

The Fault Current Limiting service Becoming a trial participant

April 2016

Overview of the trial

What is Respond?

Respond is one of a number of projects being trialled by Electricity North West. It uses innovative techniques and new technology to utilise the existing electricity network more effectively to help us meet expected future demand. The Respond project is funded by Ofgem's Low Carbon Networks Fund.

Increased demand and the connection of more generation will create pressure on the 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.

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 help keep costs down for customers, reduce carbon emissions and allow us to manage our existing network assets more efficiently. The Respond solution is faster and cheaper to implement than traditional methods and will allow us to connect new low carbon technologies much more quickly and at less cost to end customers.

Without more efficient ways of utilising existing assets, some industrial and commercial customers may be prevented from making savings from generating their own electricity for heat and power.

Respond actively manages fault level on the network by a range of techniques which include the commercial Fault Current Limiting service (FCL service). This is a completely new type of managed service agreement that will be available to certain industrial and commercial (I&C) generation or demand customers (ie users/consumers of electricity supplied from the public distribution network). The FCL service will enable I&C customers, meeting suitable criteria, to financially benefit from entering into this new commercial arrangement by providing Electricity North West with a fault level response.

Trialling the Fault Current Limiting service

When a fault occurs, all sources of generation connected to the electricity network contribute to fault current. Under fault conditions, inertia in large synchronous motors can have the same effect as generators.

The FCL service trial will allow Electricity North West to test new technologies that can switch off a customer's generator or motor, remotely and instantaneously, when a network fault occurs and when fault level is high. By switching off the customer's equipment for just a few minutes (up to a maximum of ten minutes) it will no longer contribute to fault current. We can then safely isolate the network fault, without excess fault current causing damage to our protection equipment.

We have carried out an extensive customer survey which suggests there is a market for this type of commercial agreement in certain market sectors. We are now approaching suitable customers who have expressed an interest in trialling the provision of this service. This new arrangement will initially benefit only a small number of customers in the North West, but could potentially be rolled out across Great Britain.



Overview of the trial

Comparing the FCL service to other commercial arrangements in the energy sector

The FCL service is a totally new commercial concept. It is unrelated to anything you might have heard of before such as demand side response (DSR), which is sometimes referred to as load shedding / load dumping. It is also different from short term operating reserve (STOR), the capacity market or energy storage schemes.

You will **not** have been asked to consider entering into this new type of commercial agreement before, although you may have had previous conversations about other types of commercial arrangements with Electricity North West, the National Grid, an energy service company (ESCo), or other organisations.

Getting involved

Some business customers have contacted us directly to express an interest in taking part in the trial. Others have indicated they may be willing and able to trial the FCL service in our recent survey.

This is a unique opportunity for your organisation to financially benefit from providing an FCL service to Electricity North West.

The trial will run until May 2018 and you can help us if you operate:

- Distributed generation, typically a combined heat and power (CHP) plant or other large synchronous generators, and/or
- Industrial AC synchronous motors connected to a circuit breaker (CB).

Active participation in the trial will be available to I&C customers connected to Electricity North West's 6.6kV or 11kV high voltage (HV) networks who operate large rotating machinery with generation or consumption capacity of between 1MW and 7MWs. This equipment should be connected in parallel to the HV supply.

The benefits to your organisation

We are offering financial incentives for trialling the FCL service. The incentive that your organisation can expect to receive is based on a pricing structure which uses a number of factors to determine your equipment's unique contribution to system fault level on the network providing your supply. Therefore, the available payment will be tailored to your individual organisation.

We will provide you with full details of the payment available to your organisation before you agree to take part in the trial. This will contain a full and transparent breakdown of the calculation.



You will receive an annual availability payment for the duration of the contract period. We will pay you an agreed, fixed and guaranteed yearly payment, irrespective of the number of times (if any) that your equipment is constrained. We are unable to provide a utilisation (per event) payment.

The payment will be affected by a number of variables, which include:

- The period that we require the service to be in place and the contract term you are prepared to accept. The agreed contract period will be a minimum of one year and a maximum of five years. However, for the purpose of the trial, this will be capped at one year
- The number of occasions we anticipate it might be necessary to constrain (switch off) your equipment each year
- The operating frequency of your equipment, ie how often it runs and at what capacity.

The final offer, the payment terms and a payment schedule will be clarified during contract negotiations and documented in your FCL service managed agreement.

Will I receive additional payments or compensation if my entire site is affected by power cuts?

Electricity North West, in common with other DNOs, does not pay compensation to customers who experience partial or complete loss of supply because of network faults. However, our customers are entitled to claim a payment if we have failed to meet our [Guaranteed Standards of Service](#). These rules are set out in the Electricity Act 1989 and National Terms of Connection and will still apply if you agree to provide an FCL service. You will **not** be compensated or receive any enhancement to your FCL service annual payment if your electricity supply is affected by a normal network fault (ie not just the constraint of your generator or motor). You will still be entitled to a Guaranteed Standard payment if your organisation is affected by supply interruption/s that meet the criteria.

Overview of the trial

What would be the impact of trialling the FCL service on my company?

