

Information Sheet for Participants – **Version 1, 30/01/2012**

You will be given a copy of this information sheet.

Title of Project: **Exploring locational influences in energy consumption through spatial analysis**

This study has been approved by the UCL Research Ethics Committee (Project ID Number): **4232/001**

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Details
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Dear Potential Participant,

Thank you for your interest in this study, and I hope that you will find time both to discuss this in person and with your loved ones and colleagues before agreeing to participate.

Identifying the “gap” between how much energy is probably being used in your home and how much actually is consumed in real life is an important research question for architects, planners, energy companies, politicians, and engineers when they are trying to design buildings, embark on a policy, or put a price on energy.

The energy use in your home is estimated based on its size, but this study wants to know if and how much your energy consumption is (or is not) affected by how much time that is being spent in the home, what other parts of your life are pulling you out of the home, and the ease in which you can come and go from your home.

Using expertise developed at the UCL Centre for Transport Studies and the Centre for Advanced Spatial Analysis, the study we are seeking participants that will agree to

the tracking of their location during their normal daily activity and the monitoring of their electricity use in the home. This will involve the carrying of a small GPS device, or 'logger' for 1 week in February 2013 about the size of a memory stick, the installation of an electricity monitor next to your electricity meter, and the placement of temperature sensors on radiators and hot water pipes.

We are seeking to recruit 1 or 2 person households (including children), who use natural gas as their heating source to participate in this study. We wish to limit the confounding factors of other members of a household using energy when the person being tracked using the GPS logger is not home and allows the researchers to make a distinction between heating demand from the gas meter and demand for appliances, lighting, and electronics demand from your electricity meter. We also ask if you can estimate the time that you and other spend in the home each day to try and control for this confounder.

All information, when it leaves your possession and is "uploaded" to the researcher, will be kept on an encrypted hard drive and deleted after the completion of the study. There will be a small team of four people that will have access to this location data during processing and analysis of the GPS logger data where we will link it to a land use database of London to translate your location into time spent in different kinds of buildings (e.g. residential, commercial, leisure). We will not publish the precise location of any of your activities in any academic journal or reveal it in interviews with the media during or after this study. Under the Data Protection Act, you may keep or request copies of the data that you generate. You will receive an electronic copy of the final report.

Please discuss the information above with others if you wish or ask us if there is anything that is not clear or if you would like more information.

It is up to you to decide whether to take part or not; choosing not to take part will not disadvantage you in any way. If you do decide to take part you are still free to withdraw at any time and without giving a reason.

All data will be collected and stored in accordance with the Data Protection Act 1998.

Please contact me at the phone number or email address above with any queries.

Yours Sincerely

Steve Lorimer and Martin Austwick
UCL Centre for Advanced Spatial Analysis (CASA)

FAQs: The GPS Logger (i-gotU)

What do I have?

Global Position System (GPS) is developed and operated by the Department of Defense (DOD) of the United States, on which the accuracy and maintenance of this system fully depends. Any change made by the authorities might influence the accuracy and performance of GPS equipment.

GPS provides satellite signals which are specially coded for the computation in a GPS receiver to record your position and time. Usually it requires four GPS satellite signals to computer correctly the position in three dimensions and the time of the GPS receiver's clock.

The i-gotU GPS loggers are made by Mobile Action. There are various models that have been made (GT-600 / GT-200 / GT-200e / GT-120). You will have model GT-120, which transfers data via a USB cable.

How do I turn it on and off?

The logger has been programmed to be on 24/7, so it will not be possible to manually turn it on or off. The time interval between recordings of your position has been set to every 7 seconds which provides around 20 hours of battery life on a full charge. Some of the help file refers to manual settings for turning the logger on and off. Please ignore these as the button on your logger has been disabled. The research team has debated the advantages and disadvantages of a logger that can be turned off and on, and the thinking is that missing data is more likely to come from participants forgetting to turn the logger on or accidentally turning it off in a bag than from forgetting to charge the logger every day. You always have the option of asking the team to set the logger to manual mode to enable you to turn it off and on to protect your privacy.

How accurate will it be?

Any obstruction above or around the receiver, such as high buildings in the neighbourhood, or bad reception location, such as in a tunnel or in a building, will influence the time needed for a successful GPS location. In areas with mixed land uses, this may cause your time to be misallocated.

