

# ENERGY DISPLAY MONITORS: HOOK NORTON CASE STUDY HOUSEHOLDS

COMMUNITY SUMMARY C4-EDM

OCTOBER 2014



## KEY FINDINGS

- EDMs ‘worked’ as awareness-raisers to some extent, and there is some evidence that they encouraged energy-saving practices and investment in more efficient appliances and efficiency measures.
- There were difficulties in installing and understanding the EDMs, partly due to design shortcomings and partly, perhaps, because there does not seem to have been much of a ‘community conversation’ about them.
- There are uses for both simple and complex EDM designs and modes of data presentation, and careful thought needs to be given to ‘horses for courses’, so that household needs and equipment are matched with suitable types of display or control.

## 1. Energy display monitors (EDMs) in Hook Norton homes

As shown in Table I, nine of the case study households were issued with a display, eight of whom used it. Three were helped with setting up and using their display, by a member of Low Carbon Hook Norton (LCHN) or by a friend or family member.

### 1.1 EDM libraries

EVALOC provided LCHN with an information pack and support to help them set up an EDM library, and the first library opened in February 2012 at the primary school, where the deputy head teacher kindly agreed to act as a library host. The head teacher presented the idea to the school council, the eco committee and Year 6 pupils, and advertised the library through the local newsletter. In spite of the favourable location and the support from the school, though, there were only six recorded borrowings. This low response may be partly due to the fact that some households in the community already had EDMs as part of other research projects,

Six case study households selected their displays from this library - four Owls, a GEO and an ONZO.

The coordinator of a church-based care group for elderly people also hosted a display library in the spring of 2012. She explained the project to group members and lent out six displays, but found that they were of limited use. Two or three people ‘stuck with the energy display monitors’ but another three were quickly returned as people found them difficult to use. One didn’t use her display because ‘she

*thought it needed to be used with a computer’ and another said that ‘it kept setting off her door alarms’. One 70-year-old woman had set up an EDM and used it for six weeks, finding the display interesting but reporting that, nonetheless, she ‘couldn’t cut back on anything’. The librarian tried one of the displays herself but ‘couldn’t get on it with’ and found it ‘ever such a fiddle. Even my son found it difficult to set up’. In her view, the displays were ‘generally not good for older folk’, and some of the people at the group had sight problems or Alzheimer’s disease. The displays ‘show what people are using but many people have already done lots of [energy saving] things’ or have ‘cut back to the limit’. The librarian felt she had reached the limit of people she could lend to.*

Both libraries were offered technical support by a member of Low Carbon Hook Norton (LCHN), but as far as we know this was not called upon.

### 1.2 Household characteristics

All the households were owner-occupied apart from one (H62), which was socially rented. Four were lived in by families with children (H55, H56, H57 and H65); five had more than one adult but no children. The dwellings varied in size from 116 to 268m<sup>2</sup>, and were a mixture of detached (5), semi-detached (1) and terraced (3). Five were built before 1919, so had solid walls. There were at least some energy-efficient lightbulbs and appliances in all of the homes, with high levels of each in five of them (H55 and H56; H58 and H59; H65). H56 had an air-source heat pump and solar thermal installation, and H59 had solar PV, at or around the start of the EVALOC project; H60 had a heat pump fitted during the course of the project.

In this small sample, there are no obvious relationships between outcomes and household characteristics, or technologies.

Home	Display type	How often do you look at display?	Help with installing and using?	Location	Have you learned from it?	Claimed Impact on electricity use?	Discuss energy with family and /or friends?
EDMs received through EVALOC/Hook Norton Low Carbon activities							
H55	Owl	Once a day, less than formerly	Yes	Dining room	Yes - 'switch things off'	Yes	Both
H56	ONZO	Several times a day, about the same as before	No	By front door (look in evening, when cooker goes on)	Yes - 'appliances left on'	Yes - 'switch things off'	Both
H57	Owl	- (not used)	-	-	-	-	-
H58	Owl	Several times a day, less than formerly	No	Living room	Yes - 'A lot. Value of low-energy light bulbs, kettles quite scary, immersion heater not as bad as we thought'	Yes	Both
H59	Owl	Hardly ever, about the same as before	Yes	On dining-room cupboard, covered by books	Yes - 'guests'	No	Both, tho' prob. not much
H60	ONZO	Several times a day, less than formerly	No	Kitchen	Yes - 'Confirmed value of diligence and turning off lights. Learnt about frequency of thermostat timings - big jump when it came on'	Yes - 'turn off dust extractors, bought new kettle, changed thermostat setting for bathroom + cloakroom'	Family
H61	Owl	Hardly ever, about the same as before	Yes	In a cupboard next to fuse box	No	No	No
H62	GEO	Now boxed up – used to be several times a day	No	Was in kitchen	No – 'already aware'	No	Family
EDM received from energy supplier							
H65	npower	Hardly ever, less than formerly	No	-	Yes	No - 'Nothing we can do about cooker + hob'	Family

\* - Dash means there is no information available from 2012 household survey

Table I. Summary table: responses to EDMs in case study households in Hook Norton

## 2. Building energy literacy and practical know-how

An EDM is intended to make energy use more visible and easier to understand, but it may still take time for it to become familiar and for people to gain the confidence and vocabulary to talk about it. The table shows how three of the nine householders interviewed were interested enough in an EDM to install it and look at it several times a day, while one claimed to look at it fairly regularly. Three, though, had 'hardly ever' consulted theirs. One had looked at their GEO display frequently at first but it was now 'boxed up', while another had taken home an Owl but not used it.

