allow elicitation of parents' views on their existing programmes (and such schools may also be considered more likely to undertake IHD loan schemes).

## 3.2. Data collection

The prime concern in selecting the method of data collection was to minimise barriers to the sharing of participants' (especially children's) views. The focus group – a type of group interview which Krueger and Casey, (2000) describe as permitting the researcher 'to understand how people feel or think about an issue, product, service and idea' – has been suggested to be particularly well suited to research with young people (Bagnoli and Clark, 2010). Focus groups may be seen as less intimidating than individual interviews, especially when power imbalances between researcher and participants are of special concern such as in work involving children (Hoppe et al., 1995). Groups were conducted with participants who knew each other and in the absence of authority figures (although in the case of child groups a teacher was always in the immediate vicinity) to promote a situation in which participants feel at ease (Green and Hart, 1999). It is possible that people would have expressed different viewpoints in front of strangers from those they shared with acquaintances, but this was considered an acceptable trade-off – and for child participants in particular it would have been difficult to do otherwise in the context of a narrow age range within a school. To minimise confidentiality concerns, knowingly including the parents of child participants in the parent groups was avoided.

Two child groups (one at each school) and two parent groups (both at school 1) were conducted. Table 1 provides summary details of the makeup and timing of each group. The parent group sizes are smaller than originally intended due to difficulties in recruitment – indeed, it proved impossible to recruit any parents from school 2 in the time available. The effect of small group size and number is that the array of views expressed is likely to be narrower than would otherwise have been the case (although each participant probably had more opportunity to contribute). In particular it is noteworthy that only one of the parent participants was male. There may therefore be gender-specific issues which were not fully expressed, or differently expressed, for this reason. The same applies for people of minority ethnic backgrounds, of whom there were no representatives in the parent groups despite school 1 having a high proportion of pupils whose first language is not English. While it would have been impractical to conduct a group with non-English speakers, having input from someone who perhaps had friends or relatives who were in this position might have allowed for greater insights in issues like dealing with school communications and homework tasks.

A common concern in this sort of study is that the people who volunteer to take part may tend to have strong pro-environmental views, thus contributing to results which are arguably less useful because of the atypicality of the sample. As the results should make clear, this was not the case for participants of this study. Instead, the discussions indicated that they could generally be better described as people who are more likely to get involved in school activities (an atypicality in itself, which is picked up in Section 4.1 below).

In agreement with the schools, all groups were conducted on school grounds during the school day. This had the benefits of room availability (in a familiar environment), accessibility for children and the presence of teachers to be in the vicinity for child groups. However, it meant that only parents who were either not working or were able to work flexibly from home could take part. Parents with full-time jobs may have expressed different opinions on issues such as, for example, spending time helping with homework.

All participants and parents of participating children received an information sheet (which was shortened and simplified for child participants) prior to the group, and provided a signed consent form. Parent participants were asked to fill in a brief form indicating their housing type and tenure. The parents in group 1 all lived in local authority apartment blocks, while the parents in group 1a owned their own house.

All groups were moderated by the first author and followed a topic guide covering the general areas: introduction; interest in energy use; energy saving action; IHDs; use of IHDs in teaching; summing up. A brief video was played so participants could see the IHD in action (available to view at http://goo.gl/9JcDz), showing the electricity use of a hairdryer) as it was not practicable to have a 'live' monitor available (due to electricity meter location and type). The IHD which the video featured was, however, present for participants to view (albeit inactive). The specific model (a Current Cost EnviR) was selected as it is a moderately priced, widely available device with medium functionality (e.g. with capacity to compare usage over the last day, week and month). All groups were transcribed verbatim and anonymized, in line with the consent form.

## 3.3. Data analysis

Content analysis was employed (Wilkinson 2004). Focus group transcripts were coded (using NVivo 9), with codes generated through repeated reading of transcripts. These were grouped under general topics of views on energy use, IHDs, the school, learning, family/social and 'other' (i.e. codes which did not fit easily into the other general groups). Cross-cutting themes were also identified and are reflected in the structure of the results/discussion presented here. Each participant has their own code (e.g. C2-1, which represent a child "C", the group number "2" and the participant of that group "1").

