Electricity North West Respond briefing and training plan, February – April 2016

Directorate	Location	Who will train	When	How	Status
Operations					
Operations Faults & Maintenance North	Barrow	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Penrith	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Kendal	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Lancaster	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Preston	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Whitebirk	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
Operations Faults & Maintenance South	Hilltop	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Oldham	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Borron Street	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
	Frederick Road	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
Control Room	Linley House	Operations Policy Manager. The control engineers require a greater understanding of the project and equipment, so further training had been carried out by Ben Ingham (Control room interface)	Feb - March 2016 29/30 March 2016	Operational Refresher Training One to One training - April 2016	Complete
Commercial					
Secondary Network Design North	Kendal	Respond Project Manager	21 April 2016	Section Team Briefing	Complete
	Preston	Respond Project Manager	22 April 2016	Section Team Briefing	Complete

Electricity North West Respond briefing and training plan, February – April 2016

Directorate	Location	Who will train	When	How	Status
Commercial					
Secondary Network Design South	Borron Street	Respond Project Manager	29 April 2016	Section Team Briefing	Complete
Strategic Planning	Frederick Road	Respond Project Manager	23 March 2016	Section Team Briefing	Complete
Control and Maintenance (External)	Hilltop	Operations Policy Manager	Feb - March 2016	Operational Refresher Training	Complete
Major Projects Planning	Frederick Road	Not required as they have designed the schemes	N/A	N/A	N/A
Connections					
Business Connections Delivery	Carlisle	Respond Project Manager	Feb - March 2016	SAP covered in Operational Refresher Training Designer briefed in Section team briefing 21 April 2016	Complete
Business Connections Delivery	Frederick Road	Respond Project Manager	Feb - March 2016	SAP covered in Operational Refresher Training Designer briefed in Section team briefing 27 April 2016	Complete
Business Connections Delivery	Frederick Road	Respond Project Manager	Feb – March 2016	SAP covered in Operational Refresher Training Designer briefed in Section team briefing 27 April 2017	Complete
Business Connections Delivery	Preston	Respond Project Manager	Feb - March 2016	SAP covered in Operational Refresher Training Designer briefed in Section team briefing 28 April 2016	Complete
Business Connections Delivery	Preston	Respond Project Manager	Feb - March 2016	SAP covered in Operational Refresher Training Designer briefed in Section team briefing 28 April 2017	Complete
Major Project connections	Preston/Fred Rd	Respond Project Manager	27 April 2016	Section team briefing 27 April 2016	Complete

RESPOND

Active fault level management (Fault Break)

Paul Marshall
Project manager

LCN Fund
Low Carbon Networks

electricity north west
Bringing energy to your door

Agenda

electricity north west
Bringing energy to your door

LCN Fund
Low Carbon Networks

RESPOND

Background

Project objectives

Techniques

What next?

Q&A

Background

LCN Fund
Low Carbon Networks

Competitive competition

Funded by GB customers

Learning, dissemination & governance

4th of ENWL's five successful Tier 2 / NIC projects

Investment

£5.5 million

Project Starts **Jan 2015** → Site selection **May 2015** → Design **Nov 2015** → System installation & Go Live **May 2016** → Post fault analysis **Apr 2018** → Purchase FCL customer **Apr 2018** → Safety case **Sep 2018** → Closedown **Oct 2018**

Project partners

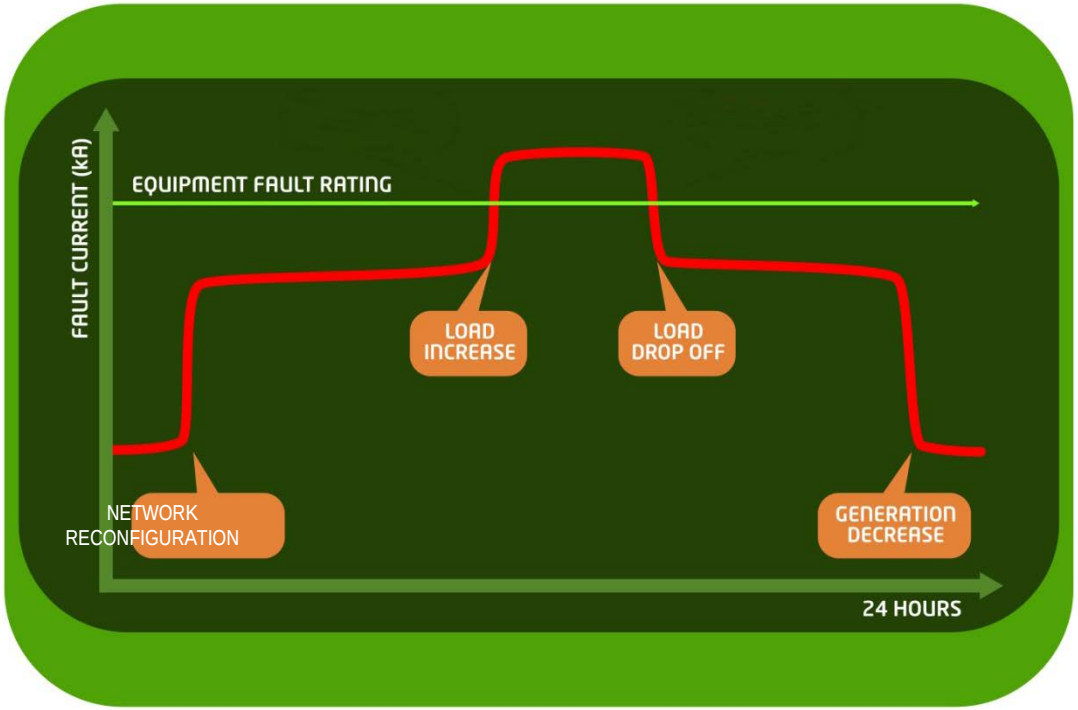
KELVATEK
PB PARSONS BRINCKERHOFF
ENER-G
ABB
Impact Research
United Utilities
ade

Financial benefits

Up to £4.9m at project scale

Fluctuating fault level

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

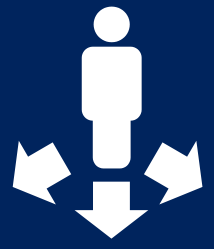


Can we manage these issues without expensive reinforcement ?

