

electricity
north west

Bringing energy to your door



RESPOND



Active fault level management

The Department of Trade and Industry wrote in 2005 that active fault level management will help 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 Respond project could make that vision a reality.

Why do we need Respond?

To meet the decarbonisation challenge laid down by the Government, our customers are being encouraged to adopt new low carbon technologies such as electric vehicles and heat pumps. Government forecasts suggest that there may be up to a 60% increase in total electricity demand in Great Britain by 2050.

Increased demand and the connection of more embedded generation will create pressure on the electricity network and cause an increase in 'fault current', which is the instantaneous surge of energy that occurs during a fault. Distribution network operators (DNOs) like Electricity North West install protection equipment to safeguard their networks from damage that could be caused by fault current. However, if 'fault level' (the potential maximum amount of fault current that will flow when a fault occurs) rises above the rating of our protection equipment, we have to replace it with higher rated equipment.

As it stands, we will need to spend millions of pounds reinforcing our network because of the increased fault level we expect to see, as demand for electricity grows.

What is Respond?

Respond has trialled an intelligent Fault Level Assessment Tool coupled with two novel technical solutions and a revolutionary commercial concept. This intelligent software, which interacts with our network management system, is installed in our control room and uses network data to predict fault level in near



real time. When fault level approaches or rises above our equipment ratings, the tool 'enables' one of three innovative techniques designed to manage fault current safely. The techniques are: adaptive protection, the I_s -limiter and the fault current limiting service.

Adaptive protection

Also known as sequential tripping, this technique re-sequences the operation of circuit breakers – the electrical switches on our network which operate automatically to protect an electrical circuit from damage. The seven installations on our network were designed to ensure they can be easily replicated on other electricity networks as either standalone or retrofitted units. During the Respond trials, the adaptive protection technology operated eight times following a network fault.





Respond will keep costs down for customers and reduce carbon emissions



I_s-limiter

The I_s-limiter is a current-limiting fuse which detects the rapid rise in current when a fault occurs and responds within 1/200th of a second to break the current. This existing technology is used on private networks in the UK and extensively on public distribution networks in Europe, USA and Australia as a fault current mitigation technique. This is the first installation of an I_s-limiter on a British DNO network. I_s-limiters are installed at two high voltage substations which operated twice during the trials.

Fault current limiting service (FCL 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 we have developed safety cases for all three fault mitigation techniques. We have 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 us to avoid or

defer traditional, expensive and disruptive reinforcement solutions. This will keep costs down for customers, reduce carbon emissions and allow us to manage our existing network assets more efficiently.

The project started in January 2015 and was completed in October 2018.

Who's involved?

Throughout the Respond project we worked with a number of partners and key suppliers who are leading experts in their respective fields of research, technology and customer engagement. Our project partners are listed below and you can find out more about how they supported the Respond project on our website.

- ABB
- The Association for Decentralised Energy
- ENER-G
- Impact Research
- Kelvatek
- WSP
- Schneider Electric
- United Utilities



TO FIND OUT MORE ABOUT OUR **RESPOND PROJECT**, VISIT:
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