Only one interviewee said that they still consulted their EDM as much as ever and, interestingly, they kept their display by the front door. This suggests that they might have established a routine of checking the EDM before going out, to see whether anything was unnecessarily switched on. The other respondents with EDMs still in use said that they now looked at them less than previously. These two patterns of display usage – 'domestication' or diminished/discontinued use after initial interest – are found in findings from larger-scale trials such as the Energy Demand Research Project of 2007-10<sup>1</sup> and the more recent 'Smart Metering Early Learning Consumer Survey'<sup>2</sup>. In a recent community-based trial in Kingston upon Thames, up to 40% of EDM owners said that they were using their monitors at least once a day, up to two years after installation<sup>3</sup>. Where there was a lack of interest in Hook Norton, the interviews suggest that the main reasons could be (a) that designs and instruction leaflets were inadequate to convey what needed doing to make use of the EDM and (b) a feeling that the EDM had nothing to offer someone who was already highly aware of their energy use, and already frugal with electricity.

It may be significant that no-one seems to have taken up the offer of help and advice post-installation from a LCHN volunteer. The table shows how those who claimed to have learned from their display, and to have saved energy, said that they had talked about energy use with friends and/or family member. This finding suggests two possibilities: that people 'make sense' of home energy use with the help of others, and that being able to visualise energy use may help them to hold conversations about it. These two possible explanations, of course, can operate together.

## 3. Lessons from the case study household interviews

Interviews carried out after approximately two years of the EVALOC project picked up a set of comments on the experience of having and using an EDM.

### 3.1 Visibility

The single most important requirement of an EDM is that it makes energy use more visible, to raise awareness and understanding, and on this count the Hook Norton displays



**Figure 1.** The OWL energy display monitor.

seem to have been quite effective, with six of the nine interviewees claiming to have learned from theirs. What is perhaps the single most important feature of an IHD – its presentation of information in real time – was appreciated by household H56 in contrast to the more sophisticated, but less available, data from a combination of smart metering and online display:

*"I've had energy monitors on and off for years so but I went through a period of not having one because I had the smart meter in, and looking at it online. But because that was a proactive thing online, and once you'd established your ... pattern of usage ... unless you are going to do radical change you don't change it. With the live monitoring it's quite useful because you wander in and think, Hang on a sec, that's 500[w], and then you go and look and find out what's been left on because I know what the standard consumption should be. So ... if it's when I'm going to bed it's more than 250, there's something gone wrong somewhere and something's been left on."*

However, the EDMs were not always easily understood. For example, respondent H59 said that;

*"I am looking at it now – now I can see the kWh figures – then there are 3 sets of figures – then something is flashing 'peak time' at me – there is another, 11.30 ... but none of the figures mean anything to me to be honest. For people like me it needs to be clearer as to what the figures actually mean ... the 11.27pm then changes to 3N27b11 – I mean, I haven't the first idea what that is. Three buttons – Mode, Adjust and Set – and I probably press those at random. So you can see that I haven't really responded to it..."*

<sup>1</sup> See <https://www.ofgem.gov.uk/ofgem-publications/59105/energy-demand-research-project-final-analysis.pdf> (basic EDMs, with or without smart meters)

<sup>2</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/407543/3\\_Smart\\_Metering\\_Early\\_Learning\\_Project\\_-\\_Consumer\\_survey\\_and\\_qual\\_research\\_-\\_Main\\_report\\_FINAL\\_CORRECTED.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/407543/3_Smart_Metering_Early_Learning_Project_-_Consumer_survey_and_qual_research_-_Main_report_FINAL_CORRECTED.pdf) (EDMs with smart meters)

<sup>3</sup> <http://eprints.kingston.ac.uk/28626/1/Smart%20Communities%20report%20FINAL%20low%20res.pdf>

The respondent admitted that her participation had been '*a bit dutiful – I wouldn't have gone and bought one myself... I don't really take any notice of it – I am not that sort of person – I don't relate to it as not very technical'. Also I've been very busy ... so can't relate it to daily life.*' She commented that her family were '*all aware of how much more careful I am with energy use' [than they were]*', but how her inability to understand the EDM got in the way of being able to talk about it to family, friends and neighbours.