Respond – The fault level challenge

electricity north west
Bringing energy to your door

Faults cause large currents to flow through our network
Fault current will damage our network assets if not controlled

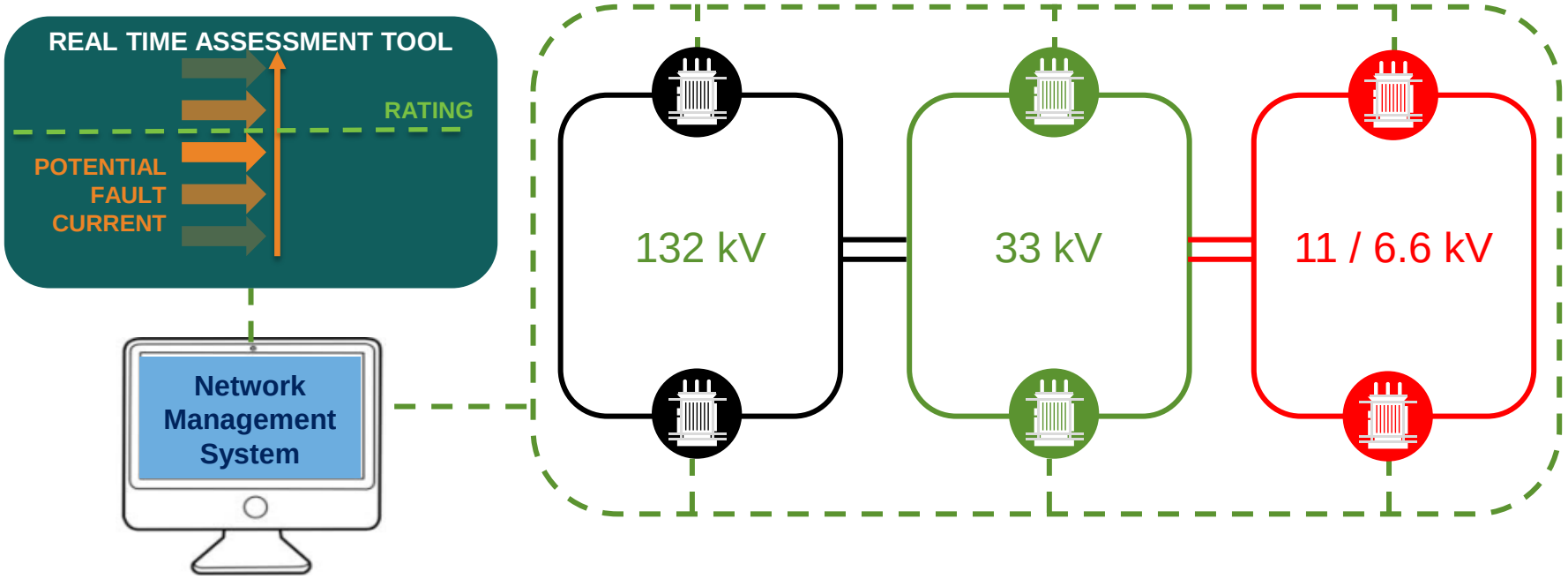
Estimation	Mitigation	New connections	Another way
			
Design tools estimate the maximum possible fault current or fault level	Sub-optimal network configuration Removal by reinforcement, cost and time	Reinforcement, cost and time May make the connection non-viable	Deliver value from existing assets Customer choice

