



KEY FINDINGS:

- EDMs created 'lightbulb moments' by making energy use visible; they prompted changes in everyday energy use, especially with kitchen appliances; and became talking-points and part of a process of social learning.
- The EVALOC evidence also showed how it is important to introduce EDMs along with the knowledge needed to operate them and make sense of the information they provide – like solar PV and solar water heaters, they are not 'fit and forget' technologies.
- The design of the EDM was clearly important, and before investing in one it is as well to check what is available and what sort of design is going to be most helpful.
- Conversations with other people were important in helping households understand and reduce their energy use with the aid of an EDM. As time goes on, it is likely that familiarity with EDMs will spread and there will be more 'word of mouth' advice available from family, friends and neighbours. At present, though, there is clearly a need to have some well-informed people in each community who are on hand to explain about EDMs before installation and to help them use their EDM if needed afterwards.

1. Introduction

The aim of this leaflet is to share learning from the EVALOC research project about using energy display monitors (EDMs). EVALOC was carried out between 2010 and 2014 to assess and explain changes in energy use in six low carbon communities (LCCs) in England and Wales. The LCCs all had carbon reduction programmes that included some or all of the following:

- Programmes aimed at helping people to rethink how they use energy and to reduce their consumption;
- Home improvements such as insulation, more efficient lighting and appliances;
- Low-carbon technologies such as solar photovoltaic (PV) panels, solar water heating and air-source heat pumps.

Each LCC had previously received some funding from the Department of Energy and Climate Change Low Carbon Communities Challenge (LCCC) initiative.

The LCCs and researchers were interested in finding out whether the EDMs would help people to reduce their energy use, and whether they would assist others in a community to learn about energy, through word of mouth and

demonstration.

1.1 What is an EDM and what does it do?

An EDM (also known as an in-home display or IHD) is a small gadget that offers energy feedback. A typical EDM can show how much electricity and people use in their homes, The simplest EDMs only show electricity use in real time, but many EDMs now also show gas usage, and can show how consumption changes from day to day or month to month. These more complex displays have screens that display a range of items of interest including consumption, cost, carbon dioxide impact, peak-times for electricity demand, and how usage changes over time. They do this in a variety of ways: digital (numbers), analogue (e.g. a speedometer-type dial, or a graph), and ambient (e.g. different coloured lights to show whether consumption is low, medium or high).

EDMs have been designed primarily to influence actions such as;

- Switching lights and appliances off,
- Using them less,

¹ http://www.cse.org.uk/downloads/reports-and-publications/behaviour-change/consumer_preferences_for_home_energy_display.pdf

- Using them more carefully,
- Improving their performance,
- Replacing them.¹

So they can influence both 'behaviour' and 'technology'. The idea is that, by giving feedback on electricity and gas use in near-real-time as well as over weeks, months and years, an EDM can *prompt greater awareness of how and where energy is used in the home, encourage people to experiment, e.g. by altering heating routines or switching off lights more often, and tell them what effect those changes have had.*

Since the late 1970s, research and trials have shown that such displays can help householders to understand and reduce their energy usage². The reductions are a few percent on average, but outcomes vary considerably depending on household circumstances, feedback quality, and the provision of additional advice and support.

A recent survey of 2,000 smart-metered households has shown how people use EDMS in one of two ways, broadly speaking:

- To find out how much electricity each of their appliances uses; and
- As part of their housekeeping routines, e.g. checking that appliances are switched off at bedtime, noticing when usage is unusually high, using the display to encourage others to reduce their energy use, working out what a normal level of use was, or monitoring over time to see what the trends are and whether energy-saving efforts have been effective.

People who took this second 'monitoring' approach had been, not surprisingly, more likely to continue using their display than those who were interested mostly in finding out about electricity use by different appliances, after which they tended to lose interest. They were also more likely to believe that it has helped them learn which appliances use the most electricity in their homes, to feel in control of their gas and electricity use, and to change their energy-related behaviours³.

1.2 EDMs and smart meters

Smart energy meters are meters that automatically measure gas or electricity use at frequent intervals (typically every hour for gas and every half-hour for electricity), with two-way communications between suppliers and customers. They are able to connect with devices in the home, including energy displays and PV panels. Government policy for rolling out smart meters in Great Britain is that every customer who has a smart meter installed will also be offered an in-home display, and the installer will have been trained to explain how to use it⁴. The Foundation Stage of rollout is under way, with large-scale rollout scheduled to begin in 2016.