Interviewee H60, with an engineering background, had chosen an ONZO because it allowed for interactive data analysis online. He and his partner had found it easy to install, though they had needed some help with passwords in order to get the online application going. When ownership of the ONZO company changed, there had again been trouble with passwords. The EDM had been kept in the kitchen and consulted often, but then moved to the hall because of building works, until, "*One day walking past it I noticed it had lost its charge and thought 'Well, we are not really interested now, so I didn't bother to charge it up.'*" However, what they had learned led to several changes (see Table 1). The respondent also commented that;

*"The temperatures [on the display] did cause a bit of interest as they were inaccurate. We were very interested in temperature as we had a new heat pump fitted and we found the ONZO was reading 2°C to 3°C lower at 15°C than our actual temperature, which is 18°C. We thought we must be hardy souls!"*

The EDM had thus formed part of the process of getting used to their new heat pump, inaccurate as it was, and it had prompted some 'low level' discussion between the couple and with their daughter when she visited them. Asked about possible improvements to the EDM, the respondent commented that, '*I suppose it might be good to have a universal monitor with everything on it – the bottom line is that you don't want too many devices sitting around*'.

Interviewee H62, a retired man, had kept his GEO display in the kitchen but no longer used it:

*"... it didn't really improve my knowledge of electricity consumption, I knew before as much as I know now. It obviously gave me a detailed reading but it didn't really help me. I think I knew by and large what things consumed what and was not really much wiser after, and the display certainly didn't help with individual things. It's very difficult to isolate individual appliances as it wasn't really feasible to switch everything off to check what a single appliance was using... I didn't use the tariff. For one thing, it's quite complicated having a dual tariff night and day time, and the second reason is that I can multiply the tariff by the usage, so I didn't think it was useful to have it calculated for me."*

The occupants of H59 kept their EDM (Owl) in a cupboard by the fuse box '*as I thought I had to plug it there*', so it is perhaps unsurprising that they said it was no use to them. But this was not the only obstacle to understanding. They had not known how to set it up with their energy tariff, given the complexity of electricity charging, and they could



**Figure 2.** Energy display monitor received from energy supplier (NPower).

not evaluate what the various figures meant in terms of energy or cost. The overall verdict was that;

*"I don't like it as it is not user friendly so I am not encouraged to use it. Even if you could put in the unit price it would need a diagram, not just plain figures e.g. like the petrol dial on a car which tells you if you are going into the red. It kept showing a lot of figures and I didn't know what they are. It might be useful to a researcher but it's useless to an ordinary member of the public."*

By contrast, H58 found their EDM, also an Owl, valuable, and had no problem interpreting it. The respondent had played around with it at first, and been '*quite obsessive... experimenting*'. As the table shows, they learned several useful things about their energy consumption and made some changes. There were also;

*"... one or two surprises– we have oil heating and sometimes we boost it with the immersion heater and we thought it would be incredibly greedy. But that hasn't proved to be the case, as we have a well-insulated tan. So once the immersion heater has heated up the water it tends to stay hot... It's certainly made me more aware ... because you are aware of the monitor, you are aware of your consumption and therefore your lights and things like that."*

The most useful information had been the price per hour, conveniently shown in big print.

### 3.2 Problems

In addition to the problems with comprehension among EDM library borrowers, noted above, H56 mentioned problems with

battery replacement. H60 and H61 both needed help interpreting their displays and H61 and H59, with Owls, did not know what figures to enter for their energy tariff.

#### 4. Impacts on energy use

The EVALOC project did not have 'before and after' consumption data for these households, and in any case the EDM is only one of many factors influencing energy use in each, so any precise impact it may have had cannot be measured. But the interview responses indicate that there was some claimed impact on energy use in four of the eight homes where an EDM was used.

Research elsewhere shows, on average, savings of a few percent for basic displays on their own, which can rise to ~10% or more if these are combined with other forms of feedback and advice<sup>4</sup>. A strong lesson from feedback trials is that 'more is more'; if people hear the same sort of message from several trusted sources, they are better able to interpret and use it to guide their actions than if they only hear it from one source. Evidence from community energy projects also shows the value of generating 'energy conversations' with input from a variety of sources. It could be that the outcomes from using EDMs in these Hook Norton households were relatively slight because most people were receiving feedback from only one or two sources, as well as because of difficulties in setting up and interpreting EDMs. However, the responses show that, in

some cases, the EDMs were seen as energy-saving tools and worthwhile additions to the household.

#### 5. Summary

The main lessons from the EDMs in Hook Norton seem to be that:

- They 'worked' as awareness-raisers to some extent, and there is some evidence that they encouraged energy-saving practices and investment in more efficient appliances and efficiency measures.
- There were difficulties in installing and understanding the EDMs, partly due to design shortcomings and partly, perhaps, because there does not seem to have been much of a 'community conversation' about them.
- There are uses for both simple and complex EDM designs and modes of data presentation, and careful thought needs to be given to 'horses for courses', so that household needs and equipment are matched with suitable types of display or control.

<sup>4</sup>See <http://www.energy.ox.ac.uk/wordpress/wp-content/uploads/2015/05/Darby15.pdf>



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**The EVALOC project seeks to assess, explain and communicate the changes in energy use due to community activities within six selected case study projects under the Department of Energy and Climate Change's (DECC) Low Carbon Communities Challenge (LCCC) initiative, a government-supported initiative to transform the way communities use and produce energy, and build new ways of supporting more sustainable living.**



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