Powerful-CB

Project Progress Report – June 2019

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Contents

Glossary

Term	Description
ABB	Our technology partner for Method 1
AMAT	Applied Materials, our technology partner for Method 2
BAU	Business As Usual
CB	Circuit Breaker – Protection device that interrupts the flow of current in an electric circuit in the event of a fault
DG	Distributed Generation
DNO	Distribution Network Operator
EMC	Electromagnetic Compatibility
ENA	The Energy Networks Association
EPN	Eastern Power Networks plc
ENWL	Electricity North West Limited
FCL	Fault Current Limiter – a FLMT that attenuates fault current by increasing its impedance (only) during a fault.
FLMT	Fault Level Mitigation Technology – a technical solution that reduces fault levels on the network
FLCB	Fault Limiting Circuit Breaker – a FLMT that blocks fault level contributions from a transformer / bus coupler / generator by disconnecting it before the first current peak of the fault
FNC	Frazer-Nash Consultancy
FSP	The Powerful-CB Full Submission Proforma - http://bit.ly/Powerful CB-fsp
GB	Great Britain
HSE	The Health and Safety Executive
Imperial	Imperial Consultants (Imperial College London's consultancy company)
IPR	Intellectual Property Rights
LPN	London Power Networks plc
M1	Method 1 - Installation of a FLCB at a substation
M2	Method 2 - Installation of a FLCB at a customer's premises
NIC	Network Innovation Competition
PPR	Project Progress Report
RIIO-ED1	The current electricity distribution regulatory period, running from 2015 to 2023
SDRC	Successful Delivery Reward Criteria
SPN	South Eastern Power Networks plc
TRL	Technology Readiness Level
UKPN	UK Power Networks

1. Executive summary

1.1 Project background

Powerful-CB aims to demonstrate that fault-limiting circuit breakers (FLCBs) can enable us to connect more distributed generation (DG) to our 11kV distribution networks without the need for costly network reinforcement.

A FLCB is a solid-state circuit breaker that operates 20 times faster than existing ones. This high-speed operation can mitigate fault level contributions from DG, allowing us to connect more DG (particularly combined heat and power) to fault-level constrained networks in dense urban areas. This will help accelerate the decarbonisation of heat, which is a key element of the Government's Carbon Plan.

The project team had been working with two technology partners to develop two types of FLCB. ABB will develop a FLCB for use at a primary substation, known as Method 1 (M1). We believe Method 1 will be the world's first demonstration of a FLCB with a fast commutating switch. Applied Materials Inc. (AMAT) were to develop a FLCB for use at a customer's premises, known as Method 2 (M2).

A change request was submitted to Ofgem in November 2018 to remove M2 from the scope of the project following the withdrawal of AMAT from the project. As highlighted in the December 2018 report, the project team made efforts to find a suitable replacement partner for M2 by engaging the market however no suitable partner was found.

The project team continue to work with Frazer-Nash Consultancy (FNC) and Imperial Consultants (Imperial) to develop the safety cases for the M1 device.

The project started on 1 January 2017 and is on track to complete on 31 August 2021.

1.2 Summary of progress

This Project Progress Report (PPR) covers the period January to June 2019. The next reporting period will cover July to December 2019. Collectively, these PPRs form the annual progress report required by Ofgem's Network Innovation Competition Governance Document.

Overall, the project has made good progress during the reporting period focussing on the development of the FLCB, finalising the design to integrate the FLCB to the network and preparing the trial site ready for installation, commissioning and energisation of the FLCB. The following section provides an update of key progress from each workstream.

As highlighted in the December 2018 PPR one of our project partners, AMAT did not sign onto a collaboration agreement and subsequently withdrew from the project. The change request submitted to Ofgem in the previous period has been agreed in principle and formal confirmation is expected in the following period. It has been agreed that M2 will indeed be removed from the project and this affects workstreams 1, 2 and 3.