Real time fault level assessment

Network management model derived from geospatial information systems

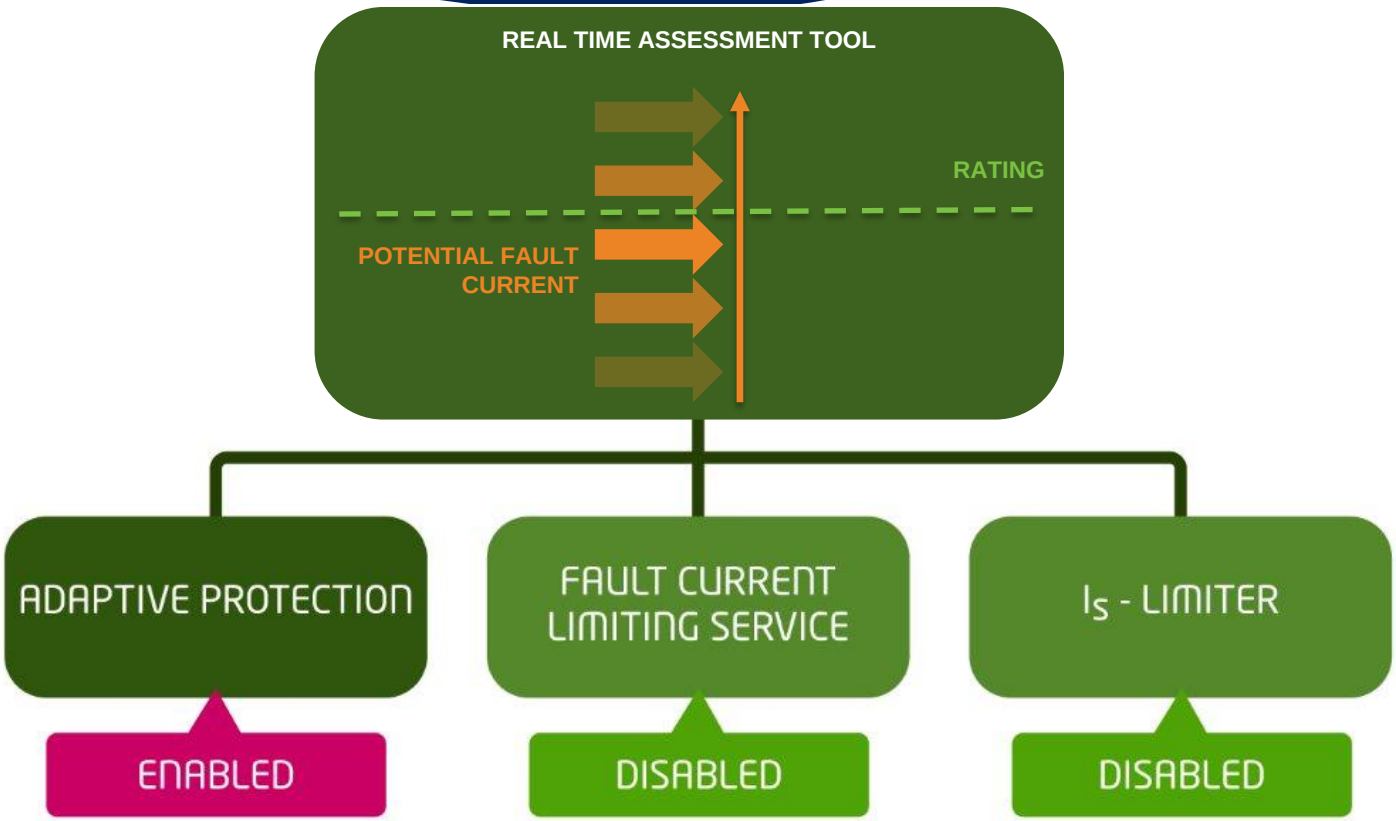
Respond will overlay fault level assessment onto this NMS

Assessment will recalculate, after topology changes or after 5 minutes



Near Real Time ● Assessment ● Comparison ● Action

Real time mitigation techniques



The technique will only operate when the fault level is exceeded and FLAT enables the technique, then we need to have a network fault.

Therefore the probability of triggering is low, so we have the ability in the FLAT tool to reduce fault triggering level to test the techniques

Respond sites

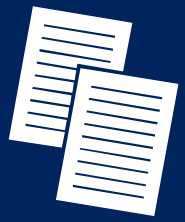
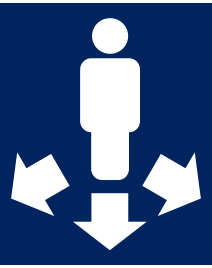
electricity north west
Bringing energy to your door

Substation	Worst performer feeder ranking	Number of faults in 2012/2013	Technology to be deployed
Bamber Bridge	315	7	HV Is-limiter - bus section - 1
Broadheath	401	10	HV Is-limiter - Incomer - 2
Athletic St	294	28	EHV Is sensing equipment - 1
Wigan BSP	145	20	EHV Is sensing equipment - 2
Longridge	135	36	HV Is sensing equipment - 1
Hareholme	257	20	HV Is sensing equipment - 2
Nelson	131	17	HV Is sensing equipment - 3
Mount St	223	10	EHV adaptive protection - 1
Offerton	719		EHV adaptive protection - 2
Atherton Town Centre	7	29	HV adaptive protection - 1
Denton West	New site	New site	HV adaptive protection - 2
Blackbull	303	17	HV adaptive protection - 3
Irlam	275	7	HV adaptive protection - 4
Littleborough	336	13	HV adaptive protection - 5