Reports on the initial trials of smart meters with in-home displays in GB and in the Republic of Ireland concluded that

savings (~3% on average, for gas and electricity) had been achieved through a combination of technology and 'delivery' (how the technology was introduced to householders). The report on the GB trials recommended that advice should be provided along with the installation of smart meters as a fundamental requirement, while the report on the Irish trials concluded that the savings were achieved by a combination of technology, pricing and 'customer engagement'⁵. That is, just supplying people with a new EDM is not likely to produce the best results. It is now policy in Great Britain that everyone who has a smart meter installed is also to be offered a display, and smart meter installers are to be trained to explain how to use them, and to give basic energy efficiency advice.

1.3 EDMs in the EVALOC project

However, it is possible to use EDMs without having a smart meter, and that was how most of the households in the EVALOC project used them. A small number of case-study households in each community (53 in all) received EDMs in the course of the EVALOC project. Some had also had their homes retrofitted during the study. The EDMs (Table 1) most commonly used were 'Owls' (26) with smaller numbers from AlertMe (4), Efergy (1) Eco-eye (3), Geo (1), Onzo (2), Saveometer (1) and Wattson (6, some of which were linked to solar PV). Some were introduced as part of the EVALOC project (see below) and eight customers had been supplied with EDMs/IHDs by their energy suppliers (six by British Gas and two by Npower). A few had used more than one type of display during the project. There was no information on the type used by four households, because they had forgotten about them by the time of the interview.

All of the EDMs showed electricity use in real time, and this was the 'first screen' for each model, the one that everyone would have seen. There was a range in complexity, from the simple Eco-eye to the Saveometer, which had many screen options offering real-time and historical data. Some EDMs could be used with a USB to download data and display it online. Gas use was only shown on the Saveometer and on some of the EDMs that were offered by energy suppliers.

The EDMS were introduced in the context of the LCCs where the householder lived, which meant that sometimes there was support from the EVALOC project team or other community members, as well as a chance to discuss the EDM with friends and neighbours in the LCC. (*Summary of Energy Displays in a*

² For a recent account, see Chapter 6 of https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/407568/8_Synthesis_FINAL_25feb15.pdf

³ 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

⁴ Department of Energy & Climate Change, 2015. Smart Metering Implementation Programme - DECC's Policy Conclusions: Early Learning Project and Small-scale Behaviour Trials. London: DECC (15D/085).

⁵ AECOM (2011) Energy Demand Research Project: final analysis. Raw G and Ross D, AECOM, London

Community Context available online as part of the EVALOC ENACT toolkit)

There was not enough meter data from enough households to produce reliable figures for changes in consumption, but the two rounds of interviews gave some valuable insights into how people used their EDMs, and what they thought about them.

By the time they were interviewed the second time, the households had had their EDMs for between seven and 21 months, and most for at least a year. The interviews offer some insights into the experiences of people who only used their EDM for a short period of time, used it for a longer time in a 'monitoring' way, as described above, or didn't use it at all.

2. Findings

Table 2 summarises some findings from 46 of the 53 EVALOC case study households with EDMs⁶.

These figures come from a small sample of households and there was not a complete set of answers to survey questions from every household (especially for Awel Aman Tawe.) We cannot draw any statistically valid conclusions from them. But they do give an idea of how effective the EDMs were in influencing energy use and prompting 'energy conversations', and they are broadly consistent with findings from research carried out elsewhere in the UK with home energy displays. Points worth noting from this table, and from the findings as a whole, are that:

