



# RESPOND

## Innovative fault level management



The Department of Industry wrote in 2005 that active fault level management will help electricity distribution network operators to quickly connect customers' low carbon demand and generation, and at a lower cost than traditional reinforcement. By combining innovative technical and commercial solutions with existing assets, the £5.5 million Respond project will make that vision a reality.

### Electricity North West is leading the way in developing smart solutions to meet the UK's 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 will deliver 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 will increase 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 an intelligent 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 will 'enable' or 'disable' one of three Respond fault level mitigation techniques: Adaptive Protection, the  $I_s$ -limiter or the Fault Current Limiting service which are installed at various trial sites around the Electricity North West network.

During the project trials the company needs to validate every fault that occurs at sites where Adaptive Protection and  $I_s$ -limiters are installed to ensure that the Respond installations have operated correctly.

### 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 have been designed to ensure they are easily translated to other electricity network operators as either standalone or retrofitted units. Since the Respond trials began in May 2016, the Adaptive Protection technology has operated six 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  $I_s$ -limiters have been through a number of factory acceptance testing stages during construction and are now installed at two Electricity North West substations. Since the start of the trials, there has been one operation of an  $I_s$ -limiter.

Reports for each of the faults that have occurred 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 Respond method releases the same capacity as traditional reinforcement but up to 18 times faster and at much lower cost – up to 80% cheaper – potentially saving GB £2.3 billion by 2050.

The project runs from January 2015 until October 2018.



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

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