I've had a look at the Mobile Action (mobileaction.com) website and have downloaded the software. Can I download my data onto my computer?

You are welcome to have your data (in fact, the Data Protection Act obliges UCL to give it you if you request it), but please wait for a researcher, most likely to be Steve Lorimer, to download the data from the logger onto a UCL computer first. A copy of the file will then be sent to you via email or a "drop box" facility.

Can I withhold my location for privacy reasons?

You most certainly can. The settings of the logger can be changed to manual mode so you can turn the logger on or off. In addition, if you are using the default setting of an always-on logger and you wish to have your location deleted for a certain range of time, contact Steve Lorimer at s.lorimer@ucl.ac.uk and he will permanently delete these locations from the database.

It's run out of battery (Neither the red nor blue light is on)!

I left the logger at home!

Don't panic. Missing data is expected in any of these projects.

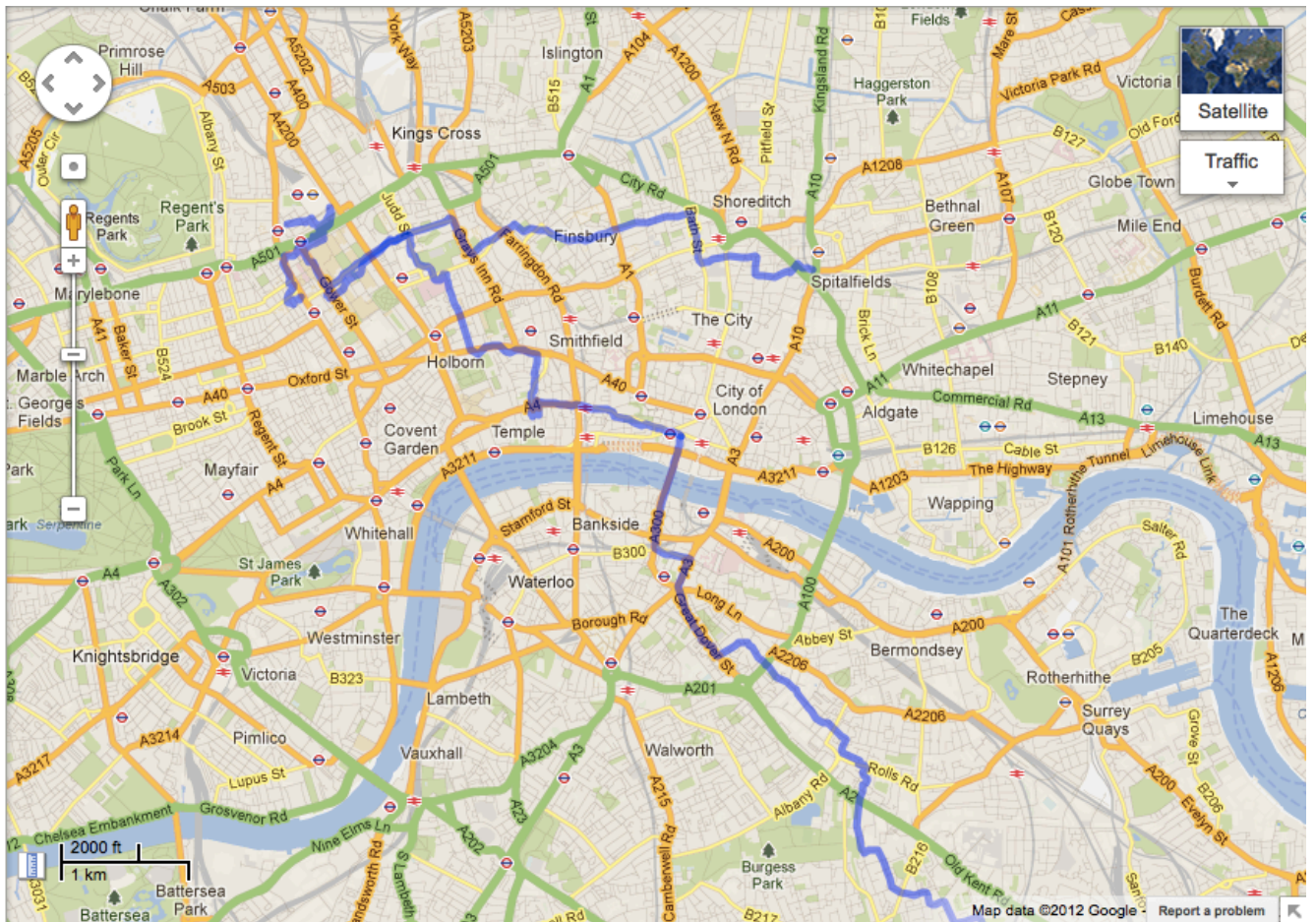


Figure 1: An example of a GPS track (note: battery ran out near Shoreditch High Street Station in upper right hand corner)

FAQs: Electricity and Gas Meters

How do I read my meter?