- Over two-thirds of respondents said that they were looking at their displays regularly (once a week or more) at the time of the interviews, with just over half saying they checked their EDM at least once a day.
- Two thirds (31) of the respondents with EDMs said they had learned from their experience with their display and 19 of them offered specific examples, mostly to do with the electricity demand of their kitchen appliances.
- 24 of the 31 respondents who said they had learned something about their energy use from their EDM, (and 3 who thought they hadn't) also said that they had discussed their EDM or other energy issues with family members, friends or neighbours. This shows how a new gadget can be a talking-point. It also suggests that talking about something with others may help people learn about how to make the most of it.
- The people who were regular users of EDMs typically kept them in the kitchen or living room, where they could easily be seen.
- Eight of the 46 respondents said that they 'hardly ever' looked at their display and five of them said that they used to look at it more often, implying that they had lost interest. At least seven respondents had not used their display at all.
- Three respondents said that their EDM had stopped working because of technical problems. Three had had difficulty getting their EDM to do what they wanted – for example, inputting the correct tariff - and eight said that

| | |
|---|---|
|  |  |
| Geo | Saveometer |
|  |  |
| Onzo | Owl |
|  |  |
| Wattson | AlertMe |
|  |  |
| Efergy | British Gas |
|  |  |
| Eco-Eye | E-on |

Table 1. A selection of the type of EDMs used in the case study households.

| | Households with EDMs | Help with installation / use? | Still looking at EDM at least once a week | Still looking at EDM at least once a day | Said they had learned from their EDM | Discussed their EDM / energy matters with others |
|-------------------------------|----------------------|-------------------------------|---|--|--------------------------------------|--|
| Sustainable Blacon | 10 | 4 | 8 | 6 | 6 | 6 |
| Eco Easterside | 12 | 6 | 7 | 6 | 6 | 4 |
| Hook Norton Low Carbon | 8 | 3 | 5 | 3 | 6 | 7 |
| Kirklees-Hillhouse | 5 | - | 3 | 1 | 3 | 3 |
| Low Carbon West Oxford | 10 | 1 | 9 | 9 | 10 | 6 |
| Total | 46 | 17 | 32 | 25 | 31 | 27 |

Table 2. Summary of findings from EVALOC case study households. Note: The seven homes in Awel Aman Tawe that had EDMs are not included, as there was little data from follow-up interviews there.

they had difficulty understanding their display.

- There are several gaps in the data on whether respondents with EDMs had help with using their displays. We had a firm answer on this for 35, of whom 17 said that they had had help with installing and/or setting up their display, in addition to the written information that came with the EDM. 12 of those went on to become regular EDM users, while five lost interest somewhere along the way. However, of the 18 respondents who said that they had *not* had help at installation, a similar number (14) went on to become regular EDM users. Of the 11 respondents for whom there is no clear answer recorded, only six became regular EDM users. It is hard to draw any firm conclusions from this small sample. Some support at installation seemed to increase the chances of regular EDM use slightly, on average, but a more important consideration (from what was said in the interviews) is that lack of support for some of the respondents made the difference between their being able to get started or not. Others already had the know-how to be able to do that.

2.1 What did people say about the EDMs?

Most of the comments were broadly positive, and some were useful pointers towards what can be done to make the most of EDMs. Comments included:

- If someone in the household had negative ideas about

EDMs, that could prevent them from even testing their EDM:

“.. she come back with all the [EDM] gear, you know, ‘plug in here’ and a CD or something... It was quite complicated ... Well, as me wife brought it in, the article was in the Daily Mail and I said to her Look, it’s saying here that it’s giving you false readings, they give you false readings and not to take any notice of them... I didn’t bother with it.” (Householder)

“We [LCC volunteers] were saying ‘These are free pieces of kit that will benefit you’, and it was, ‘Oh, we don’t get anything for nothing, it’s obviously not really free, you know.’” (LCC focus group)

- It isn’t always clear to people just what an EDM can do for them:

“...when a local organisation was offering free painting for people who were elderly or disabled, we took a little page at the bottom of the [community council] newsletter ... and it said if you are disabled, over 60, this organisation can paint two rooms in your house and all you have to do is pay a £3 fee... on the basis of that, this area and another one that we leafleted had the biggest take-up for that service in the whole of Middlesbrough ... I think the reason ... was everybody knows what painting is ... While it wasn’t ... taken up in terms of ‘Power Downs’ [standby electricity switch-off plugs] and things like that, because I think really just people aren’t aware of those issues to the same extent they are aware of painting their house. So I think you need to give that information in a much simpler way, and perhaps on a face to face basis as well.” (LCC focus group)

- Installation is not always straightforward, and some people

didn't get beyond having the EDM in their home, unused:

"It wasn't easy [to install the EDM]. My husband was an electrician for 60 years [but] it wasn't easy. To be fair on the person that left it for us, I think we did say we'd manage it, and to be honest we didn't...we don't look at it. We just pick it up and dust under it, and that's it." (Householder)

- But some people had no problem initially and were able not only to install their EDM but to try out more advanced operations with it. Here are two examples. One householder had worked out a system that gave him a good grasp of his consumption over the course of the year, while the others had needed a little help in getting access to their own data online:

"The most important things is what I get every month which is those graphs - I churn them out...It's to do with the Owl - you've got to download it and do it that way ... I get a printout from the electricity and gas use in graph form and also the consumption in the month, and to me that's the significant thing, that's the trend I'd go for..." (Householder)

"It was very easy to install - I clipped it to the meter cable and plugged it in. I did not require help ... It required a little more application to connect it up to the Internet. We required a little help interpreting it - it seemed to have been used before so the initial set up had been used so it could not be used by a new user, so I had to contact [project researcher] or [LCC volunteer] who arranged a new password, and then it got going." (Householder)

- Help did not always come from experts. For example, one couple told of how their granddaughter had been able to set up their EDM, which they now used regularly.
- The design of the EDM mattered, in terms of making information easy to understand or not:

"You get to know which the most energy efficient, rather than most power hungry, things are." (Householder)

"I don't like it as it is not user friendly, so I am not encouraged to use it. Even if 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." (Householder)

- Some people took an interest in what their EDM told them for a while and were able to put what they learned to good use. Then they lost interest or even turned against it:

"Initially excited by it, so looked at it all the time as it was in the kitchen and could see it all the day eg when making a cup of tea. ..We kept it in the kitchen as most visible... We learnt about the frequency of our times for heating in the bathroom and the cloakroom as it showed a big jump when they came on and we realised ...we didn't need to do that every day, so adjusted the timers, and that saved us a few bob.' We then moved it to the

hall as we were rearranging furniture because of building works. One day walking past it I noticed it had [broken down] ..." (Householder)

"They put the displays in a cupboard somewhere, because they'd used it for three to six months and then they'd sort of gleaned everything that they could from it, so that they knew how much the kettle was using ... it was very good at reinforcing energy saving behaviours ...but ... only like over the short term." (LCC focus group)

"[EDMs] ...make you paranoid. I don't use it, because as it was going sky high I was telling people 'Turn that shower off ! Turn that kettle off!'" (Householder, who then decided that his best course of action was to keep a spreadsheet of the household's energy use over time)

"Sort of got a bit fed up with it." (Householder)

- The most positive outcomes were for those who adopted the EDM, made it a part of the household, learned from it and used it as a point of reference for routine behaviour and for choosing new appliances:

"Oh yes, I would say [we've learned] quite a lot in terms of consumption that individual appliances use – kettles are quite scary. One or two surprises actually – 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 tank so once the immersion heater has heated up the water it tends to stay hot... The value of low energy light bulbs, because we have a twin clusters of lights in the utility room which came with ordinary bulbs ... and those use a lot more electricity than I thought, which I got from the monitor." (Householder)

"I make sure that if I'm say cooking something and cooking a second thing that's ready to go in the oven straight away, that I don't have to leave it on for an extra ten minutes before it goes in..." (Householder)

"I just like to be able to see ... out of interest, how much electric? You know, if something says it's A-rated or whatever. It's nice to know what an A-rated is, isn't it?" (Householder)



Several respondents commented on the EDM providing them awareness on the electricity use of their appliances such as kettles (image: <https://www.youtube.com/watch?v=YWliYEeyFCE>)

2.2 EDMs and social networks

In social terms, the EDM could become part of a wider conversation with others about energy:

“I talked to my neighbour ... I made sure that she’s got loft insulation and cavity wall, and I have talked to her about the project and to other people... Within the family, I’ve talked about ... why is that on such-and-such? People have asked about different types of energy saving ... things like turning the heating down one degree and turning lights off can make a difference ... because I’ve talked about the monitors.” (Householder)

“The energy monitor generated awe with our visiting friends from France when the kettle went on.” (Householder)

“It was seeing how much energy my kettle actually used when I switched on the EDM, and how much that cost, that got me hooked. I took it to work to show them ... and I’m now a volunteer.” (Householder)

Drawing on the social network analysis which was conducted as part of the EVALOC project, we found that energy was not necessarily considered a neutral subject by the interviewees: they may consider it as novel (e.g. new solar panels or EDMs), a practical issue (e.g. how to get a boiler upgrade) or an issue which implies judgement (e.g. the feeling of not being ‘green’ enough).⁶ This influenced whether, and to whom, they communicated energy messages, and the contexts where energy was discussed.