Trial period - May16 to April 18

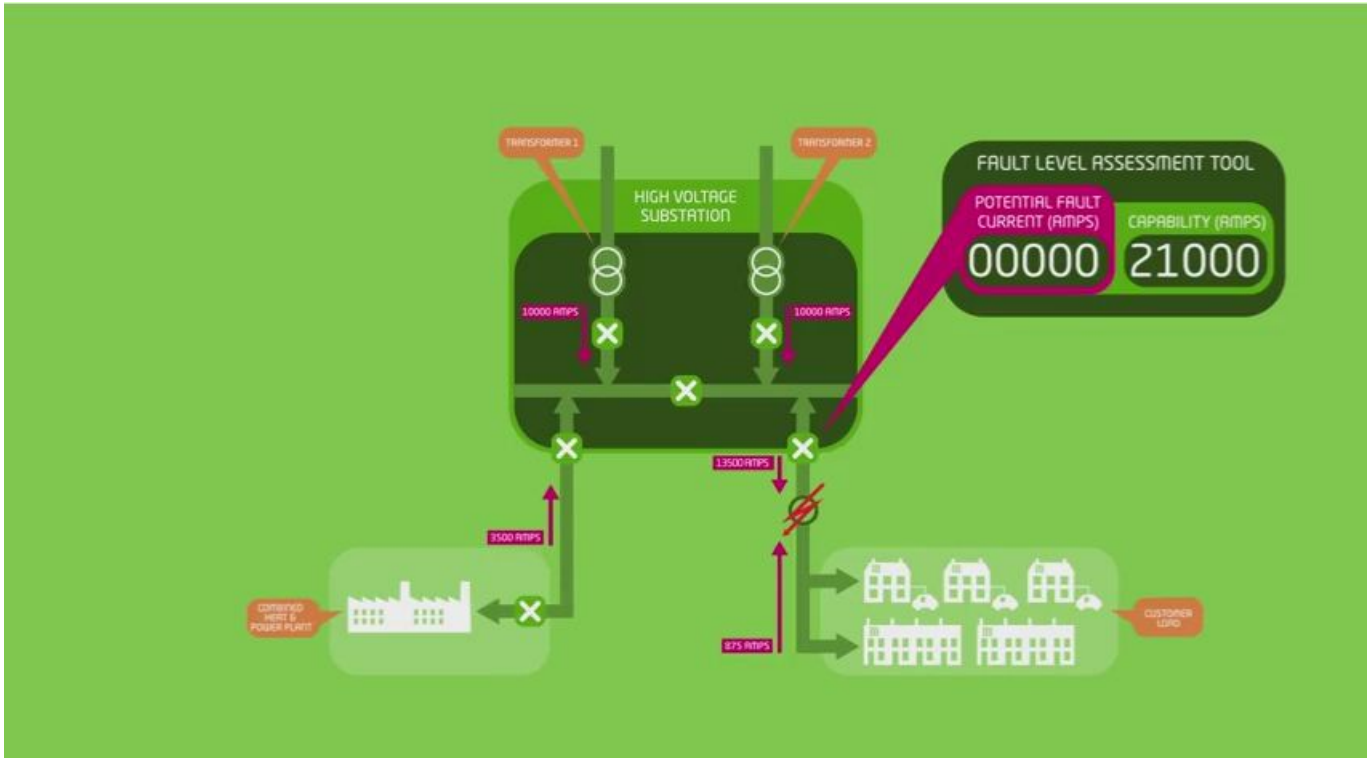
electricity north west
Bringing energy to your door

How accurate is the FLAT tool ?
Do the mitigation techniques work?

Fault	Analysis	Findings	Actions ?
			
Respond networks monitored for all faults System snapshot at every fault	Fault current experienced vs. calculated Actual operation assessed	What fault current flowed Did mitigation operate correctly Outram/TNEI/PB	Data availability Data quality Settings Performance