Workstream 1 – Development of a FLCB Device

During this reporting period Workstream 1 (WS1) finalised the design of the FLCB including adding additional safety features following engagement with internal stakeholders. ABB completed validation testing for electromagnetic compatibility (EMC) and endurance tests of the fast commutating switch. Within this period ABB also undertook type testing of the FLCB although there was a two month delay in completing these due to a fault of the generator used for high energy tests at the accredited high power test laboratory. In addition to this, the FLCB failed the internal arc

test and subsequently will need to be re-tested in the near future. Due to this the project team made the decision to delay SDRC 9.1.1 from the end of May to the start of November 2019 so all test reports can be incorporated to ensure the most valuable learning dissemination is delivered.

Workstream 2 – Network Demonstration

During this reporting period Workstream 2 (WS2) focused on completing civil, mechanical, cable routing and the electrical designs for the trial site. Procurement of the protection relays and SCADA panels has also been finalised.

Site preparation work to ready the site for installation of the FLCB has been completed. This included installing durasteel walls, levelling the floor, core drilling holes in the floor for cable access, replacing the entrance door and replacing small power & lighting.

Workstream 3 – Understanding Customers' Requirements

During this reporting period the project team agreed in principle with Ofgem for the removal of M2 from the project. During the following period it is expected formal confirmation will be received and then the project team will inform all interested stakeholders involved, including the project mailing list about the removal of M2. Following the removal of M2 from the project, SDRC 9.3.2 – *Assess the (commercial) business case based on the technical and customer findings, focusing on investment decision criteria and trade-offs, such as cost, time to connect, space and impact on security of supply*, will no longer be produced and published.

UK Power Networks still intends to build upon the learnings generated from our engagements with customers willing to participate in such a trial, and continue to see real value in the customer placed FLCB. As such we are partnering with Western Power Distribution on an NIA project called EDGE-FCLi (Embedded Distributed Generation Electronic – Fault Current Limiter interrupter). The scope is similar to that of M2 and although a different supplier is being used, we aim to deliver similar benefits to customers once the project is complete. The project is unique as the technology readiness level (TRL) of the device being developed is lower than what was originally proposed with AMAT in M2 and hence provides a great opportunity for the project to increase choice in the market for customers.

Workstream 4 – Knowledge Dissemination

In January a paper titled, "Fault Current Limiting Circuit Breaker in Distribution Systems" was submitted to the international conference CIRED. The paper details the drivers behind the device development, the unique characteristics of the device compared to existing FLMT and the implementation plans for the FLCB. In April we were informed of the paper's successful acceptance and presentation at the conference in Madrid took place in June 2019.

The project team have made good progress during the reporting period updating the project website in readiness for the launch of the new UK Power Networks innovation website.

1.3 Risks and issues

The project continues to apply robust risk management procedures to reduce the probability and impact of risks materialising. The full risk register and status of each can be found in section 11. Several risks have materialised and are impacting certain project activities or have a medium likelihood of materialising. The project team have taken mitigating actions to reduce the impact of issues and are closely managing high risk items. Further detail is provided below:

Ref	Issue	Impact	Mitigation
R41	Delay in testing and/or Factory Acceptance Testing (FAT) of FLCB device.	Delay in delivery of device to site This risk has become an issue due to the original high power test laboratory having a fault with the generator required for the type testing. Due to the long lead time (3-4 months) for repair of the generator. Failure of internal arc testing has meant ABB will have to re-run the type testing and consequently delay the delivery of the device to site.	Change order of type tests depending on what is causing the delay. An alternate high power test laboratory has be booked. This will minimise the impact on the readiness of the FLCB for delivery to site.

1.4 Outlook for next reporting period

During the next reporting period the project will transition from prototype development of the FLCB to installation, commissioning and energising of the FLCB followed by commencement of the network demonstration period. The project team will also deliver SDRC 9.1.1 following completed type testing.