## 4. Results and discussion

### 4.1. Overview of energy use and energy saving

Child participants were able to suggest well-publicized approaches to saving electricity such as turning off lights and not keeping TVs on

**Table 1**
Summary details of child and parent focus groups.

| | School | No. of participants | | | Duration | Comments |
|---|---|---|---|---|---|---|
| | | **Total** | **Female** | **Male** | | |
| **Child group 1** | 1 | 6 | 5 | 1 | 00h40m | Children from a general class who returned a permission slip. |
| **Child group 2** | 2 | 4 | 1 | 3 | 00h41m | Children from school 'green team' who returned a permission slip. |
| **Parent group 1** | 1 | 3 | 3 | 0 | 00h42m | Able to attend group during school day; knew each other. |
| **Parent group 1a** | 1 | 2 | 1 | 1 | 00h42m | Able to attend group during school day; married couple. |
| | **Totals:** | **15** | **10** | **5** | **02h45m** | |

standby. Unprompted, none of the children proposed curtailing energy-consuming activities such as watching TV. When asked why people want to use less electricity a frequent suggestion was to minimise dangers such as electric shocks or fire, probably a reflection of the emphasis that is placed on electrical safety in the early years curriculum. Neither climate change nor reducing bills were proposed unprompted as justifications, although children were mostly familiar with these concepts.

There was little evidence of energy use being discussed in the home, and most child participants appeared fairly ambivalent towards the idea of saving energy at home (e.g. 'I don't care' [C1-4], when one child was asked why she hadn't challenged her family over leaving their computer on). This may be explained in part by parents' attitudes towards saving energy. Group 1 parents spoke of having more important things to worry about than energy use:

'It's easy that somebody stands on TV saying save the environment … inner city people like us from the estates and things, I don't think many of these people are really worried about that at the moment I think we've got bigger problems.' [P1-1, parent group 1]

There was a perception in this group that energy use would be more of a consideration for people with 'big houses and got a bit of money and can afford to, like, turn it off' [P1-3]. Indeed, group 1a parents (who own their own house) reported a keen interest in their home's energy use. Where children did provide evidence of energy being discussed at home they were mostly from (more affluent) school 2, for example where one child was limited by his parents in his use of electronic goods for energy-saving reasons. Children from this school also provided accounts of themselves telling siblings or parents to save energy, and tended to demonstrate greater knowledge of how people save energy and more of the reasons why. There was mostly active resistance across children at both schools towards the option of saving energy through measures like watching less television or cutting time spent playing video games.

The parent groups did give a few examples of parents broaching energy issues with their children – such as one parent telling her son to switch lights off. Generally, however, there was scant evidence of parents pressing children to save energy, in spite of complaints about how much energy they thought their children used ('I mean they've all got everything on, that's mad…' [P1-3], 'and then with the PlayStation, Xbox, laptop, music, TVs, everything…' [P1-1]). This may be a result of a combination of having other priorities and a desire to avoid conflict – see Section 4.2.

Parents did provide some accounts of children telling them to save energy or take other environmental actions, but not usually of responding positively to this – and sometimes rather negatively:

'Yeah [child] definitely, he's into it all he goes and helps and the garden and that and he tells me like that I'm wrong, "You're wrong! You need to…"" I'm like, "Oh get over it…"' [P1-1, parent group 1]

Unsurprisingly, parents who expressed a greater interest in environmental issues were more likely to discuss energy use with their children.

In general, children were more enthusiastic about taking action at school. Many participants had some kind of formal role such as ensuring lights are switched off or noting electricity generation by school 1's PV installation. In these cases children appeared to enjoy such responsibilities, and there was appreciation (mostly at school 2) that gaining knowledge in this area would be important for the future:

'I like it because I have a responsibility and I get to like do things that other people can't do' [C2-2, school 2 child]

'It's something that you like kind of need to know about if you want to have a good profession when you want to grow up.' [C2-3, school 2 child]

As participants were to an extent self-selected by their having shown inclination to get involved in school activities (see 'data collection' Section 3.2 above) it is not clear that the attraction of responsibility would apply to children more broadly.

