



IDEAL

home energy advice project



Information Booklet

Important information about the project
and your household's participation in it



Welcome to IDEAL!

Thank you for agreeing to participate in this research project. This booklet gives you more information about the project: what you get from participating, what is expected of you, and how we will look after and use the data we collect about you and your energy use.

Inside this booklet

1. About the IDEAL research project
2. Your energy feedback system:
what you'll get and what it does
 - a. The standard system
 - b. The enhanced system
 - c. Energy feedback
3. What does participation involve?
4. FAQs and terms and conditions
5. Finding out more



1. About the IDEAL research project

We are testing an ‘energy feedback system’ in households like yours – a set of sensors that record energy use and other details like temperature and humidity in your home, and give feedback about it to you. Around 300 households will be involved in the project, from across Edinburgh, from 2016 up to 2018.

Participation in the IDEAL project also includes participation in a smaller project called BIGSMALL. This information booklet describes both, and references to the IDEAL project also include the BIGSMALL project.

IDEAL focuses on testing new ways of giving people feedback about their energy use to understand what people find useful and what helps them to reduce electricity and gas use.

BIGSMALL aims to develop ways to use the data we collect to identify what people are using their energy on in the home.

Both projects are being conducted by a team from the University of Edinburgh and environmental charity Changeworks, led by the university's Nigel Goddard. Researchers and academics from University College London are also involved in the BIGSMALL project. The research is funded by the UK Government's Engineering and Physical Sciences Research Council.

Aims of the project

We are investigating how sensors can help us identify what people use energy for in the home, and give feedback to help people find ways to use less electricity and gas in their homes. We hope the results of the projects will help us to:

- improve our understanding of what people use energy on in the home
- improve our understanding of how people use energy feedback devices, so that they can be better designed in future
- get new information about how household energy use changes because of the feedback given to people
- better understand which kinds of feedback are most useful for which kinds of household
- better understand how this can contribute to reducing energy demand from homes.


We expect the results of the studies to be relevant to smart meter design and policy, and to help ensure people in future are better able to reduce energy use at home, saving money and reducing greenhouse gas emissions.

Your involvement

We hope being involved in the project will be interesting to you too – you'll be involved in a big University research project, helping us to develop better energy feedback. You'll find out more about how you use electricity and gas in your home. And you'll hopefully discover convenient ways to save energy and reduce your energy bills.

You'll also be making an essential contribution to the research and to meeting our research aims, so thanks!



A close-up photograph of a hand turning a white radiator control knob. The knob has a ribbed texture and three red vertical lines on its side. The background is a blurred wall.

2. Your energy feedback system: what you'll get and what it does

There are two versions of the energy feedback system that we can install in most homes, the 'standard' and the 'enhanced' versions. You will have already chosen one when you first spoke with us on the phone, but if you want to change your mind after reading this and pick the other one, let us know when we talk to you again soon.

The sections below describe the equipment that we'll install, and the kinds of energy feedback you'll get, depending which version of the system you pick.

The system is a mixture of commercially available equipment and items developed by the University of Edinburgh as part of the IDEAL and BIGSMALL projects. All parts of the system are CE certified for safety where required.

The Standard system

There are four main parts to the standard system:

Room sensors

- We'll put sensor boxes in nearly all the rooms in your house.
- They record temperature, humidity and light levels.
- They're attached about shoulder or head height (around 1.7m/ 5'6" from the floor), to the wall or reasonably permanent furniture (like bookshelves), but there's some choice about where in each room they go – the installer will ask where you would like them.
- They are battery powered, and the batteries should last the length of the project so shouldn't need changing.
- We attach them with sticky labels specially designed to attach securely, and to avoid damage to surfaces when they are removed at the end of the project.
- The sensor boxes send the data they collect to the base station (see below), using the same radio frequency range as ordinary Wi-Fi (in testing, there has been no problem with interference between the equipment and other Wi-Fi devices in the home).



Gas, electricity and boiler sensors

Similar sensor boxes are also used on or near your gas and electricity meters, and on the pipes going into your boiler, to record how much energy you're using, and when you're using the central heating and hot water. These ones have special sensors attached on or near those meters and pipes, connected by cables to the sensor box.

