RESPOND

Technical overview

LCNI conference, 25 November 2015

Session 3.1 – Fault level

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Introduction

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Background

The Respond project

Learning to date

More Information

Fault level challenge

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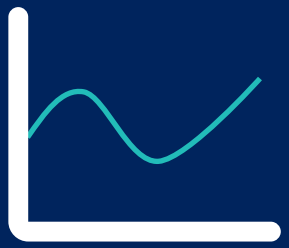
Traditionally network is reinforced when load or fault current limits are reached

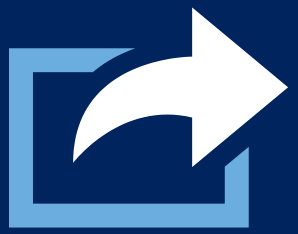
LCTs will increase the need to reinforce due to fault level issues

Balance between load and fault current reinforcement expected to change

Time-consuming and expensive reinforcement could constrain LCT connection



Need to improve fault current prediction capabilities



Need cost effective, safe alternatives

Fault current and the Respond project

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When a fault occurs on the network there is a sudden surge of current, much larger than normal current, known as **'fault current'**

Respond is an alternative approach to managing **'fault level'** – the maximum amount of potential fault current

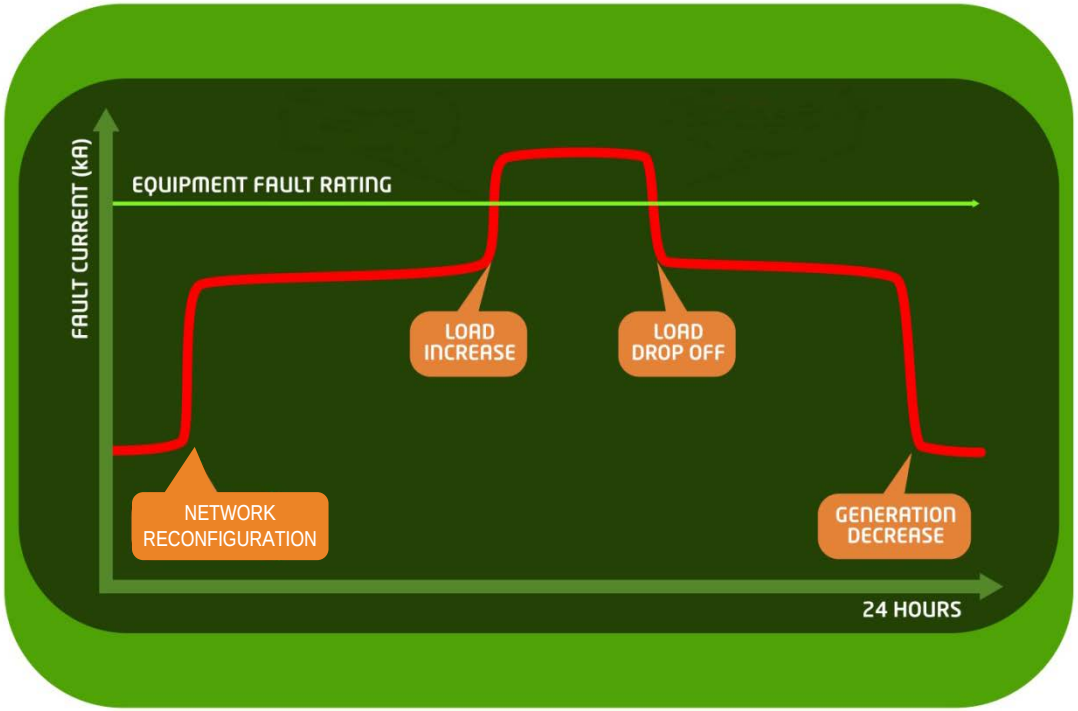
Combination of innovative technology and commercial techniques

More cost-effective than traditional methods

The commercial technique is known as the '**Fault Current Limiting service'**

Offers financial benefits to customers

Fault level



Fault level reinforcement is disruptive, lengthy and expensive which can discourage connection of new demand/generation

How can we manage these issues without expensive reinforcement ?