### 4.2. Children, parents and energy feedback

Children reacted with enthusiasm to the IHD (shouts of 'Can I have it?', 'Can I do it!') which chimes with the findings of other research (FDS International, 2010; Navigator, 2012). While they were not generally familiar with the concept of watts and kilowatts, simply seeing the changes in the scale of the number on the IHD with the use of a hair dryer was sufficient for children to make the connection with high energy use ('That's a lot!'). They also made connections between watts/kilowatts and grams/kilograms. Previous studies have highlighted the sometimes abstract nature of the information from the IHD (Kidd and Williams, 2008; Hargreaves et al., 2010). The indication here is that children can still make sense of this information, and that it may help children view energy as something tangible and quantifiable. Indeed, compared to some parents, children showed less inclination to dismiss the information on the basis that they were not familiar with the units (according to one parent: 'I just don't get all the nought point zoo doo doo' [P1-1]). In general, children expressed a keenness to use the monitor experimentally to discover the energy use of different appliances. There were also examples of children wanting to share the IHD socially ('I'd take it to my youth club' [C1-2]).

Parents were inclined to take more of an interest in energy issues where they saw this as helping their child's education ('Yeah for them…' [P1-3], '…then it's a different ball game because you want your kids to understand…' [P1-1]). This is consistent with findings from other studies which show evidence of positive effects of school-based initiatives (Commission for Energy Regulation, 2011; Hargreaves et al., 2013), and is potentially significant. Recent, large scale studies have shown savings of around 2–4% resulting from energy feedback rather than the 5–15% (from Darby (2006b) which has been traditionally quoted (McKerracher, 2011). McKerracher speculates that more representative samples of a general population who have less interest in managing energy use, and involve less frequent interaction with study participants may be an explanation for the lower savings observed in the larger trials. If parents take a more active interest in energy when supporting their children than they would otherwise, as this study seems to suggest, savings in the upper range may be more likely. This is in line with the recommendation from Ehrhardt-Martinez et al., (2010) that to achieve savings as a result of feedback requires maximising consumer engagement, ideally through non-financial motivations and leveraging existing organisations and networks. It should, however, be noted that comments from a teacher group, not reported here, show that parents may not always be as ready to engage in their children's schoolwork as parents' comments would suggest.

Hargreaves et al. (2010) provided evidence for the occurrence of guilt and dispute within families on the laying bare of energy use by energy feedback. The present study found similar potential for this to occur with children. Indeed, some children (all from the Green Team at school 2) already seemed to associate their energy use with a feeling of guilt, referring to themselves as 'energy wasters'. There was a tension here as this guilt met with enjoyment of energy consuming activities:

School 2 child [C2-3]: 'I think I'm more of an energy waster cos I always have my radio on for hours at a time and so now my mum's banning me from putting the radio on for too long.'

Facilitator: 'Oh right. What do you think about that?'

School 2 child [C2-3]: 'I think it's unfair cos I love the radio.'

Indeed, in discussing the need for energy education, parents expressed concern about loading worries about energy use onto children, especially at primary school age: 'I don't think you should put that upon a child' [P1-3].

The above example also demonstrates the possibility for dispute around energy use – and there were indications that this may increase as parents became better informed about their children's energy use and vice versa. On watching the video of the IHD in action, parents joked about wanting 'compensation from the kids' [P1-1], 'I'm thinking they could start paying…' [P1-2] (for the cost of the electricity they used) or 'hiding the hair dryers' [P1-1]. The child in the example above [C2-3], on seeing the video (about the energy use of a hairdryer), commented on his surprise as his mother (who he presents as a keen energy saver) spends a long time drying her hair. Increasing children's ability to challenge parents on energy issues (and vice versa) may be no bad thing if it promotes discussion, learning and action. But if the parent/child responds negatively (as for the example above: 'Oh get over it' [P1-1]) unhelpful and potentially damaging dispute may result. Critiques of so-called "pester power" around environmental issues have been presented in the media (e.g. O'Neill, 2008). It is interesting to note that the recent 'Act on CO2' campaign, coordinated and funded by the UK Department for Environment, Food and Rural Affairs, featured a series of television advertisements showing a father nagging his family to save energy (example here: http://goo.gl/GN8oq). The result obtained here would call into question the likely effectiveness of such an approach.