The technology used to activate the FCL service is being developed under the Respond trials. This technology will give Electricity North West control of the CB protecting your motor or generator. If we need to constrain your equipment's contribution to fault current when fault level is high on the network, we will remotely operate the protective relay to trip your CB. This will turn off your equipment instantaneously and will be done **without any prior notice or consultation**.

The new technology will allow us to switch off **only** the motor or generator specified in your managed arrangement. The FCL service will **not** trip the whole or part of the supply to your site, unless this is specifically agreed as part of the contract. The agreement will not isolate any transformers you may have on your site. After we have operated the relay to trip your CB, it will take us approximately three minutes (but no more than ten minutes) to remove the constraint on your CB, allowing you to safely reclose it and switch your equipment back on in a controlled manner.

The technical arrangements to activate and manage the FCL service are likely to differ from site to site and will be subject to technical and commercial considerations specific to individual customers.

Can I choose when to restrict the constraint of my generator/motor if I take part in the FCL service trial?

No - It is not feasible to provide protected days, times or restrict the number of occasions that we constrain your equipment each year.

The service will always be required when system fault level is above the switchgear rating. Our remote control (RC) enabling technology will be permanently connected to your CB and could switch off your generator or motor at any time, as dictated by network conditions. Therefore, it is **not** possible to have protected days.

The agreement will not be suitable for organisations who are only able to offer the service when production processes are off-line, ie when your generator/motor is not operating.

Similarly, it is unlikely that we will be able to offer a FCL service to organisations with rotating plant that operates very infrequently, ie you may have standby generation which is only activated to provide your site with an alternative source of supply during a failure of the public network.

How frequently would my equipment be constrained?

It is not possible to predict how many times the FCL service will be activated each year to constrain your equipment. On the basis of historical fault information, we anticipate that it would be, on average, twice each year. We will provide you with details of the fault history in your area which will give you an indication of how you might be affected. However, we are unable to predict the number of faults that might affect any of our circuits in the future. Similarly, fault level on our network is constantly changing. Therefore, it is not possible to accurately anticipate when these two combined factors might activate the fault current response. Your equipment might never be constrained during the contract period (other than to test the remote control (RC) enabling technology) or your CB may be tripped more frequently than estimated.



Overview of the trial

How will my supply be affected if I agree to take part in the FCL service trial?

The FCL service trial will have **no impact** in increasing or reducing the frequency of supply interruptions experienced by your whole site. Your organisation will **not** be subject to any more power cuts than would have ordinarily affected your supply and the duration of any such power cuts will be unaffected.

However, the motor or generator specified in the commercial agreement will be subject to an increased frequency of interruption, as the CB protecting the equipment is tripped to respond to faults over a larger area of our network.

On average, there are eight independent circuits fed by a primary substation. Your supply would normally be interrupted if a fault occurs on the circuit that directly provides your electricity supply, but this depends on the location of the fault.

Your site supply will not generally be interrupted by a fault on one of the other circuits fed from your primary substation, but you may occasionally notice a slight dip in voltage. This sometimes coincides with the time the fault occurs, or the restoration of electricity to the customers that were directly affected (ie customers that experienced a power cut).

However, your specified motor or generator (as agreed in the commercial arrangement) could react to a fault on any of these independent circuits if fault level on the HV network is high when the fault occurs. Your specified equipment will be disconnected by tripping its CB, leaving the remaining supply to your premises unaffected.

This is because your equipment is operating and therefore contributing to the overall fault current rushing to the point of the fault. By instantaneously constraining your motor or generator for just a few minutes, you can help us to significantly reduce the fault level on the network. This will allow us to safely operate our protective devices (network circuit breakers) and prevent them from failing. If the fault level is too high, Electricity North West's circuit breakers will be damaged and this could cause much greater harm to the network.

Within ten minutes of tripping your CB, Electricity North West will disable the constraint, allowing you to safely reclose it and restart your equipment in a controlled manner. The arrangements for confirming when the constraint has been removed will be agreed as part of the system design and confirmed in your contract.



Would the FCL service be enabled every time there is a fault on the network?

No – we would **not** activate the fault current response to switch off your equipment every time there is a fault on one of the circuits fed from your primary substation. We would **only** enable this service when fault level on the network is high and approaching the safety rating of our protection equipment (network circuit breakers) **and** there is a network fault. Fault level varies continuously throughout the day, depending on the level of demand and generation on the network.

How would the FCL service affect our standby generation?

Some customers have private back-up generators to mitigate the impact of a power cut. These sources of generation either fully or partially maintain the customer's electricity supply when the public network fails.

Standby generation does not operate in parallel with the public network and should disconnect the customer from the network before starting up.

These bespoke arrangements are unique to individual organisations and our engineers will discuss any technical issues that might impact on your suitability to provide an FCL service.

Are there any risks of getting involved?

The FCL service will not be suitable for all I&C customers and specific risks might exist for some organisations. It is the responsibility of individual customers to evaluate the benefits of providing this service to Electricity North West against any risks to their business, equipment or processes and any potential losses, damage or expenses that might be incurred. This type of agreement might be more suitable for customers in the non-manufacturing sector, who are able to cope with the constraint of equipment without any impact.