Sources of fault current

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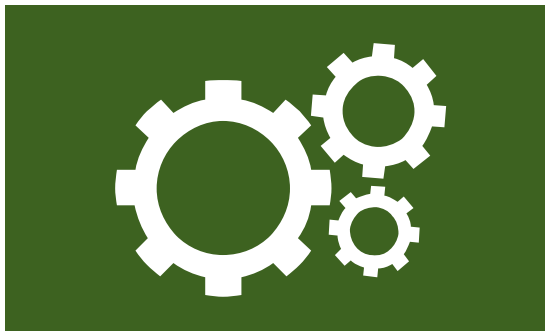
To reduce fault level
we need to disconnect sources of fault current

Generator

Large motor



Designed for generation of electricity eg power station, CHP plant, windfarm

If spinning when a fault occurs, momentum of motor and magnetic field cause electricity to flow towards the fault

- Fault current depends on size of generator and distance from the fault
- Larger sources will contribute more
- In the future, number of local generators near the fault will increase

Respond system overview

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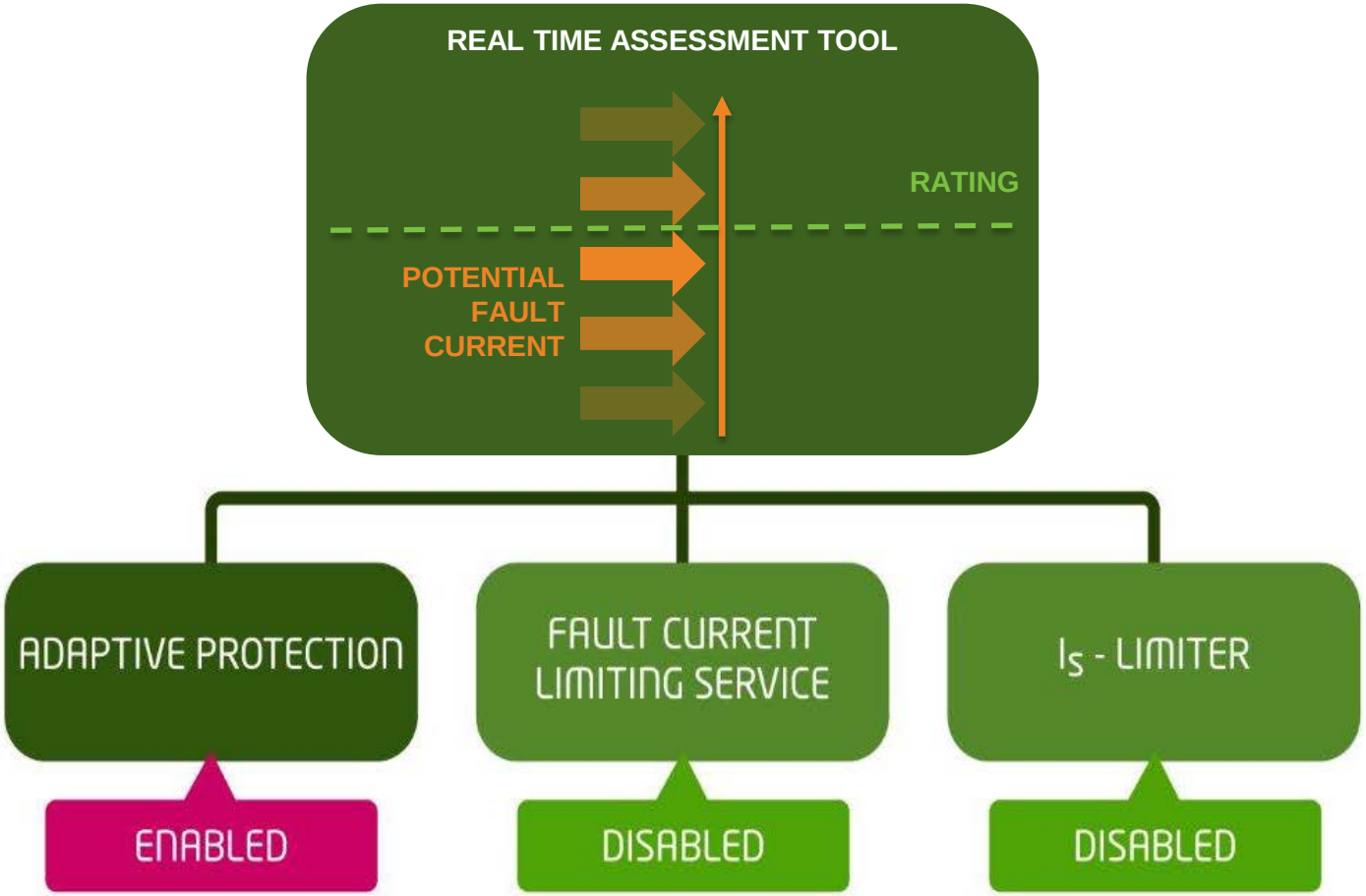
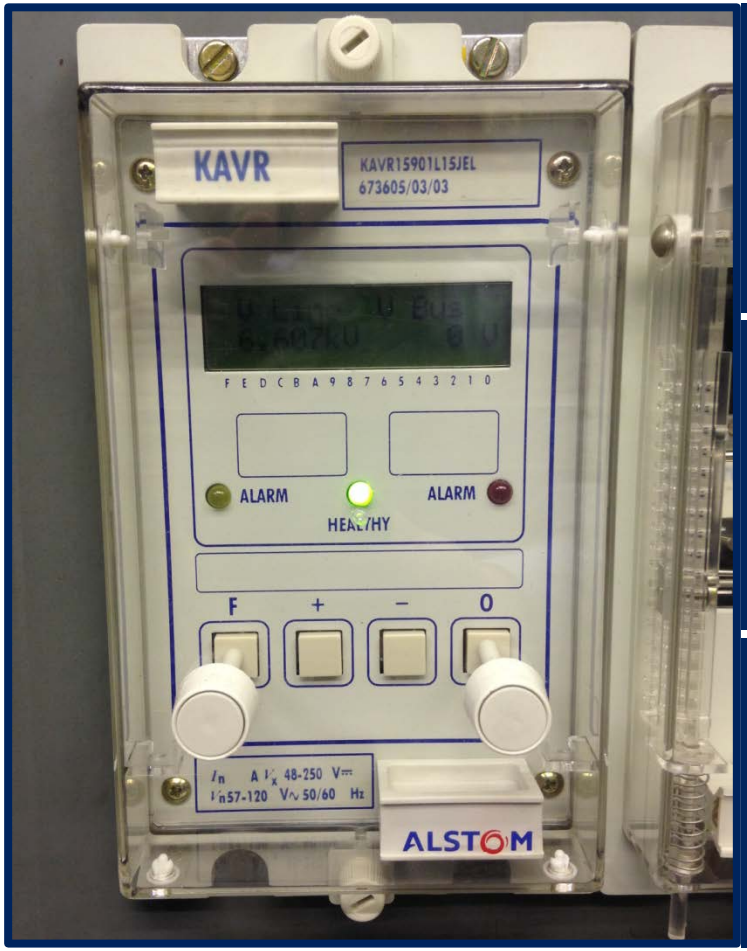