### 4.3. Children's capacity to act on energy feedback

The idea of agency was introduced above in relation to work by Bartiaux (2009) and refers (simply put) to people's capacity to act (Barker, 2008). Promoting children's ability to challenge their parents around energy use issues would imply that their level of agency in this regard has been increased. However, this capacity to act may be enhanced or limited by a wide variety of physical and social factors. For example, children at both schools made frequent mention of their use of ICT and consumer electronics. One school 2 child [C2-3] stated that his mother encourages him to, 'entertain [himself] and go outside in the garden' instead of using electronics. Contrast this with comments from parents (living in blocks of flats) at school 1, such as:

'Now you can't let your kids out, so I think energy is the least of people like my worries than, you know I'm worrying about making my child survive…' [P1-1, parent group 1]

'Yeah, that's what it's like today…' [P1-2, parent group 1]

Children who don't have access to a garden and whose parents worry about them playing unsupervised in public places have one prime alternative to electronics-based entertainment – playing outdoors – effectively removed as an option (and their agency is therefore constrained in this respect). While this constraint is mainly material (possession, or not, of a garden), more clearly social constraints were also evident. The following example (drawn from a discussion of recycling in parent group 1) illustrates this. A parent who displayed mostly negative views towards environmental concerns throughout the group commented:

'And he [child] moans if I put the batteries in the bin as well, "You're supposed to take them up the…" I'm like, "Who's walking up Holloway?"' [P1-1, parent group 1]

Here, the child's desire to pursue a pro-environmental action (battery recycling) is referred to negatively (the child 'moans') and, if not dismissed, is not actively encouraged and seems unlikely to ultimately be acted on ("Who's walking up Holloway?"). Since battery recycling probably requires some degree of parental cooperation, the withholding of this can be considered a constraint on recycling behaviour. Bartiaux (2009) found that parents' environmental attitudes have an important role in determining their receptiveness to children's influence in this area, and this also may be in evidence here.

These observations bear out a common element of many theories and models of behaviour, which is that whatever an individual's attitudes, motivations or intentions may be, constraints can exist that prevent these being reflected in action. These are variously captured by the ideas of 'facilitating conditions' in the Theory of Interpersonal Behaviour (Triandis, 1977), 'external conditions' (or 'context') in the A–B–C model (Guagnano et al., 1995) and 'opportunity' in the Motivation–Ability–Opportunity model (Ölander and ThØgersen, 1995), amongst other examples. Furthermore, it is enough for constraints to be perceived by individuals (whether they can objectively be said to exist) for them to have an effect on the likelihood of a behaviour being carried out. This is captured, for example, in the idea of 'perceived behavioral control' contained within the Theory of Planned Behavior (Ajzen, 1991). As demonstrated by the battery recycling example above, children may be considered a special case in relation to constraints (perceived or otherwise) because they '… experience unequal power relations with adults and much in their lives is controlled and limited by adults' (Punch, 2002, p323). There were indications from the discussions, however, that limits were negotiable – for example in the following exchange regarding what children thought would happen if they turned appliances on and off to test out the IHD:

School 1 child [C1-1]: 'I'll get in trouble.'
Facilitator: 'You'd be in trouble do you think, if you went around and did all that?'
School 1 child [C1-1]: 'Because, um, my mum would get angry that I turn everything off and on, and the reason of electricity, because she has so much bills to pay.'
Facilitator: 'Oh OK, I mean even if it was homework? What if, do you think, what if it was coming home from school?'
School 1 child [C1-1]: 'She'd allow that, she'd allow that.'

In this case the participant perceives a potential constraint to action (parent getting angry) which is perceived to be removed when the authority of school is brought to bear.

