

CLNR Case Study

There's a new breed of energy consumer not only ready to tackle their bills but to go one step further with innovative ways to embrace home electricity generation. With the help of the Customer-Led Network Revolution, 'Energy Citizens' are leading the way.



DETAILS

Paul Johansson, 53

LOCATION

Sheffield, UK

TRIAL

Solar PV Users with in-premises
balancing for Automatic Hot
Water Charging

Sheffield technology teacher Paul Johansson, 53, has always been interested in generating his own electricity, but in the past it had found it prohibitively expensive to buy and install. Now, he and his family are taking part in the largest smart grid project in the UK, which aims to accelerate the cost-effective uptake of low carbon technologies and give consumers more choice in how they use and generate electricity.

Paul, his wife Helen and their 16-year-old son live in a detached, four-bedroomed home built in 1982. Eager to adopt in-home generation when it became more affordable, Paul first got involved through the feed-in-tariff scheme launched in 2010. Says Paul: "Although the quotation we got for a solar-powered system was quite high, I was really interested in the concept as it was still a very good investment when the feed-in tariff was at its peak."

After considering a large 4KW solar photovoltaic (PV) installation, he eventually chose a mixed system; solar thermal for hot water and a smaller solar PV system capable of generating 2.2KW. Since its installation, Paul estimates that he has generated 4300KW hours of electricity over two years – enough to boil over 10,000 kettles.

Says Paul: "The system works great; we cook, dish wash and wash our clothing during the daytime using our 'free' solar PV generated electricity. Our gas boiler is switched off from April to September, when we don't need the central heating as the solar thermal provides all the hot

water we need. It used to annoy me each summer to burn gas for hot water on a hot sunny day. The renewable heat incentive is starting in 2014, so an annual RHI grant should help recoup our solar thermal investment."

Joining the Revolution

The Johanssons are just one of thousands homes and businesses, mostly in the North East and Yorkshire, taking part in the Customer-Led Network Revolution. The project aims technical, social and commercial interventions to support the speedy and cost-effective transition to a low carbon economy.

One aspect of the project is looking at how customers can get the most out of their solar panels and use the electricity they generate more effectively in the home. Some customers have been supplied with smart meters and in-home energy displays, helping them to better understand and take control of their energy use, while others, like the Johansson's are taking part in automated schemes where hot water and storage systems are powered by the electricity they generate in the home.

Paul was contacted as a British Gas customer by telephone one evening; the representative explained the project very well and Paul was keen to get involved.

The proposed installation

Paul uses an EMMA – Energy and Microgenerator Management Unit - alongside his solar PV systems to allow





the storage of any excess electricity generated by the PV. The Customer-Led Network Revolution is trying to establish whether solar PV users can use their own in-home generation to ease stress on the local electricity grid during periods of peak electricity demand. The EMMA unit can automatically balance surplus electricity and decide whether to store it for hot water or heating or export it back to the grid.

The system is more financially efficient for the end-user because the feed-in tariff pays them more to use any excess generation in the home than it does to export it to the grid. The key benefit for Northern Powergrid, the network operator leading the CLNR project, is that that it could reduce the amount of electricity being exported back to the grid.

In the past, the electricity distribution networks were a relatively one-way street – electricity flowed down high voltage networks towards customers at low voltages – but now, with renewable sources, such as solar power and wind farms, the power is flowing in both directions. The network is not designed to deal with large amounts of micro-generation sending power back up the lines, a predicted problem for the grid in the future, so the role that customers can play in helping to balance supply and demand is important.

Installing the EMMA unit presented some challenges for Paul: “Because I had solar thermal already and was already producing hot water via that, I wasn’t sure how the Customer-Led Network Revolution’s proposal of adding an EMMA system would benefit my current energy system.”

“I already had a pre-existing system of two flat-plate technology solar thermal panels heating my hot water. So there was an argument that the EMMA system might just

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be replicating the job they were already doing. However, we were installing a new en-suite shower room and sink in our main bedroom at the time, which would increase our need for hot water.”

“I decided that it would be a good idea to power the en-suite directly from the EMMA unit, so I had a 125-litre unvented hot water cylinder installed in the attic. It needed to be unvented because there was no room for a second cylinder in the bedroom and a traditional vented one in the attic would have no water pressure because it would be too high up in the house.”

The unvented cylinder takes mains pressure cold water and outputs mains pressure hot water. This would normally be expensive to run as it is only heated by electricity, it has been estimated that the cost of one hot power shower per day can cost £300 per year with electricity.

Paul has found that, during the winter, the EMMA system has been providing reasonable amounts of high-pressure hot water for power showering with occasional direct electricity to boost the hot water when it is cold and dull.

“We only started using it in January and we only needed occasional electricity boosts in February and March. April to August was fantastic, with the EMMA meeting all of the en suite’s hot water needs.

“I spent £500 on the cylinder for the EMMA unit as well as having to buy new cabling – but we now get power-shower performance from a mains-fed system. It’s a digital, high-performance shower, so I’m happy. Now the house always has hot water that is green – we have the capacity to store 500 litres of hot water in total. Admittedly, not every home can accommodate two hot water cylinders, but it’s working well for us.

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“I don’t know my actual export figures but I know that they are now much smaller, this summer has been super and the EMMA has fully heated the cylinder water to 60 degrees on most days. It is then at this point that the system starts to export electricity.”

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www.networkrevolution.co.uk