The EDMs appeared to stimulate conversations through their novelty, as illustrated in some of the quotations above, and they opened up a space for energy to be discussed. In this way, implicit permission was given to discuss other aspects of energy. Within the household, particularly, the EDMs were considered as a practical tool for feeding back energy usage to one another. As the EDMs made the energy consumed visible, they could provide the opportunity for any hint of judgement to be less personalised, because the information came through an object rather than directly from a person.

The EDMs could also be used as talking points in a very focused way, in ‘low carbon living’-type groups:

“We’ve told them the main things that we learned from the OWL because I suppose we would assume that it’s true for everyone that their oven and their kettle are some of the main culprits. ... we all went away together when we were in the middle of doing the programme, so at that point we talked in quite a lot of detail...”

3. Implications for practice

These EVALOC findings help to fill out our knowledge of how EDMs have been used in places where a ‘community conversation’ about energy is developing. The case study home interviews showed how EDMs;

- Created ‘lightbulb moments’ by making energy use visible;
- Prompted changes in everyday energy use, especially

with kitchen appliances; and

- Became talking-points and part of a process of social learning.

The EVALOC evidence also showed how it is important to introduce EDMs along with the knowledge needed to operate them and make sense of the information they provide – like solar PV and solar water heaters, they are not ‘fit and forget’ technologies. We cannot draw firm conclusions from the 35 interviewees who said something about whether they had help with their EDMs, but it looked as though some help at or around installation was valuable to many households and without it, they might not have been able to get started with their EDM. The EVALOC findings, along with those from other studies, show that advice can be effective when it helps people understand their EDM and encourages them to keep an interest in different types of information an EDM can offer, keep the EDM in view, and make it part of everyday life.

The design of the EDM was clearly important, and before investing in one it is as well to check what is available and what sort of design is going to be most helpful. Which? Magazine has done ‘best buy’ comparisons in the past, and there may be other help online in choosing EDMs.

Expectations also mattered: it helped if people started with a positive and realistic view of what an EDM might be able to do for them.

Conversations with other people – family members, friends, researchers or LCC leaders – were important in helping households understand and reduce their energy use with the aid of an EDM. Some of the most enthusiastic references to EDMs came from householders who belonged to low-carbon living groups. As time goes on, it is likely that familiarity with EDMs will spread and there will be more ‘word of mouth’ advice available from family, friends and neighbours. At present, though, there is clearly a need to have some well-informed people in each community who are on hand to explain about EDMs before installation and to help them use their EDM if needed afterwards.

4. Implications for policy

The EVALOC findings broadly support the GB policy of offering displays with smart meters and requiring installers to explain them and to be able to give basic energy advice. They also point to the importance of face-to-face support from installers and others to encourage a ‘monitoring’ approach to the use of displays. LCCs are in a good position to provide this, given appropriate training and resources. While there is no prospect of an area-based smart meter rollout in Great Britain, there is still scope for supportive activity by locally-based third parties related to smart meter adoption and this merits exploration by LCCs, government and suppliers.

⁶ A recent report on ‘Smart Communities’, where participants used feedback in a social context, is also a useful source of information on possibilities and limitations of EDMs – see http://business.kingston.ac.uk/sites/all/themes/kingston_business/charmproject/smartcommunities.pdf



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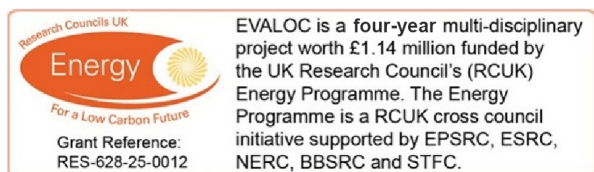
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The **EVALOC** project seeks to assess, explain and communicate the changes in energy use due to community activities within six selected case study projects under the Department of Energy and Climate Change's (DECC) Low Carbon Communities Challenge (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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