Theme:
Energy Feedback

Overview

Giving energy feedback to households can reduce energy used in buildings. The idea is that by providing information about energy use people will change their behaviour. Research has shown that energy savings from feedback can range from 5 to 20%. The challenge is that every individual responds differently to messages and the technology by which they are communicated. Researchers working on TEDDINET projects are focused on both the technical and the social parts of the problem. They have been thinking about two fundamental questions:

1. How should feedback be presented? This technical research is developing and evaluating energy feedback displays and interfaces.

2. How should feedback be communicated? The social science research aims to understand which feedback strategies work by understanding what motivates behaviour change.

Key Messages

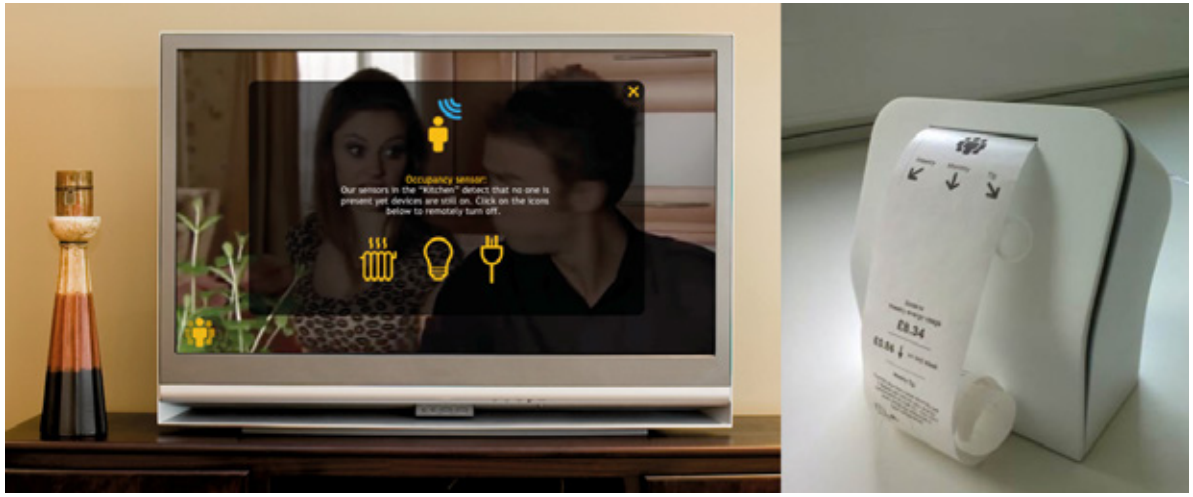
Universal feedback - Good quality energy feedback has been shown to reduce energy use by up to 8%. If energy feedback was standardised and made central to the billing process it would be available for all households and large savings would be possible.

Smart metering - The UK government smart meter roll out is a significant opportunity to give tailored energy feedback to millions of homes and small to medium-sized business but more work is required to ensure that the opportunity is not wasted. Long term sustained savings require occupants to stay engaged in feedback devices, such as a home energy display. Consequently, high quality design based on robust research is essential.

Beyond feedback - To create significant energy savings in the order of the targets set out in the UK Climate Change Act (2008) a large investment to improve the thermal properties and heating technologies in the building stock is required.

Example: APAtSCHE

Researchers on the APAtSCHE project studied energy demand in the aging population. They developed and tested two new feedback interfaces. The first provided energy feedback via a TV. This was generally well received because it was a familiar device, but the ability to understand the feedback varied greatly between people. The second interface gave energy feedback using a small printer. The paper printout reported weekly energy use and an energy savings tip. The physical nature of the feedback helped to ensure that it was read. The simplicity of the printer was helpful for people who do not wish to engage in new technologies. The research concluded that different interfaces would suit different users.



Concept prototypes tested by the APAtSCHE project

Information gathered from

The Aging Population Perspective on Designing Successful Feedback Inter-faces for Home Energy Systems: Beyond In-Home Displays

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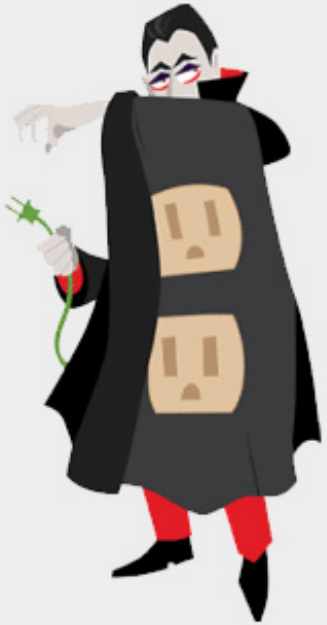
http://www.teddinet.org/project.php?s=apatsche

Example: DANCER

The DANCER project aimed to assess whether energy feedback can influence pro-environmental intentions. Researchers gave over 1000 people information about the annual cost of their “energy vampires”. Energy vampires are appliances such as televisions and laptops that consume energy even when they are not being used. Researchers presented the feedback in different ways, for example, financial losses vs. financial savings or collective costs vs. personal household costs. Several feedback strategies were tested, but none of these had a statistically significant positive effect on behavioural intentions. The participants reported increased understanding of energy costs but this was not enough to change their reported behavioural intentions.



Information gathered from

Buchanan, K., Russo, R. & Anderson, B. (2015) Vanquishing energy vampires: the failure of feedback. Proceedings from the European Council for an Energy Efficient Economy 2015, France.

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http://www.teddinet.org/project.php?s=dancer

Example: ENLITEN

The ENLITEN project tested four feedback strategies in 43 homes. Researchers installed monitoring equipment into the homes to collect indoor temperatures and energy use data. This data was used to develop an energy behaviour change system called iBert. iBert is an Android application that uses sensors data to generate tailored energy feedback to users. The four feedback strategies are described in the table below.

Examples of feedback with actions prompts are:

C3: “I have noticed that the temperature in your home is frequently ...°C. This is considered unusually high. This might require ... kWh more energy over a whole winter, in comparison to a temperature of 21°C.

Advice: Consider lowering the thermostat to 21°C. If you don’t have a central thermostat, adjust your radiators. Alternatively, try changing your heating schedule so your boiler

C4 “I think a lot of heat might be escaping from open windows. The escaping heat results in wasted energy. Repeated regularly over a whole winter, the extra pollution from this wasted energy is equivalent to the destruction of about ... trees. This may be because there are too many windows open, they are open too wide or for too long.

Advice: Try changing how many windows you open and for how long to see if this message disappears next week”.

Messages were sent about four aspects that relate to home energy use. These were indoor temperature, heating schedule, electricity consumption and ventilation level. The message that used energy consumption figures converted into values (C2) was found to be the best feedback strategy resulting in energy savings of around 8%.

http://www.teddinet.org/project.php?s=enliten

Information gathered from

iBert: Intelligent Support System for Energy Behaviour Change

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	- Value	+ Value
- Action Prompts	**C1**: kWh	**C2**: kWh converted into values
+ Action Prompts	**C3**: Messages with action prompts	**C4**: Value messages with action prompts

The 4 feedback strategies and an example of the feedback given by iBERT.