Building on the publication of the preliminary safety case report in 2018, Phase 2 of the safety case will be completed. Phase 2 will include updating the preliminary safety case with any lessons learned and additional safety requirements identified during the preparation, installation and commissioning of the FLCB.

The project team intends to keep recipients on the project mailing list (which constitutes of all interested stakeholders) informed about how M1 is progressing as it transitions from the development phase to the network demonstration phase of the project.

The project team are expecting close out the change request submitted to Ofgem to remove M2 from the project in the following period.

Knowledge dissemination planned for the next reporting period includes engaging with internal and external stakeholders to share knowledge gained from the installation work and commissioning. The project will be presented at this year's LCNI conference and is also planned to feature in other UK Power Networks led external events.

2. Project Manager's report

The project made good progress during the reporting period (January-June 2019), focusing on the following areas:

- Ongoing project planning;
- Continued development of the FLCB by ABB with collaboration from UK Power Networks;
- Validation and type testing of the FLCB;
- Completing civil, mechanical and electrical design to allow for integration of the FLCB into the existing site where the FLCB will be trialled;
- Completing civil, mechanical and small power & lighting works at the network demonstration site; and
- Finalising change request submitted to Ofgem for the removal of Method 2 (M2) from the scope of the project.

The following sections present individual workstream reports covering progress made during the reporting period, challenges encountered, lessons learned and the outlook for the next reporting period.

2.1 Project Team

The core project team continues to comprise of three dedicated roles:

Role	Status	Start date
Project Manager	Appointed	4 February 2019
Workstream 1&2 Lead	Appointed	23 March 2018
Workstream 3&4 Lead	Appointed	3 July 2017

In this reporting period, the newly recruited Project Manager (PM) joined UK Power Networks and the project team in February 2019. An official handover of activities and responsibilities occurred from the interim PM to the newly appointed PM.

The Workstream 1 (WS1) and Workstream 2 (WS2) Lead remains unchanged from the period however the role of the Workstream 3 (WS3) and Workstream 4 (WS4) Lead has been reduced to WS4 only. This is due to the change request submitted to Ofgem for the removal of M2 from the scope of the project.

2.2 Project Partners

As highlighted in the December 2018 Project Progress Report (PPR) our project partner ABB has signed onto a collaboration agreement and progressing with developing the FLCB. The M2 proposed project partner, AMAT, did not sign onto a collaboration agreement and subsequently withdrew from the project. Although the change request which was submitted to Ofgem in the previous period has not been formalised, it has been agreed in principle that M2 will indeed be removed from the project. The removal of M2 impacts WS1, WS2 and WS3 and as such works relating to M2 will no longer be discussed in future PPRs.

2.3 Workstream 1 – Development of a FLCB Device

WS1 is responsible for designing, building and testing prototype devices suitable for installation and trial and both a primary substation and customer site within London Power Networks (LPN). With the removal of M2 from the project,

a device will no longer be developed for trial at a customer site. For the remainder of the project WS1 will focus on developing and delivering M1 only.

ABB are progressing their technology from TRL4 (single-phase proof-of-concept prototype) to TRL6 (three-phase field prototype), in accordance with defined specifications provided by UK Power Networks. For WS1, ABB will design a three-phase prototype, build and integrate it into modular switchgear cubicles, and perform testing to ensure the prototype complies with UK Power Networks' requirements.

The learning from WS1 will be captured in test reports, which will be made available to other Licensees. The results and learning from specifying the device, prototype development and testing will be disseminated via SDRC 9.1.1.