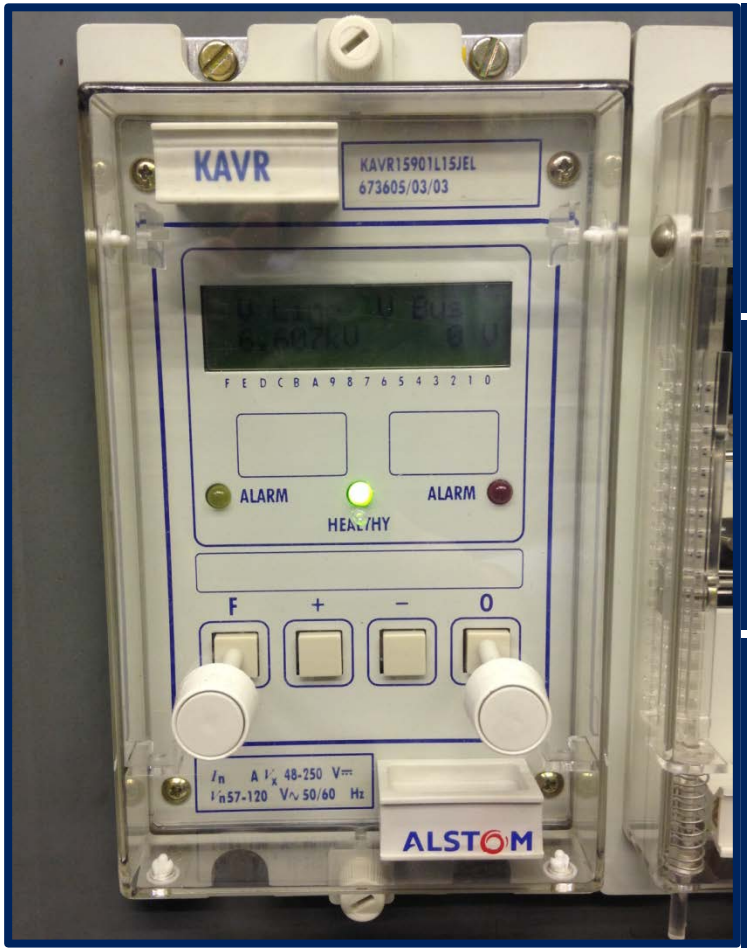
Respond video

https://youtu.be/dDgpb4x04f4



Adaptive protection
Five at 11kV sites & two at 33kV sites

electricity north west
Bringing energy to your door

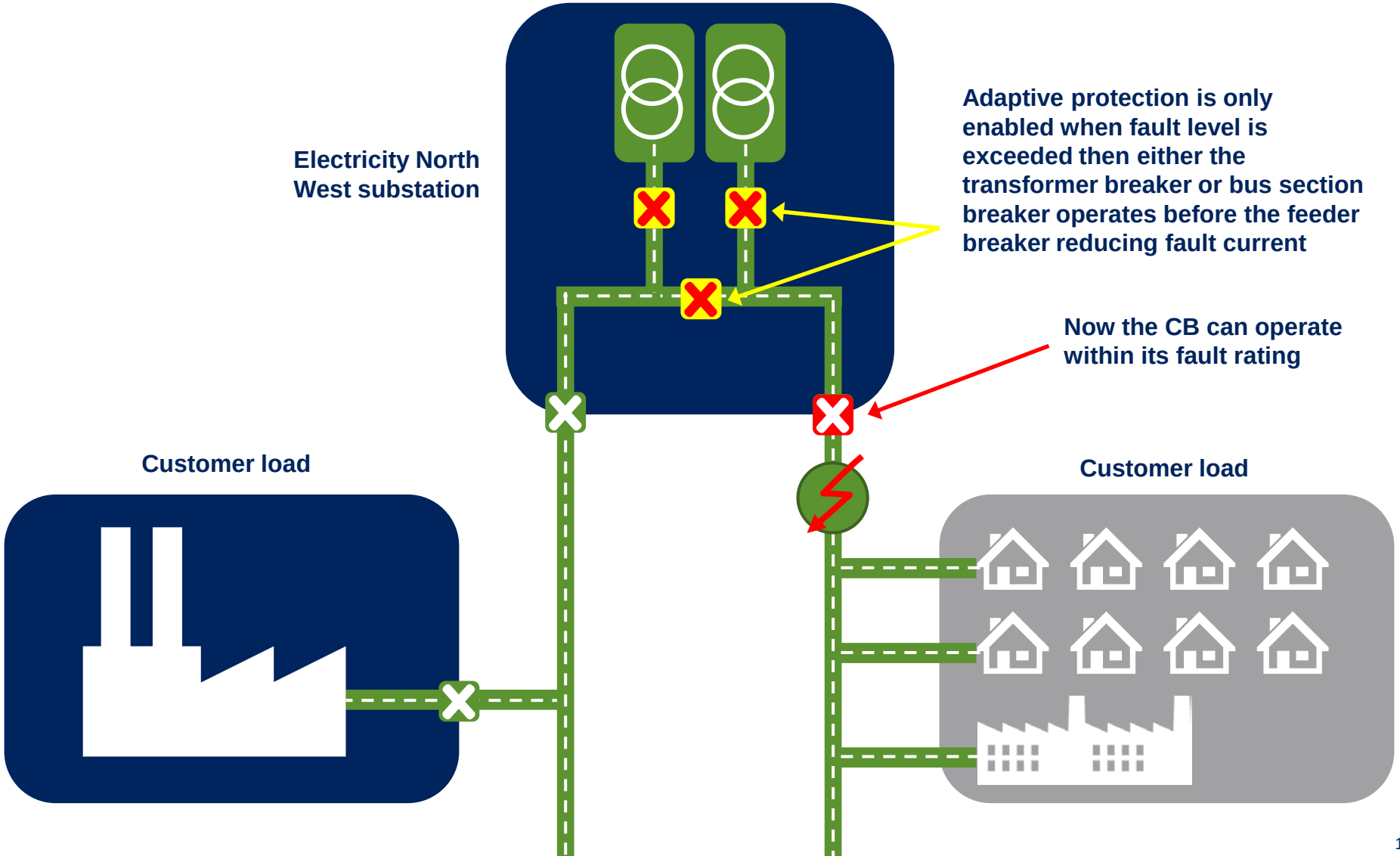


Network already designed to break fault current

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



I_S limiters – Two sites and five sensing sites

electricity north west
Bringing energy to your door

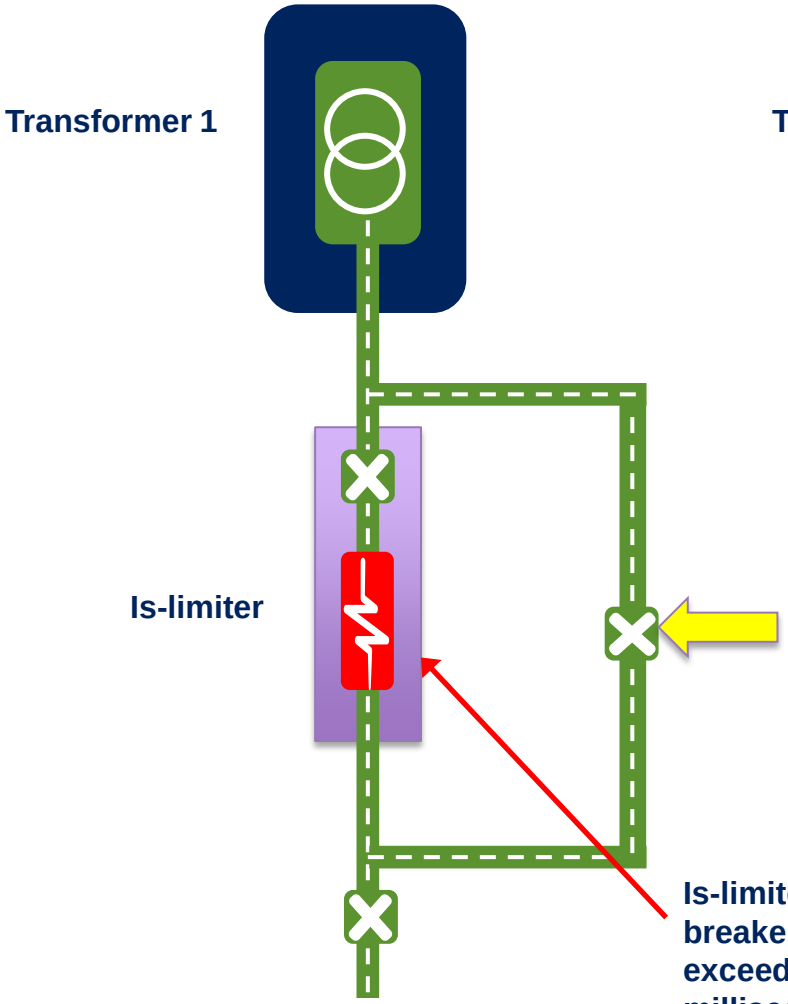
Operates within 5 milliseconds or 1/200th of a second