Base station

The base station connects by a cable to your broadband internet router, and also plugs into the mains for electricity. It collects the data from all the sensor boxes and uses your internet connection to send it securely to servers at the University of Edinburgh.

The feedback system sends and receives about 0.5GB of data per month (equivalent to about 15 minutes of HD video, so not much); varying depending on exactly how many sensors you need in your home, and how much you use the feedback app. Most broadband services don't have data limits: if yours does and this takes you over your limit, you might incur extra broadband charges which the IDEAL project is not able to reimburse.

A tablet computer

We'll leave you with an Android tablet with an app on it to see feedback about your energy use (see the section called 'Energy feedback' below for details). You'll be able to use it for other things too, just like any other tablet.

The Enhanced system

The enhanced system uses additional sensors to collect a much higher level of detail about your use of individual appliances. We aim to make the installation as neat as possible, but it is more visible in your home than the standard system. It also involves three visits to set it up, including some electrical work by a qualified electrician (paid for by us). You will however get much more back from participation in the enhanced system:

- Easy access to the data we collect, in spreadsheet format for you to look at.
- We'll occasionally ask you to participate in developing new features of the energy feedback system, so you have the chance to shape which features we develop and how you would like them to look.
- You'll receive new features of the feedback system much sooner than households which have the standard system, and will get all the most advanced features.

Extra sensors

If you choose the enhanced system instead of the standard system, then you'll get everything above, plus a large number of other sensors, described below.

We'll put more of the standard sensor boxes with sensor cables attached:

- On the pipes going into and out of every radiator in your home.
- On every hot water pipe or tap (e.g. kitchen sink, bath, shower).
- Above any gas heaters, gas ovens, or gas hobs.



We'll also connect 'plug level monitors' to various appliances in your home. We'll attach them to any of these that you have:

- Microwaves
- Fridges and freezers
- Kettles
- Washing machines and tumble dryers
- Vacuum cleaners
- Portable electric heaters, dehumidifiers, aquariums and wine coolers.

Finally, we'll install a sensor that can monitor how much electricity is being used in different circuits of your home. This involves a qualified electrician making some changes to the wiring at your electricity meter. This sensor will record use of electricity by some high power appliances that are wired directly into your electricity supply instead of being plugged in, mainly electric ovens and hobs, electric showers and electric heaters that are fixed in place.

Extra data

The feedback system for an enhanced system sends and receives about 2GB per month (equivalent to about 60 minutes of HD video, so not much), varying depending on exactly how many sensors you need in your home, and how much you use the feedback app. As with a standard installation, if your broadband service has data limits, and this extra takes you over your limit, you might incur extra broadband charges which the IDEAL project is not able to reimburse.

A note on safety

The equipment contains small parts and batteries so should be kept out of the reach of children under three years old.

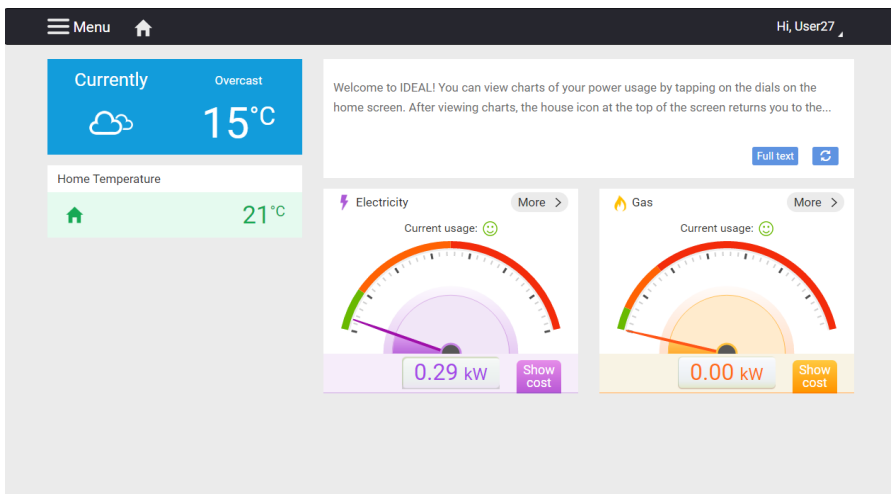
Please also keep equipment out of the reach of young children and pets in your home because of the risk of damage to it. In the case of an enhanced installation, there are sensors that must be placed near to the ground (around 1m or 3ft, from the ground). You should not agree to have an enhanced system installed in your home if there are children under 7 years of age and pets which may be able to access the parts of the system, because of the additional risk of damage to it.