### 4.4. Children's motivations

Motivation plays an explicit role in a number of models of behaviour, such as in the aforementioned Motivation–Ability–Opportunity model (Ölander and ThØgersen, 1995) and the Means–Motive–Opportunity framework (see AECOM, 2011, p69). In this study the children's main motivation to participate in environmental activities appeared to be roles/responsibilities such as noting the generation of the PV installation or being part of the Green Team – although as noted above, this may be partly attributed to selection bias. There were some indications that their interest continued at home, for example switching off lights, recycling and even regularly reading the electricity meter. However, as previously noted, much of children's direct electricity consumption is likely through use of ICT and consumer electronics. There was little evidence that it would be easy to motivate them to reduce this consumption. Children often

spoke of being frustrated at being told to turn off the television, or how they would be reticent to cut gaming activities:

'We want the film to finish, not like, leave it and then go.' [C1-3, school 1 child] And:
School 2 child [C2-1]: 'I really like playing on my X box.'
Facilitator: 'Yeah, so would you do that less? To save energy?'
School 2 child [C2-1]: 'No.'

While parents spoke of children passing a lot of time watching television or playing video games, they talked more forcefully of the time and money pressures they feel themselves to be under. In such circumstances having children watch television or play games may liberate parents' valuable time (at minimal cost) and reduce conflict. In this, children's and parents' motivations are aligned and run contrary to any goal of saving energy. In combination with the constraints on agency described above, these factors may be expected to have limiting consequences on the potential for children (at least in this age group) to influence energy saving at home.

## 5. Conclusions

This study has added to a relatively small body of work focused on children's role in home energy use, and is rare in attempting to foreground children's own perspectives. Due to the small number of research participants the results cannot be generalised, but it is possible to make some broad observations which can inform thinking about energy, children and family. This section draws together the findings presented above and considers possible implications for policy and for energy research.

### 5.1. Policy

Children who participated in this study spoke of their enjoyment of the responsibility involved in helping to save energy at school and sometimes at home. Energy saving behaviour was sometimes also understood as a way of avoiding dangers such as fire and electrocution that children associated with electricity and gas use. Recognition of children's different understandings of energy issues should be useful to those developing programmes for children and families to promote energy saving in that it relies on tangible concepts to which children can relate rather than more abstract financial and environmental concerns often used to appeal to adults. Advocating such an approach may also allow energy use education to be positioned as more mainstream and introduced at an earlier age, rather than being allied solely to environmental or sustainability issues. The development by the UK Department of Energy and Climate Change (DECC) of the fun and accessible My2050 simulation tool (available here: http://my2050.decc.gov.uk/) with associated schools toolkit is welcome and demonstrates that department's recognition of children's role in the UK's energy future. This complements other well-established schools initiatives run by industry (e.g. E.On's 'Energy Experience' and EDF's 'The Pod').

There was evidence of a wide range of levels of engagement with energy use in children's home lives, with most children and parents indicating that it is a subject that is little discussed. Considering the importance of energy use behaviour to meeting future national energy and carbon targets, there is an argument that there is a greater role for schools to play in addressing this – perhaps through mainstreaming approaches such as that suggested above. It was interesting to note that parents responded more positively to the idea of using IHDs when their use was framed as supporting their child's education, and this is perhaps an area where education and energy policy may complement each other. The forthcoming smart meter roll-out will afford greater access to energy use information to all households. Promoting interaction through school, and more

generally by exploring ways to better engage all household members and not just bill payers, may be a way to leverage this that goes beyond financial motivations, as recommended by Ehrhardt-Martinez et al. (2010). This could be one route to partially address the concern put by Hargreaves et al. (2013, p 133) that the, '…lack of support … received from within the wider policy and market context [could make] a bottom-up, demand-driven transition pathway … extremely improbable.'

The economic argument in favour of the smart meter roll-out is in substantial part based on expected consumer savings resulting from reduced energy consumption (DECC, 2013b). DECC use a 2.8% reduction in electricity use in their central consumer benefits scenario, increasing to 4% in the higher scenario. Achieving the higher value would result in an additional £329m (present value) in consumer benefits (p113). As indicated in Section 4.2 above, savings resulting from feedback can be quite variable and finding ways to push them even slightly higher is of non-trivial importance and, potentially, value. DECC's response to the consultation on the consumer engagement strategy, published at the end of 2012, recognises the role that trusted third party messengers will have to play in the engagement effort (DECC, 2012b).