The best source is the website of your energy provider, as they likely supplied the meter.

How often should I read my meters?

Every day during the survey period around the same time (e.g. 8am or 7pm) is preferable. If you are a couple of hours out, this is not a problem. Remember to write down both the numbers for electricity if you are on an Economy7 rate plan.

Some suggestions to help:

- Link taking down meter readings to a part of your daily routine, such as making coffee in the morning or brushing your teeth in the evening.
- Take pictures of the gas and electricity meters with your phone instead of writing the meter readings down. This has the added advantage of logging the time of the reading into the picture file.

My energy company always has me drop the last digit(s) of the reading when reporting it to them. Should I do the same with you?

No, write down all of the numbers displayed. Do put a decimal point to the left of the red number(s).

I forgot to take a reading yesterday. What now?

If you forget, don't panic or "make up" a reading in a pang of guilt. Missing data is expected.



Figure 2: Example of a electricity meter picture

FAQs: The SmartEnergy Monitor

Is it a smart meter?

No. It is a monitor that reads the current (in amperes) going through the cable leading from your electricity meter. Electricity meters measure the power (in watts) used by the customer before calculating consumption (in kilowatt-hours) by multiplying power by time. Electricity monitors calculate power by multiplying the current going through it by its voltage. In the UK, electricity network operators aim to deliver a voltage of 230V, but this is allowed to deviate by as much as 10%. This means that there can be a similar error in the monitor's calculation of your electricity consumption.

How do I install it in my home?

<https://www.alertme.com/help/devices/> is the website to go to for information, but in short:

- 1) Plug the SmartHub to a spare ethernet port on your broadband router with the ethernet cable provided and plug it into the mains.
- 2) Login to a computer on the <http://www.alertme.com> website using the username and password provided for the device. The instructions will take you through the following:
- 3) Plug the SmartDisplay into the mains. It will connect with the SmartHub.
- 4) Put the batteries provided into the SmartMeter reader and connect it with the electricity clamp.
- 5) Open the clamp of the SmartMeter reader and attach it around any one of your electricity meter cables, closing the cable firmly. This should now read the current going through the cable, giving your home's energy usage. The signal range of the SmartMeter reader is around 20 metres from the SmartHub.

Do I need to do anything else?

No. The project team will remotely login from UCL and download hourly consumption data from your SmartHub.

Can I keep the monitor after the end of the survey?

Yes, if you wish, and we can ask AlertMe to change the username and password on your behalf.

FAQs: The iButton Thermochrons

What are they?

They are small sensors that can store temperature data. They have been set up to take a reading every five minutes. They were originally designed for monitoring cold storage, but are increasingly used for research in the built environment.

Where do I put them?

- 1) Your main radiator (i.e. one that is always left open, likely to be found in the hallway as opposed to rooms that you occupy such as bedrooms and lounges). The readings from this iButton will be used to estimate space heating demand.
- 2) On a hot water pipe leading out of your boiler. The readings from this iButton will be used to estimate water heating demand.

Are you monitoring this remotely as well?

No. We will download the data from the sensors at the end of the week.

FAQs: Participants

Who are you looking for?

We are looking, ideally, for single-person households who use natural gas for their heating system. We want to have single-person households because we wish to connect one person's movements through the city to their energy use, and there would be confounding information if there were other people accessing your home and creating energy demand when you are tracked as being elsewhere. We are looking for gas-heated homes because this allows the researchers to separate heating energy demand (fuelled by gas) and non-heating energy demand (fuelled by electricity).

I have some energy provided from sources attached to my home. Is that OK?

These sources can make it look like your energy demand is less than it actually is if we rely solely on your gas and electricity meters. If you have any renewable energy sources attached to your home, such as solar hot water heaters or photovoltaic panels, please discuss this with the research team to see if we can take readings of their energy generation. We will then be able measure how much demand from "the grid" was reduced which will allow you to participate in the study.

