

# case study

## CLIPS Intelligent plugs

### Project Summary

The project will develop a unique wireless network system to transmit energy usage information from domestic plugs to a small central unit that will monitor, display and control the power consumption.

A special component will be introduced into domestic plugs to create 'intelligent' plugs, indistinguishable from standard plugs, and the base unit that will monitor, display and control power consumption for every domestic device.

The system, will allow energy usage profiles and behaviour patterns in the home and at work to be monitored and improved by user-programmed control of energy usage.

### Partnership

- University of Essex – rated 10th in UK for research and 8th for teaching
- Circad Design Ltd. – Ipswich-based electronic product designer

### Aims

To develop an 'intelligent', people-centred plug system that will allow energy control for all domestic appliances, especially inefficient wall plug transformers and devices left either on or in standby mode. Intelligent plugs will address the need to reduce the energy consumption of products by providing a technological, programmable intervention at the power system level.

### Inspiration

The number and complexity of electronic systems within the home has expanded dramatically and, while this growth is set to continue, the end-users are becoming more demanding and the systems are becoming more sophisticated. Many products are difficult to switch off, especially when plug sockets are relatively inaccessible.

This behavioural-change-through-technology project creates incentives for people to switch things off, - either financial (the cost of the energy they are wasting) or altruistic (the carbon they are needlessly emitting).

### Innovation

The intelligent plug is non-invasive, can be retro fitted or built in by design and captures individual power statistics while allowing a centralised control of energy budgets.

Inside the plug will be a power meter, a microcontroller and a wireless transceiver, which will relay the power information back to a central control point from a few metres up to 1km. This will allow for automated control policy in both domestic and industrial settings.

### Future Implementation

There are 22,539,000 households in the UK with an average electricity consumption of 1650kwh per year. Between 1972 and 2002, domestic electricity use doubled and is projected to rise another 12% by 2010.

All electricity consumers will benefit from this initiative by a reduction in their domestic bills and the project delivers a benefit to the national economy by providing a vehicle to reduce energy consumption.

Estimates suggest that a 30% reduction of energy usage equates to 233kg of CO<sub>2</sub> per household per year. Nationally, this would relate to a reduction of nearly 6 million tonnes of CO<sub>2</sub> for the UK alone.

The intelligent plug has scalable options: a householder can set a maximum fiscal amount per day for consumed energy. Alternatively the householder can register an upper limit to the energy the home is allowed to consume during a day.

The controlling unit will manage the energy budget by prioritising certain energy tasks, taking into consideration the time of day and previous owner behaviour. It will also have the potential to interact with renewable energy resources such as photovoltaic cells and a small wind turbine. Further future developments will allow users to power appliances up or down by remote device.

The intelligent plug will be in carbon credit within 6 months of installation. With centralised control, energy targets can be stipulated and realised in a way, which would not otherwise be possible.

**Carbon Connections** is HEIF-funded investment project utilising £3 million for carbon reduction activities. Based at the UEA, Carbon Connections supports innovative projects in carbon reduction using a partnership model. The aim is to facilitate knowledge transfer between universities and research laboratories and the business community to speed commercial development of carbon-saving projects, whether technological or behavioural in focus.

