

RESPOND

Innovative fault level management



Electricity North West's innovative Respond project has demonstrated an intelligent approach to managing fault current - the instantaneous surge of energy which occurs during a fault on the electricity network. Intelligent software uses network data to predict potential fault current in near real time and 'enables' innovative techniques designed to manage fault current safely.

Electricity North West is leading the way in developing smart solutions to meet our future energy demands.

As the regional electricity operator, the company is responsible for keeping the lights on for five million people in the North West of England. It's also their job to plan for the future and look at smarter ways of meeting the expected increase in electricity demand as we start to reduce our reliance on fossil fuels.

What is the Respond project?

The £5.5 million Respond project has demonstrated a revolutionary approach to managing fault current – the instantaneous surge of energy which occurs under fault conditions.

An increase in demand for electricity and the connection of additional sources of generation increases the potential fault current on the network, known as fault level. If fault levels exceed the current safety rating of network equipment, it needs to be replaced, which can be disruptive, lengthy and expensive.

The Fault Level Assessment Tool

Using intelligent software known as the Fault Level Assessment Tool, Respond uses network data to calculate fault level in near real time. When fault level approaches or rises above network equipment ratings, the tool 'enables' or 'disables' one of three Respond fault level mitigation techniques: Adaptive Protection, the I_s-limiter or the Fault Current Limiting service, installed at various trial sites around the Electricity North West network.

Adaptive Protection

Also known as sequential tripping, Adaptive Protection re-sequences the operation of circuit breakers to

reduce fault level. The seven installations on the Electricity North West network were designed to ensure they can be easily replicated on other electricity networks as either standalone or retrofitted units. During the Respond trials which ran from May 2016 to May 2018, the Adaptive Protection technology operated eight times following a network fault.

I_s-limiter

This current-limiting fuse detects the rapid rise in current when a fault occurs and responds within 1/200th of a second to break the current. The I_s-limiter went through a number of factory acceptance testing stages during construction before being installed at two Electricity North West substations. The I_s-limiters operated twice during the trials.

The Fault Current Limiting service

This commercial solution provides an opportunity for large demand and generation customers to earn rewards by selling a fault current limiting response to their local network operator through a managed service agreement. The Respond trials proved the technical feasibility of the service. However, an extensive survey of industrial and commercial customers showed there is currently no commercial appetite. This may change with the transition to Distribution System Operator, which is likely to create synergies with other commercial demand side and balancing arrangements in the marketplace. The method is also suited to a new form of managed connection agreement that could mutually benefit network operators and their customers in the future.

As part of the project the company developed safety cases for all three fault

mitigation techniques. They also validated every fault that occurred at sites where Adaptive Protection and I_s-limiters were installed to ensure that the Respond installations operated correctly. Reports for all the faults that occurred during the trials can be found on the project website.

Respond will benefit all electricity customers in the long term by helping avoid or defer traditional, expensive and disruptive reinforcement solutions. This will help keep costs down for customers, reduce carbon emissions and allow low carbon technologies to be connected to the network much more quickly.

The project ran from January 2015 until October 2018.

Find out more about Respond at:
www.enwl.co.uk/respond



An Electricity North West engineer replaces a fuse following the operation of an I_s-limiter.

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