- Near real time fault current assessment
- Safe network operation

Adaptive Protection

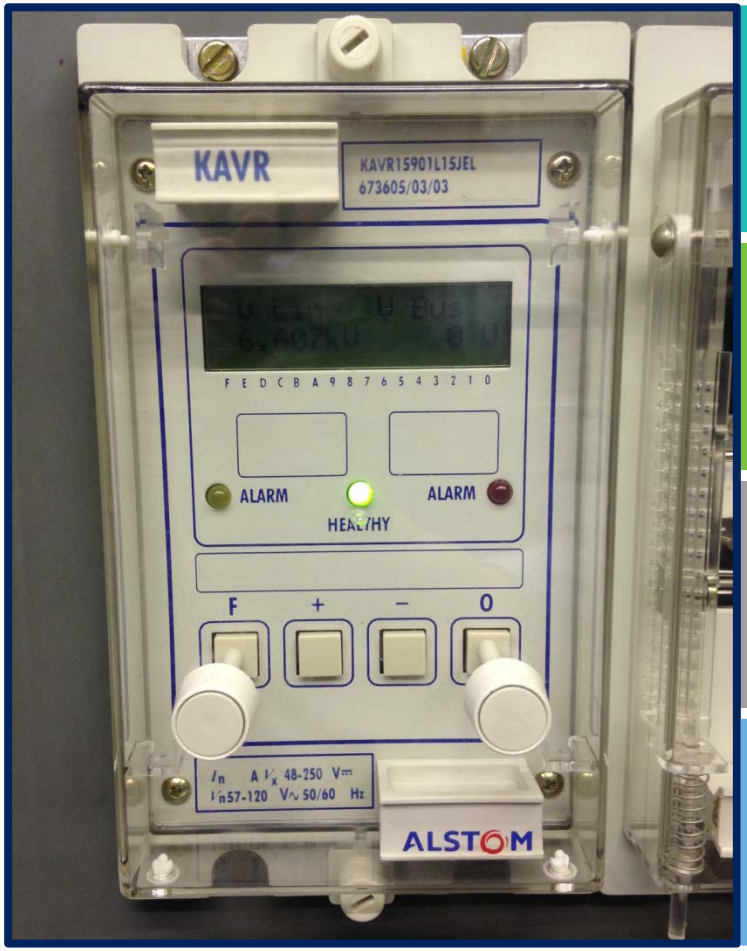


Network already designed to break fault current

Adaptive protection changes the order in which circuit breakers operate to safely disconnect the fault

Using redundancy in the network ensures no other customers go off supply

Adaptive Protection learning



Standard AP retrofit scheme to be fitted at primary due to legacy issues

Instantaneous protection to be time delayed to allow bus section circuit breaker to open and reduce fault level

33kV AP requires more complex AC scheme design than 11kV

Use interposing CTs to reduce risk and effects on existing overcurrent protection

I_S limiters

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Operates within 5 milliseconds or 1/200th of a second

Detects rapid rise in current when a fault occurs and responds to break the current

Respond will prove the technology, review safety case and deploy at two sites

I_S limiter learning

Designed to initiate operation in 1ms and clear fault in 3ms

Uses rate of change of current and current level together to initiate trip

Trip value changes implemented by ABB only

Container with separate bypass CB container increases number of sites where I_S limiter can be installed