Energy feedback

We're going to be developing a range of features to give you feedback about your electricity and gas use:

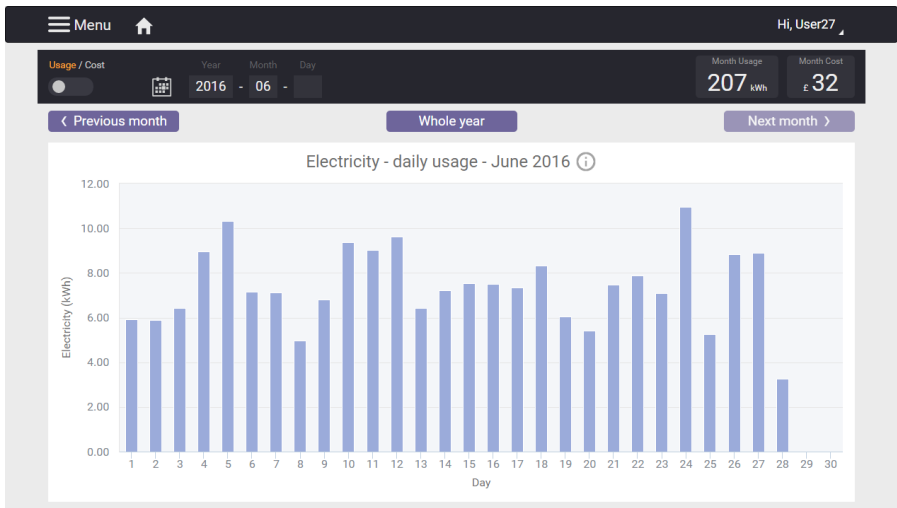
- how much you're using
- what it costs
- ideas and support to reduce your usage

You'll be able to view this on the tablet we provide, and it is also available over the internet. Each individual in the home will have their own account to use the feedback system. For privacy, over the internet you can only access your account using a username and password to log in. On the tablet we provide, anyone can view the feedback, but you can set up a password to log in to the tablet if you wish.



From Day 1

From the day we install the system in your home, you'll be able to see feedback about your current and past energy use, and an estimate of what it costs, along with the current weather and your home's temperature.



We'll also occasionally use the app on the tablet to ask you and others living with you some questions, including some right at the beginning. There won't be too many, and please answer as many as you can to help the project.

More features coming later

Our main aim is to develop and try out new types of feedback, so we'll be giving you new features every now and again all through the project, and asking you about how you like them.

Soon after you get the system we'll start providing energy saving tips. Other features will be released later. We'll email you and others in your household just before we release new features to let you know about them.

Some of the features we plan to develop over the next two years:

- Your energy use in comparison with similar homes.
- More detailed information about what you're using gas and electricity on, when, and what it costs, such as your use of heating and different appliances.
- More advanced tips, advice and support to help you reduce the energy you use at home in convenient ways.

Some of these new features may let you work out what has been happening in your home (such as when the heating has been on, and in which rooms, or when ovens, washing machines, showers and other appliances have been used).

For homes with a standard system, different homes will get different features. Which kinds you get will be chosen at random, but everyone will receive several new features over the project. Homes with an enhanced system will get all the features, and will usually get them sooner than homes with a standard system.



3. What does participation involve?

We ask you to participate until the end of the project (probably until June 2018). Participation involves:

The installation of the energy feedback system. Whether you opt for a standard or an enhanced system, we'll install all the kit ourselves and show you how to use it, at a time convenient to you.

Using the feedback. We ask that you and other household members use the feedback system as much as is convenient for you. We need your help to make the feedback system right for you. By using the feedback interface on the tablet or website we will be able to find out how intuitive and useful you find the system. This will help us improve it over time.