This study (like others e.g. Darby (2006a) in the case of energy advice) also demonstrates the importance of tailoring advice and teaching to the personal context. Children differ in the opportunities they have both to save energy themselves and to influence their parents. This is due to an interlinked range of material and social constraints (such as the availability of safe green space and parents' environmental attitudes). These are constraints which energy policymakers must recognise, but which can only be addressed by joining up more effectively with other policy areas such as planning and health.

Another noteworthy finding is the apparent alignment of children's and parents' motivations towards maintaining or increasing children's energy use. Children said they would be reluctant to reduce those activities which account for most of their direct energy consumption – such as watching television and playing games – while for parents the incentive of reducing energy use by discouraging children from these activities was outweighed by other priorities such as availability of time and money. Expecting education policy to act through children to influence home energy use should not therefore be viewed as straightforward, and indeed the risk of conflict such as those cited by Hargreaves et al. (2010) should caution against any simplistic response here. This is in agreement with results from previous research into children's role as potential catalysts of environmental change, which recommends that policymakers might usefully promote environmental education but only as part of wider efforts to engage communities with such issues (Uzzell, 1994).

### 5.2. Energy research

The design of this study was unusual in employing a combination of separate child and parent focus groups to research home energy use. This section provides some reflections on the approach which may be of interest to researchers working in this area, with a particular emphasis on the use of child focus groups.

In this study, a reasonable amount of available time (5–10 min over the course of the group) in child group 1 was taken in keeping discipline, although this may be preferable to having a teacher participate (rather than being in the close vicinity) as that may risk prompting the inhibitions which this method aims to avoid. It has been suggested that using older children to run groups with the researcher merely observing (or not even present) can enable greater cooperation (Green and Hart, 1999; Murray, 2006). There was generally less discussion between child participants than between participants in adult groups. This is of concern as part of the power of focus groups is their ability to permit participants to reflect on others'

views. Perhaps because of the school setting, some children were reluctant to speak without being invited, or once they became more at ease they quickly went off topic. This in itself is instructive – perhaps suggesting that the children did not view energy as an engaging topic or as an issue which they have to negotiate a position on. Nevertheless, it is possible that holding groups in a less formal environment (e.g. in the context of an after-school club), or perhaps holding more than one session per group to allow the children to become more familiar with the researcher, would promote more interactive discussion. Finally, the use of what are sometimes thought of as more child-friendly data collection methods such as drawing and worksheets could be considered, although any advantages should not be assumed to be clear-cut (Punch, 2002).

It seems that the principal aim in holding child-only groups – reducing the potential for inhibitions associated with other forms of interview – saw some success. For example, when children were asked if they try to get their parents to recycle, one response was: 'I try to but they don't really do anything.' It is not possible to say whether the child would have been so candid in their parents' presence, but it seems more likely that statements of this nature will occur where the probability of being told off or contradicted is lessened. Separate child/parent focus groups also permitted the juxtaposition of children's and parents' views in enlightening ways, such as in the case of gardens and outdoor play.

Understanding the best strategies to pursue will require more research into children's role in, and perspectives on, energy use. This study used separate focus groups with children and parents to deliver insights into energy use within households that may have been unobtainable by other means. By reducing power imbalances and presenting the opportunity to share experiences with people in a similar position, participants may be readier to be candid in the views they share than in circumstances such as those of individual or household interviews. Going forward, it would be informative to employ a similar method to that utilised here in the context of families already benefitting from feedback on their energy use through IHDs. While discussions in this research tended to focus on electricity and ICT/consumer electronics, it would be also be interesting to learn more about children's perspectives and influence in the important area of home heating, and in this case an approach which takes practices as the unit of enquiry may be usefully employed.

In closing, it is worth highlighting the overarching point that children are undeniably actors in relation to home energy use, albeit to varying degrees. Referring to 'households' and 'consumers', while convenient, glosses over the multitude of dynamics that exist within homes and families. This risks blinding researchers to the possibility of learning from these dynamics, and policymakers to the opportunities that exist to harness them and promote action.

### Acknowledgements

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