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

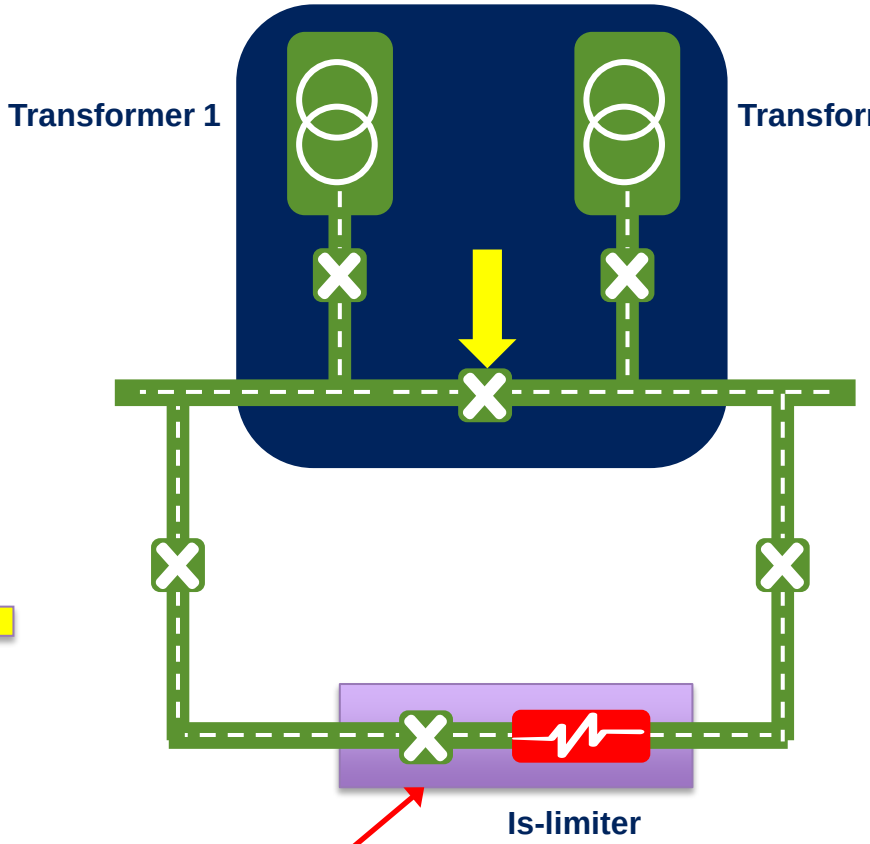
Respond will prove the technology, review safety case and deploy at two sites

Is-limiter

Broadheath

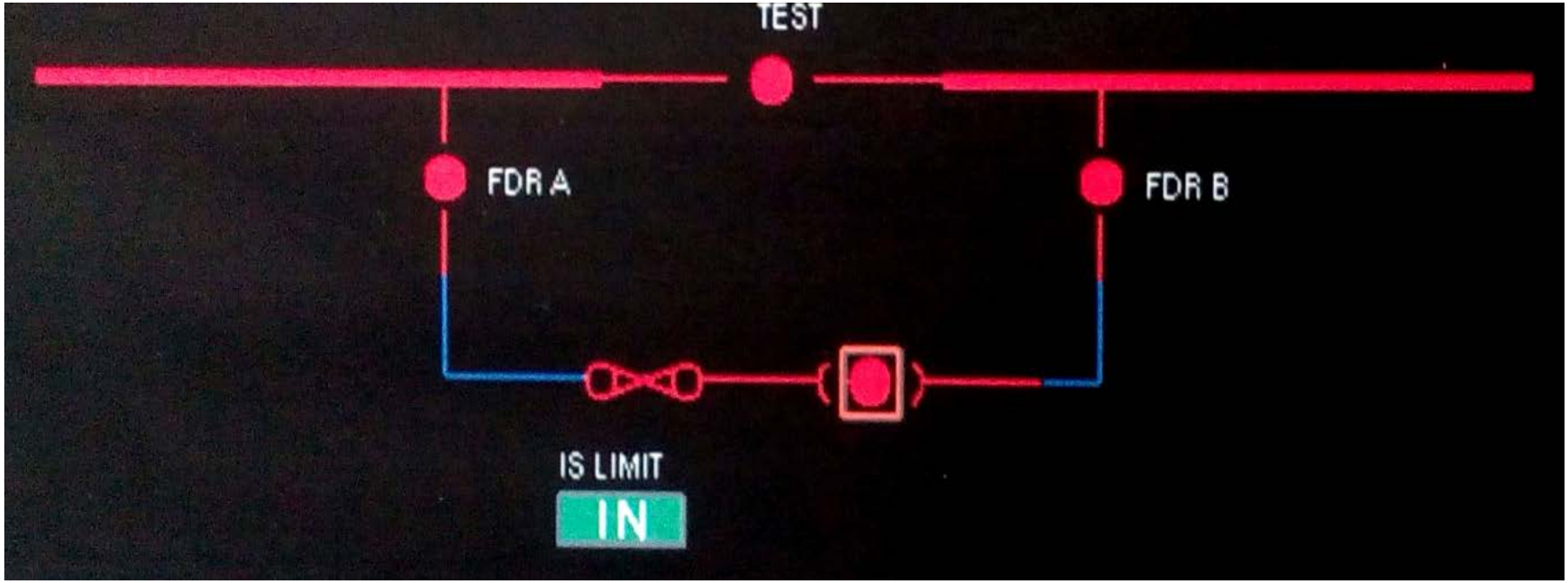


Bamber Bridge



Is-limiter acts like the bus section breaker or transformer breaker and is only enabled when fault level has been exceeded and then in the event of a fault operates in 2-3 milliseconds reducing fault current