Telling us your thoughts. There'll be various ways we will ask for your thoughts on the system:

- **Occasional questions in the feedback system.** The feedback system will occasionally ask questions to everyone with an account, to understand more about you, your energy use, and your use of the feedback.
- **Completing surveys.** One member of your household will be asked to answer a survey during the installation visit about your household and your energy use. The same person will also be asked by email to answer short surveys (about 5-10 minutes long) every six months through the study.
- **Optional interviews and focus groups.** We may also ask you to participate in interviews or focus groups, to ask about your experiences with the feedback system and your use of energy. These are optional – you can decide when we contact you if you want to join in or not.

Helping us keep it running!

- **Keep your internet router and the base station turned on.** Your internet connection is needed for the feedback system to work. We need you to keep your internet router and our base station turned on all the time, 24 hours a day, during your participation in the project, even if you go away for a while. We realise not everyone does this usually, but running a router 24 hours a day typically costs around £5-10 per year in electricity.

- **Help with fixing things!** Some of what we're installing is not a commercial product, it's been developed as part of a University research project. Sometimes things might go wrong – if they do in your home, we might contact you by phone or email to ask you to try to fix it, or failing that, to arrange a time when we can come round to get it working again. Your help with this will be very appreciated!

At the end. Towards the end of the project, we will get in touch with you: there may be follow on projects that we'll give you the option to continue in. If you'd rather leave, we will arrange to remove all the equipment. We will either explain how to remove the sensors and base station from your home and return all the equipment to us (at no cost to you), or we will arrange a suitable time to visit and remove it.

For enhanced installations, we will always come to uninstall it. We can either remove the electrical work done at the start of the project, or leave it in place, as you prefer. We will make good any damage to plasterwork but will not be able to repaint or redecorate.



4. FAQs and terms & conditions

Information collected and what we do with it.

Our system collects the following data.

From the sensors in your home and the feedback app and website:

- Gas and electricity usage readings.
- Temperature, humidity and light readings from every room in which a sensor is installed.
- Temperature readings from pipes to which sensors are connected.
- Patterns of usage of the feedback system. This includes times when the app or website is used, which items of information you look at, which feedback advice you tap or click on, and use of any of the other features we may develop for the feedback.

Directly from you and other household members in your home:

- Answers to questions we ask you and other household members through surveys and via the feedback app and website.
- Data from any focus groups or interviews you participate in and from questions asked to you in person, by telephone, email or other channels during your participation in the project.

During the installation visit:

- Characteristics of your home, including room physical characteristics, details of energy using appliances, and details of the locations in which our equipment is installed.
- Photographs of the installation locations of equipment to help understand their functioning, and of appliances to record makes, models and information labels.

Data collection and use

- Data collected in your home will be transmitted in encrypted format to a secure server located in the School of Informatics, University of Edinburgh. This data is sent without any personally identifiable information (such as names or addresses). It is stored in a separate data store from where we keep your name and address details.

- The full set of collected data will be accessible only by staff involved in the IDEAL and BIGSMALL projects, and future related projects conducted by the University of Edinburgh.
- Data will be analysed and used for the purposes of improving and refining the functioning of various aspects of the system and wider project, including data collection and analysis systems, the feedback system, participant recruitment, and the equipment installation process.
- It will also be used to improve our understanding of how participants use energy in their homes. This will include identifying some of the things happening in your home that use energy, and approximately when (for example, use of central heating, patterns of laundry washing). It will also be used to improve our understanding of which kinds of feedback people find useful, how feedback influences people's energy use in the home, and to produce journal articles, presentations and other research reports and outputs describing the research and its findings.
- All data and information we store about you and your household will be stored securely and kept confidential, and you will never be named or identifiable in anything we produce.

- Anonymised data from the projects will also be placed in the University of Edinburgh’s data archive, the purpose of which is to make the anonymised data available for future research conducted by us and other organisations and for public access. This will not contain any personally identifiable information, so neither you nor your household will be identifiable from it.

Changing my mind

You have the right to omit or refuse to answer or respond to any question that is asked of you.

You are also free to decide to leave the project at any time, without penalty, even after you have agreed to participate, and you won’t need to give us a reason. If you want to leave the project, you can contact us using the details at the end of this booklet and tell us and we will arrange this with you.