Progress during this reporting period

During this reporting period, WS1 focused on the following activities:

- In January a paper about the FLCB was submitted to the international conference CIRED. In April we were informed of the paper's successful acceptance and presentation at the conference in Madrid took place in June 2019. For further details on the paper and the CIRED conference refer to section 2.6;
- The FLCB schematics, including general electrical schematics have been completed and used in WS2 to facilitate the design for FLCB integration into the trial site. Similarly the mechanical drawings showing the exact dimensions and cable entry points have been finalised and used for WS2;

Figure 1 Installation using three MV panels to integrate the FLCBs

- Successful verification testing of the FLCB was undertaken in this period. The tests included:
    - Electromagnetic Compatibility (EMC) tests in accordance with IEC 61000-4 of the complete panel and selected critical components. The purpose being that the FLCB contains several new controllers and sensors for this application;

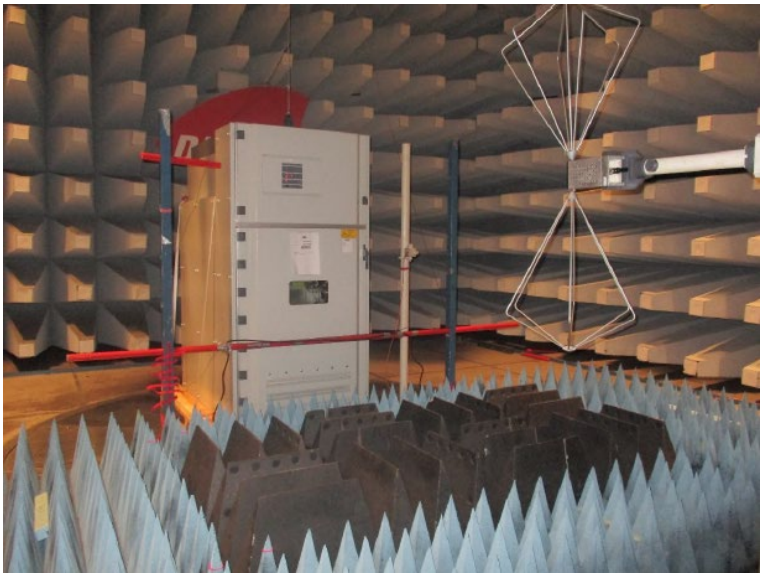

Figure 2 FLCB panel during EMC testing

- Endurance testing to ensure the FLCB can cope with the mechanical stresses and continue to operate as planned after thousands of operations. This was especially critical for the fast commutating switch (FCS) which was developed for this application and is expected to operate within <1ms;

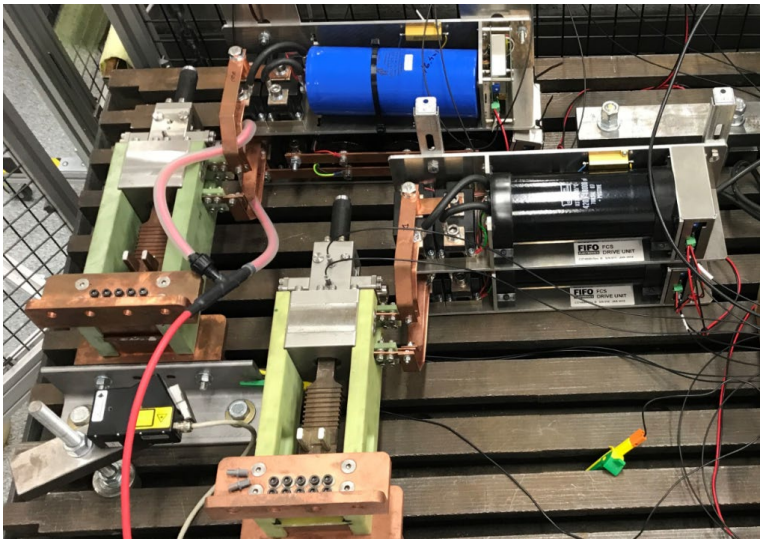

Figure 3 Mechanical endurance test set-up

- Type testing of the FLCB was undertaken during this period. The tests were delayed by two months due to issues with the laboratory generator; however, the project team worked closely with ABB to mitigate the impact and reschedule the tests as early as possible at an alternative certified laboratory. Selected type tests were completed in the presence of an external observer from PEHLA (the association of high power laboratories in Germany and Switzerland) and several in the presence of UK Power Networks. The following type tests were completed at accredited high power test labs in Germany and the Netherlands:

- Dielectric testing in accordance with IEC 62271-200;
- Temperature rise testing in accordance with IEC 62271-200
- Breaking and making testing in accordance with IEC 62271-100;
- Short time/peak current withstand testing in accordance with IEC 62271-100; and
- Internal arc testing in accordance with IEC 62271-200.