Taking part in the trial

Commercial and technical arrangements

If you are interested in taking part in the trial, we will provide you with all relevant information including the background, objectives, timelines and benefits. We will also discuss the commercial and technical arrangements with you. If you are happy with the arrangements, we will formalise the details in a contract. Once this has been completed we will make arrangements with you to install the remote control (RC) equipment at your premises to enable the fault current response. We will carry out this work at no cost to you.

Access to your premises

If you agree to participate in the trial, you will need to agree to have the appropriate equipment installed in your premises. We will pay for this installation. You will be provided with details of all necessary installation activities as part of the design process and we will not proceed until you are happy with the design.

In order to fit the RC enabling technology, we will need access to your premises. An appointment will be made at a date and time that is convenient to you and your organisation. Any of our employees or contractors visiting your premises will be able to explain the purpose of their visit. All of our employees and contractors will carry an identity card showing their company name, their own name, a colour photograph of the individual and a contact number for information.

Installation of the technology at your premises and FCL service design

Our engineer will arrange for a detailed survey of your site to finalise the design of the RC equipment required; this will include a remote terminal unit (RTU) that will interact with the protective relay on your CB. The design will be agreed with you prior to any work starting on your site. The design of the installation will ensure that we can effectively control the fault level contribution of your equipment..

Installation

If you agree to trial the FCL service, you will receive clear and transparent information about how and when the enabling equipment will be installed, how long it will be installed for and how it will be decommissioned. Your contract will define the extent of Electricity North West's responsibility in relation to installation and maintenance arrangements for FCL service technology. The contract will also stipulate individual responsibility for any necessary investment in infrastructure and define liability relating to resilience, damage, maintenance and warranty of Electricity North West's and your own equipment.

The contract will stipulate all relevant terms and conditions, agreed in advance negotiations. You will be fully consulted about the installation or modification of any equipment at your premises which will be subject to your consent.

All works facilitating the provision of the FCL service will be carried out by Electricity North West or our accredited contractors. This applies to the installation and commissioning of the RC equipment. Our control equipment will be connected / interact with specific parts of your electricity installation. This connection can either be made by our accredited contractors or by your own accredited contractors. If you would prefer your contractor to do this work we will review their accreditation and their suggested costs. Once agreed they will be paid by us.

Notification of supply interruptions to install technology

It is unlikely that we will need to interrupt your supply to install FCL service equipment at your premises. In the unlikely event that we do need to interrupt all or part of your supply, the time and date will be agreed with you in advance.

Customers who sign up to an FCL service agreement will not notice any difference in the quality or reliability of their electricity supply. We anticipate your specific motors or generators will be switched off remotely, approximately one to two times per year, when a fault occurs on a nearby network. Each of these constraints will last no more than ten minutes.



During and after the trial

Testing the equipment

During the trial we will need to test our equipment to ensure our control centre systems seamlessly interact with the telemetry and RC technology at your site. If no faults occur during the trial period to activate the fault level response and trip your CB, we will need to simulate these conditions to constrain your equipment. We will try to conduct these tests at a time that is acceptable to you and your business.

The RC enabling technology installed at your premises will conform to the appropriate specification and will undergo a stringent testing regime before it is connected to your equipment. In the unlikely event that a problem develops or you raise a concern about the equipment or the fault current response, we may halt the trial to conduct investigations. In these circumstances, we will continue with the trial only after any such problem has been resolved and you have agreed to recommence the trial. Permanently halting the trial may have an impact on the incentive payment available.

Ongoing access

From time to time we may need to visit your premises to inspect or maintain our equipment. These visits will either be made by one of our employees or a contractor working on our behalf. All such visits will be agreed with you in advance and will be made at a time convenient to you.

Feedback

During the trial, we will proactively communicate with you and we will agree in advance how you want to be contacted. All organisations involved in the trial will be asked to take part in a customer survey and provide feedback about their experience. This research will be undertaken by our partner, Impact Research.

Your contribution to the project will not only provide you with a financial incentive, but identify the long term benefits of a Fault Current Limiting service to customers across Great Britain.

Decommissioning

All of the RC enabling equipment installed at your site shall remain the property of Electricity North West. If the agreement is terminated, the RC equipment will be removed from your site by our accredited contractors. We will need access to your premises to do this. We will also need to disconnect our control equipment from your electrical installation. This disconnection can either be carried out by our accredited contractors or by your own accredited contractors. The cost will be agreed in advance and paid by us.

Useful information

To find out more about the Respond project and specifically the FCL service, please visit the key documents section of the Respond website at www.enwl.co.uk/respond or watch the [FCL service video](#).

If you want to know more about the FCL service, please email us at futurenetworks@enwl.co.uk.

Respond website: www.enwl.co.uk/respond/contact-us

Email: futurenetworks@enwl.co.uk

Tel: 0800 195 4141 *charged at your standard network rate.*

Post: Future Networks, Electricity North West, Technology House, Salford, M6 6AP