Fault Current Limiting (FCL) service

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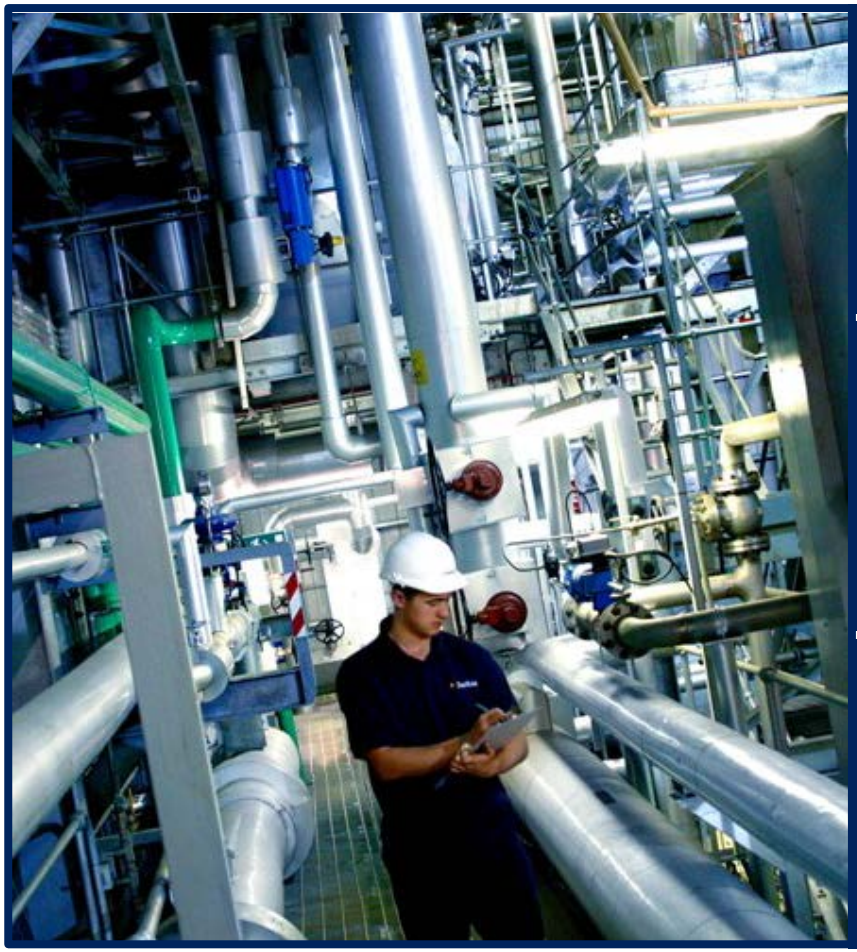
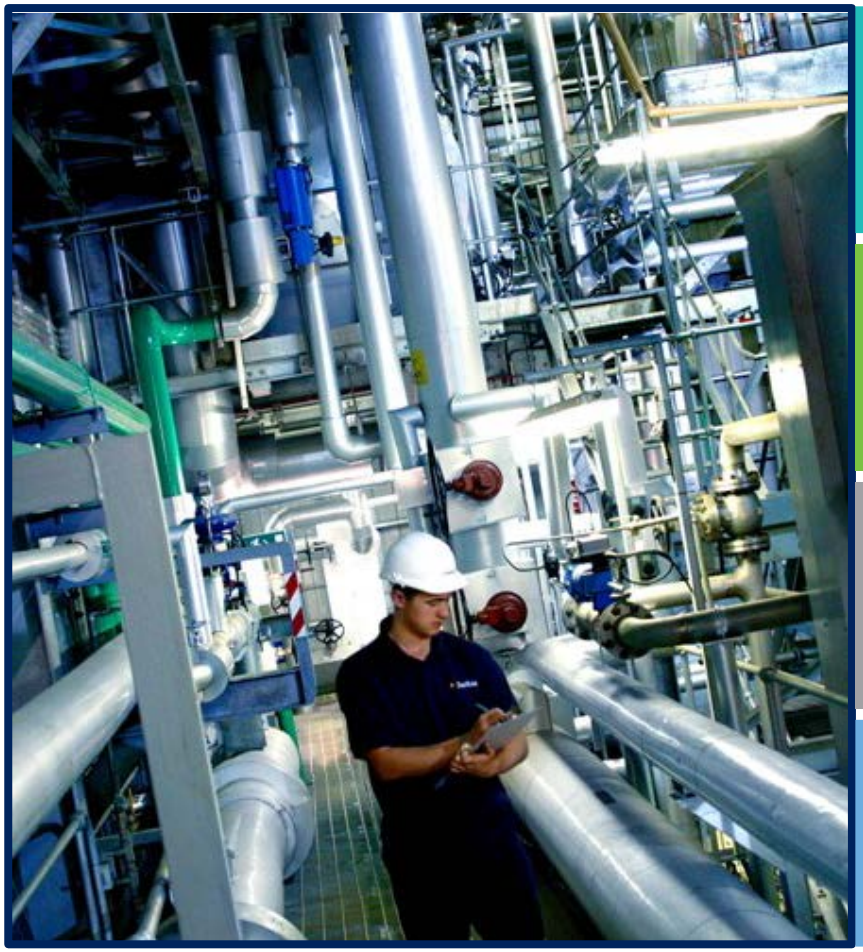


Fault current generated by customers can be disconnected using new technology

Financial benefits to customers taking part and long term to all customers

Challenge is to identify customers to take part in a trial of the FCL service

Fault Current Limiting Service learning



- Customers may confuse FCLS with STOR market
- Customers' engineers often unfamiliar with concept of fault level
- Customers' sites unlikely to have ready access to DNO SCADA
- Customers concerned what impact FCLS may have on their operations

Fault Level Assessment Tool learning

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Failsafe periodic ‘hold off’ feature required to AP/FCLS/I_S limiters

Fault level study after any operational network topology change

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QUESTIONS & ANSWERS

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For more information on Respond

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	**www.enwl.co.uk/respond-videos**
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Thank you for your time and attention