What information about me is needed?

We need to have information on the occupation of your residence during the survey. Please look at the response proforma for taking down meter readings and recording additional occupancy in your home during the day. There is a "Blank" sheet and an "Example" sheet included in the excel document. Feel free to print out or fill out electronically.

As this is such a small study, demographic information (e.g. age, sex, income) will not be necessary. There will be an optional exit interview or a follow-up questionnaire after the data is analysed where some questions may be asked about the size of your home, how many devices you own, or the make of the boiler to help the researcher and you to understand what drives your energy consumption at home when you are present there.

Can I do more to help you?

We would like to show this project to both the academic and wider communities. We of course will do this using maps, graphs, and statistics, but what won't come across is what it feels like to be a participant in the project. In other words, we want to "make it real" for future audiences when we show off our research! In addition, this is a pilot study with a small number of participants, and we are seeking funding to expand this to a wider survey involving many more households and even entire workplaces.

Here are some ideas:

- A traditional time use diary for a weekday and a weekend day during the survey period. A form using a template from Eurostat's [Harmonised European time use surveys](#) is attached.
- A photo or video diary of what happens during your day for one weekday and one weekend day during the survey time. A sample list of events during the day to record would be:
 - Leaving home
 - Waiting for the bus/train, or beginning walking/cycling to work
 - Arriving at work
 - Arriving at lunch
 - Leaving work
 - Arriving at the shops
 - Arriving at the restaurant/pub
 - Waiting for the bus/train, or beginning walking/cycling to home
 - Arriving home

UCL Centre for Advanced Spatial Analysis

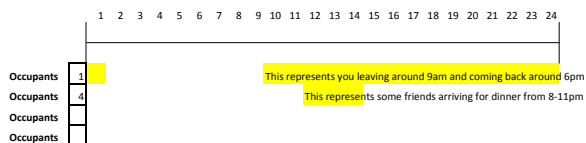
Exploring locational influences in energy consumption through spatial analysis (4232/001)

Participant number (on side of logger) IGU-026

Day

1
06/02/2013

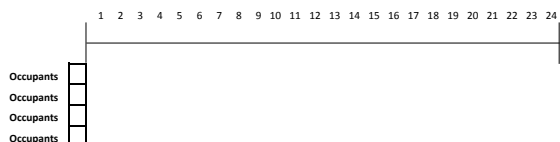
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Day

2
07/02/2013

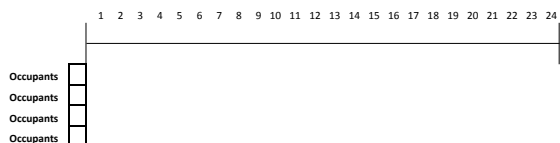
Meter reading time	Electricity meter reading	Gas meter reading	+24 hours



Day

3
08/02/2013

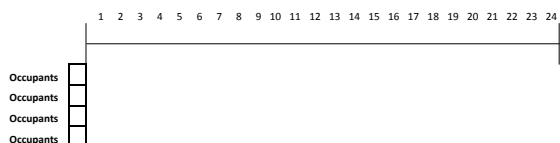
Meter reading time	Electricity meter reading	Gas meter reading	+24 hours



Day

4
09/02/2013

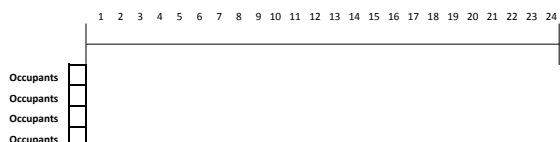
Meter reading time	Electricity meter reading	Gas meter reading	+24 hours



Day

5
10/02/2013

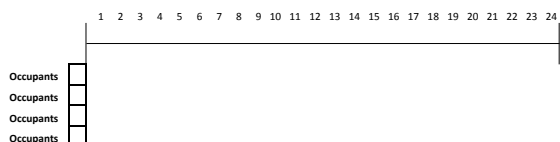
Meter reading time	Electricity meter reading	Gas meter reading	+24 hours



Day

6
11/02/2013

Meter reading time	Electricity meter reading	Gas meter reading	+24 hours



Day

7
12/02/2013

Meter reading time	Electricity meter reading	Gas meter reading	+24 hours