NMS Schematic of Bamberbridge



NMS Schematic of Broadheath

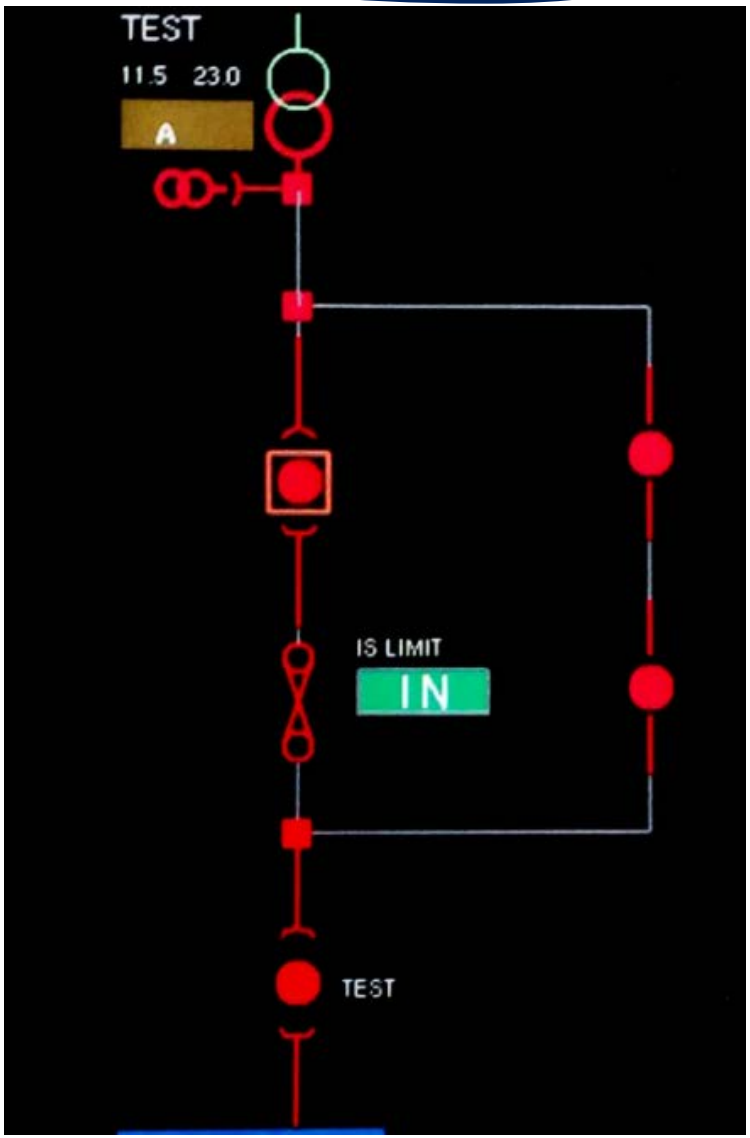
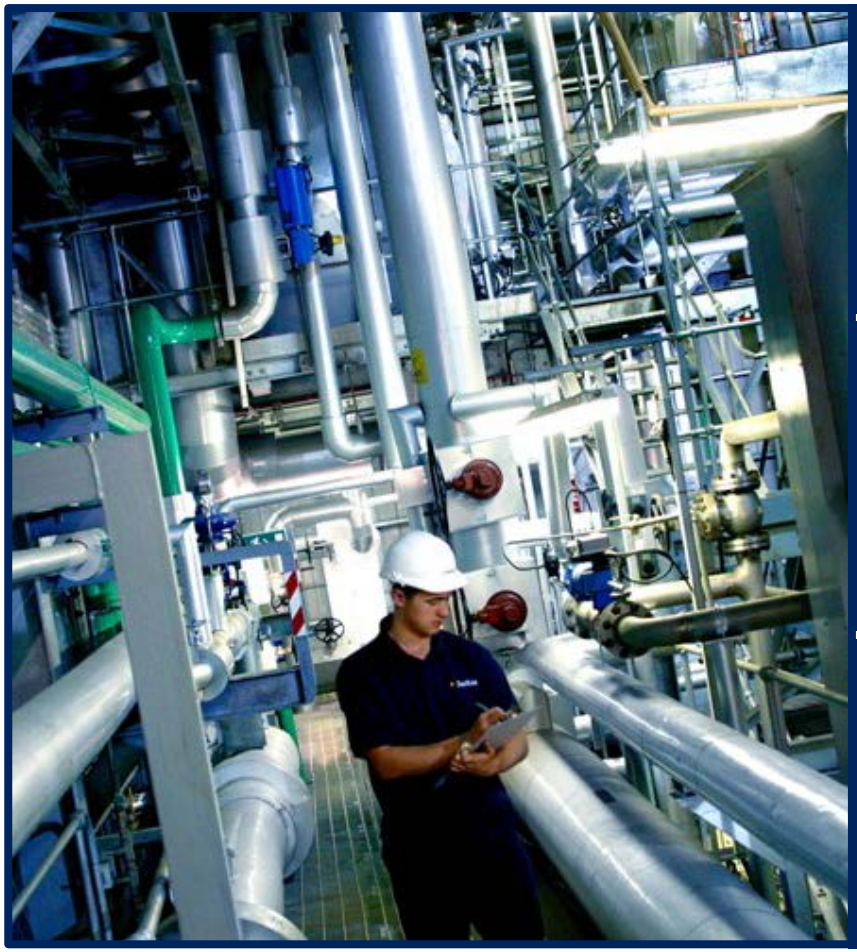



