ADVERTORIAL

Analysing the effects of new technology on the electricity network

electricity north west
Bringing energy to your door

C_2C

Electricity North West is trialling a new way of managing the electricity network to increase its capacity and keep customer bills down at the same time. Half way into the trial, the company has begun to analyse the data it has monitored from the trial circuits.

Electricity North West, the company who operates the electricity network in the North West of England, is conducting a trial known as Capacity to Customers (C_2C) as part of Ofgem's Low Carbon Networks Fund. C_2C will use new technology and innovative commercial contracts to increase the amount of energy that can be transmitted through the region's existing electricity network.

How it works

The existing electricity network is designed to keep the lights on when things go wrong by keeping some capacity for emergency use. This allows electricity to be re-routed following a power cut (fault). For most of the time, only half of the total capacity of the network is used, with half reserved for emergencies. By reconfiguring the network and working smarter, this extra emergency capacity can be released for everyday use.

This will be done by closing the 'normally open point' (NOP) on the C_2C trial circuits. High voltage networks are often interconnected by an NOP which is only used in the event of a network fault or planned outage. Closing the NOP allows all customers affected by a fault to be re-supplied from the alternative circuit. By redesigning the network to allow the NOP to be run closed, the two circuits can be joined to release their full capacity.

A key aspect of the trial is the analysis of this new configuration for which Electricity North West has partnered with two leading academic institutions: The University of Strathclyde and The University of Manchester.

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Analysis of network performance

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The analysis method involves combining network data from a variety of sources to produce detailed models which represent the circuits involved in the trial.

The models can be simulated for conventional system operation and for C_2C operation, to compare their technical differences under a variety of scenarios. This will be extended to support future network scenarios, such as the uptake of low carbon technologies.

Using the circuit simulation models, the maximum capacity provided by C_2C operation can be quantified. The effect of C_2C on other technical factors, such as network losses and power quality metrics, will also be assessed.

These results will be generalised by circuit type to estimate the potential benefits of C_2C operation, if adopted by other network operators in the UK.

Economic benefit analysis

The University of Manchester is conducting economic benefit analysis and is responsible for developing appropriate frameworks to investigate whether or not the C_2C method is economically sound.

As a starting point, the adequacy of Ofgem's cost benefit analysis (CBA) framework to capture the key characteristics of the C_2C method was assessed. In principle the framework was found to be adequate to capture the value of the C_2C method in respect to losses, emissions, reductions in customer interruptions (CIs) and customer minutes lost (CMLs), asset investment deferral and connection of new low carbon technologies. However, it was found that enhancements to Ofgem's CBA framework could be made to fully capture the value of the C_2C method.

Using an enhanced framework the current stage of the research involves quantifying the value of

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C_2C solutions in different scenarios. The results are expected to provide an enhanced understanding of the C_2C related investments and ultimately justify or challenge the validity of the C_2C method from an economic perspective.

Carbon benefit analysis

The Tyndall Centre for Climate Change Research at the University of Manchester is conducting studies to understand the carbon impacts of the C_2C project.

The approach is similar to that used by the Kyoto Protocol's Clean Development Mechanism. A baseline scenario has been constructed to represent business as usual capacity release through traditional reinforcement. A Life Cycle Assessment (LCA) will be performed for the assets used in the network reinforcement, totalling the greenhouse emissions embodied in their manufacture, transport, installation and disposal. The carbon impact from the assets and the operations of the network under the C_2C configuration will then be compared to this baseline and summed across defined time periods.

This work will also explore the indirect emission reductions that may be made through the facilitation of new low carbon consumer technologies, such as heat pumps and electric vehicles, and the more rapid connection of new renewable generating capacity. Many of these changes will not be observed on the trial circuits so will be explored through scenarios.

The trial is scheduled to continue until September 2014 at which time lessons learned and findings will be collated in more detail and communicated to all interested stakeholders via a range of knowledge dissemination routes.

To find out more about the project visit:
www.enwl.co.uk/c2c

To find out more about Ofgem's low carbon network fund visit **www.ofgem.gov.uk**