Research ethics

The projects have been subject to the research ethics review process for the University Of Edinburgh School Of Informatics.

If you have any concerns about the way in which the study is conducted, you may contact Changeworks using the details on the last page of this booklet.

Further terms and conditions

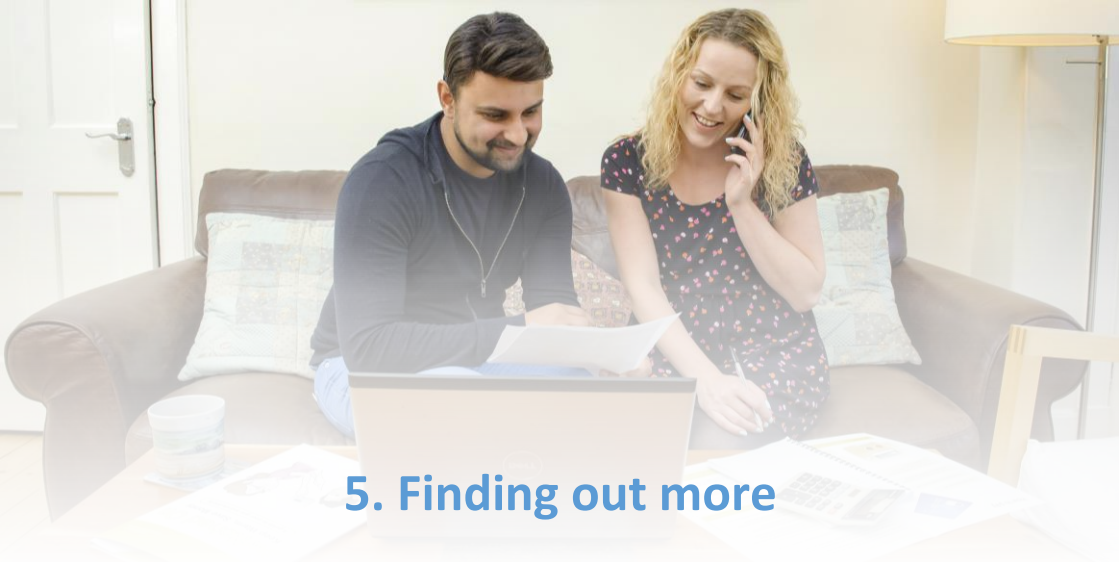
By participating in this study you agree to be bound by this End User Licence Agreement (EULA) and also the EULA of third parties such as the manufacturer of the tablet computer and Raspberry Pi base station provided.

The hardware, software, information and data ('the system') supplied to you as part of participation in this project remain the property of the University of Edinburgh, which grants you a non-exclusive, non-transferable right to use the equipment and services as described in this booklet. You have no title, ownership rights, rights to trade secrets or intellectual property to the system supplied. You may not alter, decrypt, disassemble, decompile or reverse engineer in part or in whole the system, except as permitted by mandatory applicable law or the EULAs of third party equipment provided. The system and its components are owned by the University of Edinburgh and are protected by applicable intellectual property laws. You may not modify, distribute, sell or lease any such copyright or intellectual rights.

The system supplied to you as part of participation in this project, is supplied to you 'as is' and your use of the system is at your sole risk. The University of Edinburgh makes no guarantees either express or implied as to the satisfactory quality, correctness, accuracy, reliability, fitness for use for a particular purpose or otherwise of the system. All equipment has been CE certified for safety as required by law.

If at any time you need to dispose of electrical and electronic equipment that we provide as part of participation in the project, please do so in line with current waste disposal policies – you may also contact us to arrange for the safe disposal of any such items, using the details on the final page of this booklet.

To the extent not prohibited by law, in no event will the University of Edinburgh, its subsidiaries, officers, employees or suppliers be liable for any damages due to the installation, use or de-installation of the system.



5. Finding out more

If you have any questions about participation or about how the feedback system is working at any point before, during or after participation, including problems you might be experiencing with the system, you can contact Changeworks:

Tel: **0131 539 8610**

Email: **IDEAL@changeworks.org.uk**

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