ABB
UniGear
AD1.1
INTERCONNECTOR


ABB
UniGear
AD1
INCOMING FEEDER
AD2
OUTGOING FEEDER

Fault Current Limiting (FCL) service
Two UU sites & three external sites

electricity north west
Bringing energy to your door



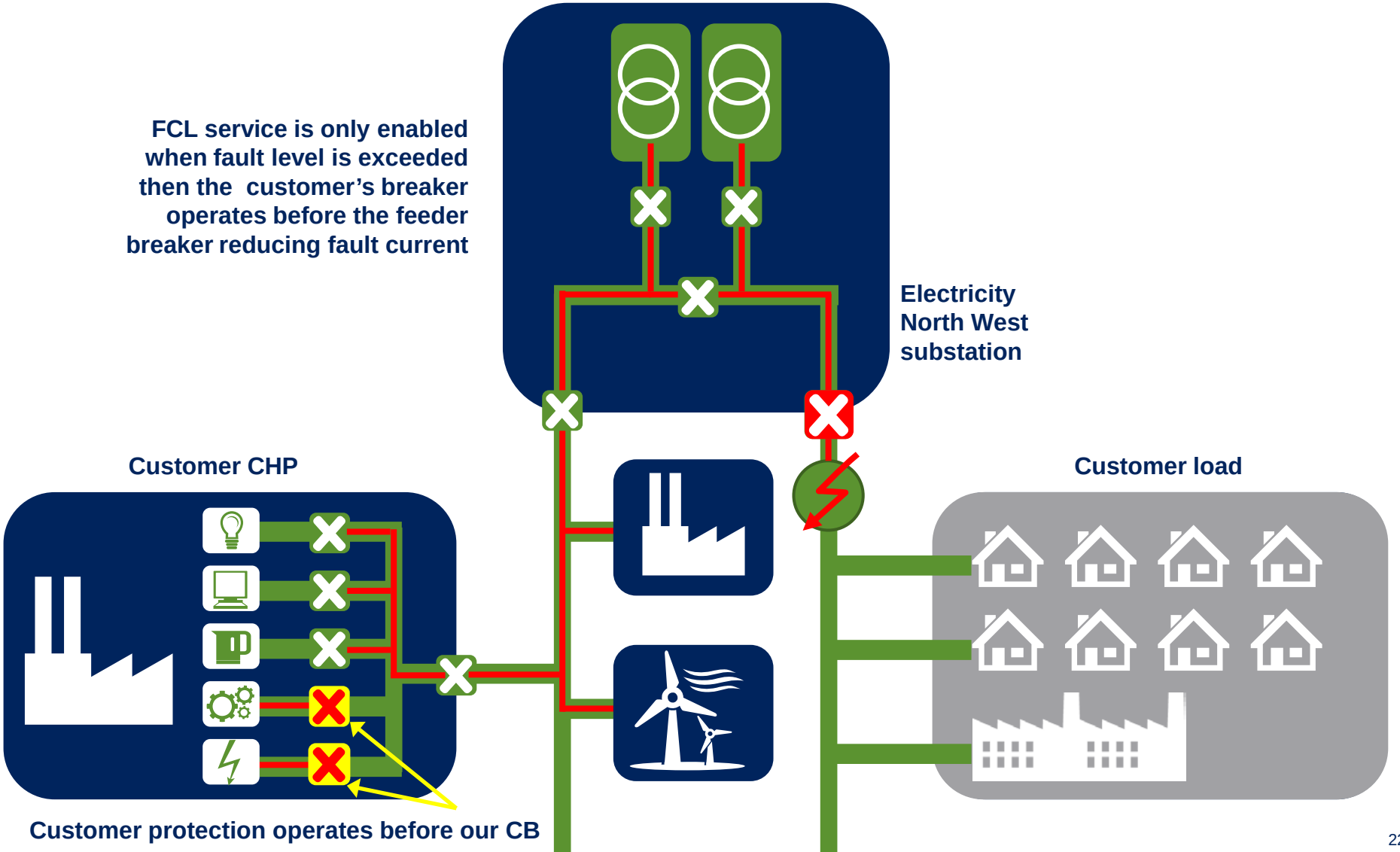
Fault current generated by customers can be disconnected using new technology

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

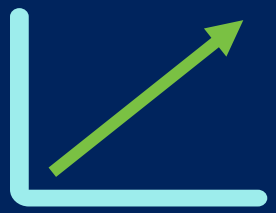
FCL service is only enabled when fault level is exceeded then the customer's breaker operates before the feeder breaker reducing fault current



Respond project hypotheses

electricity north west
Bringing energy to your door

Faster and cheaper to apply than traditional reinforcement



Will deliver a buy order of fault level mitigation solutions based on a cost benefit analysis

Facilitates active management of fault current, using retrofit technologies and commercial services

Enables a market for the provision of a FCL service

Uses existing assets with no detriment to asset health

Reduces bills to customers through reduced network reinforcement costs

For more information on Respond

electricity north west
Bringing energy to your door

	**www.enwl.co.uk/respond**
	**www.enwl.co.uk/respond-survey**
	**www.enwl.co.uk/respond-videos**
	**futurenetworks@enwl.co.uk**
	**0800 195 4141**

Thank you for your time and attention