



Energy Optimizers is a leading UK manufacturer of ZigBee enabled power meters and load controllers for the home and office. As the cost of energy continues to rise, so too does the effort to find new ways in which to monitor, control and save energy usage, especially at times of peak demand.

Interested in finding out about the way households consume energy, a leading Canadian electricity supplier is utilising one of Energy Optimizer's new remotely controlled energy monitoring devices, known as the Plogg, in order to understand domestic electricity use trends, with a view to both saving energy, and reducing peak demand times on the grid.

The Plogg, supplied by Energy Optimizers, is a Zigbee wireless enabled smart meter plug, designed to provide essential data about energy consumption at the point of use - the power socket. The Plogg is able to send two-way wireless communication from a PC, PDA, Smart Phone or over the internet. User specified data logging of intervals between 1 minute and 1 month can be set enabling great scope for detailed appraisal of an appliances' energy performance.

The Plogg has a wide appeal: Having access to such precise and regular energy data can have a significant impact on power consumption: The availability of such data can not only encourage energy saving behavioral changes in the way appliances are used, but if energy managers have immediate access to the price and environmental impact of the way their company is using electricity, energy savings can be maximized, whilst buildings may be designed to minimise energy use and maximise the wellbeing of the occupants.

The Canadian utility company has utilised over 100 Ploggs as part of a project to attain End-Use Metered data (EUM) across a group of houses. Their aim was to learn more about load on the grid, with regard to how energy is used in the home – which requires understanding demand across the consumer base. For example, there appear to be surprise peak loads, which were as yet unexplained. In addition, the study would flag up any areas where idle appliances could be switched off, with the effect of saving energy.

From the point of view of Energy Optimizers, by carrying out analysis with smart metering devices such as the Plogg, the utility company could demonstrate that the Ploggs would work when taken to the next stage in a larger study, (several hundred houses with around a thousand devices in place).

There are no real studies or reports available on this the subject of patterns or trends of home energy use, even though the issue is now of increasing interest to utility companies, so the Plogg would play a major role, of use to all companies interested in surveying the energy consumption of individual appliances.

Another issue raised in the study was that of reactive power, described by the UK National Grid as "background energy movement in an AC system arising from the production of electric fields". Reactive power is an issue because, although it needs to be generated in order to supply energy to homes, reactive power itself never gets consumed. Analogously, you can have water coming into your home but if there is no pressure in the system, the water cannot be used. It costs money to generate reactive power and send it round the grid, so the utility company was interested in any measures that could be taken to reduce the load that might come to light as a result of the metering study.

In a typical house in the study, the Ploggs monitored every appliance and energy consuming machinery in the house. End-use data is vital for obtaining accurate load for the following residential end-uses:

- Electric Water Heating
- Electric Space Heating
- Fridge/Freezer
- Electronic Appliances (TV, HiFi, PC, Games)
- Base load (including Standby or Phantom)
- Lighting (both incandescent and CFL)

The first stage of the study came up with a number of interesting results:

- The study has proven that phantom loads do exist in household energy consumption: phantom loads are defined as the power consumed by an appliance whilst it is switched off, or in a standby mode. Commonly phantom loads can be caused by a power adapter left plugged into the mains (even though it may not be connected to an appliance at the other end).
- The study has proved we can understand general trends, patterns and data about the way in which energy is consumed on a domestic level on a potentially large scale.

- The study shows there is potential for improvement in the way power is consumed, by highlighting the devices which are left on and wasting energy.

Shaun Merrick, **General Manager** Energy Optimizers, commented, "There is a need for all major industrial countries to see how consumers use electricity in the home. This study shows it is possible to attain data about household energy use, and leads us to the next stage in both energy saving and reducing peak demand on the grid – which is to suggest how appliances can be switched off remotely by utility companies."

"For instance, if you agree with your utility company to switch off your fridge for an hour, remotely via a Plogg, (and obviously at a time when you won't be using the contents) the utility company can then give you a financial reward."

Not only is this going to be beneficial for carbon saving, but will help alleviate the problem of peak load on the grid: Whilst energy is produced by power generation companies at a fairly consistent rate, this study confirms that the same is not true for the homeowners who use electricity, resulting in peak demand times, with which the grid can struggle to cope. Shaun said, "for instance, if two million fridges were switched off at a peak time, say, 5.30 on a December evening, it would have the effect of saving a power-station being switched on."

Ploggs have been proven to play an important role in switching off loads, which will give utility companies the capability to switch off discretionary loads, such as immersion heaters, fridges or swimming pools – none of which, if turned off at agreed times, would affect the consumers' lifestyle or comfort level. This practice would save energy, with the effect of reducing the contribution to peak load on the grid from electrical processes that are not immediately needed – the Plogg's role is to demonstrate where and how this can be done.