All type tests were completed successfully with the exception of internal arc testing which did not pass. Initial investigations by ABB show that only minor modifications to the device panel are required to resolve the issue however this will delay the readiness of the device to be delivered to site. Internal arc testing will need to be undertaken again during the next period to ensure safety of employees, operatives and the network.

Challenges and lessons learned

This section describes the main challenges and lessons learned in the workstream during this reporting period:

- During the FLCB development stage additional safety considerations for operation and maintenance were made resulting in further design requirements. The solutions to the problems were relatively simple however it was important these were identified during the development phase of the FLCB rather than once the device was on site. The observation and incorporation of these additional considerations was enabled by regular internal technical stakeholder engagement undertaken by the project team and regular meetings between ABB and the project team. The following safety considerations were observed:
  - All cabinets for switchgear used by UK Power Networks require tools to open as this adds another layer of protection to prevent accidental opening of cabinet doors. Although an interlocking system to prevent accidental opening of the cabinet doors of the FLCB was already designed by ABB, it was identified that the application of standard UK Power Networks practice for switchgear cabinets will add an extra layer of protection. As such, the door handle was modified to include a bolt, which would need to be unscrewed in order to open the FLCB cabinet doors; and

Figure 4 Mechanical locking of switchgear door

- Another additional safety consideration was adding a grounding cap to the FLCB. The FLCB includes capacitors that hold charge and could potentially cause harm to operatives working on the device. Although the device is required to be earthed before any work is initiated, it was suggested to add an additional visible item to ensure that the capacitors are earthed prior to the commencement of works. A yellow grounding cap was hence introduced by ABB, which needs to be manually changed in position to earth the capacitors

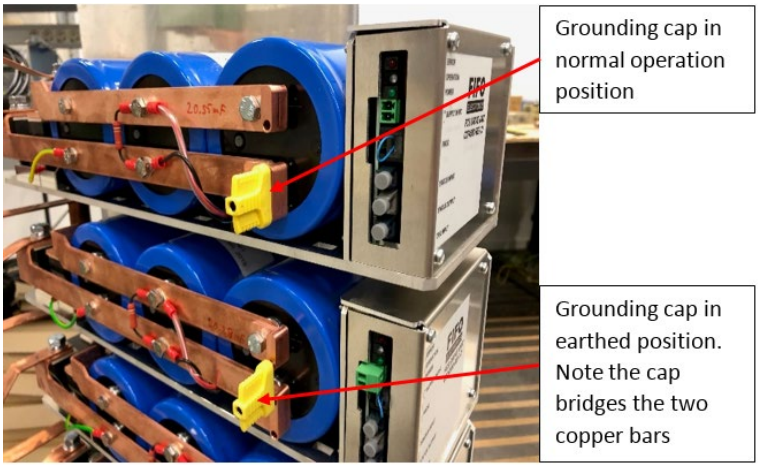

Figure 5 Grounding cap shown in normal position and maintenance position

- Finalising the electrical schematics and design included some challenges. While there were no problems with the main functions of the FLCB, there were delays in the completion of the signals to interface to the existing equipment. This was due to the change of communication medium used by some of the signals the FLCB sends and receives. While ABB assumed that according to the practices in Germany, a number of the signals would be delivered using Ethernet communications, UK Power Networks does not currently use this technology and utilise dedicated hard wired solutions. Additionally as this is a demonstration trial, the project aims to capture a significant volume of signals and data, to generate comprehensive learnings, which results in requiring a large number of output gates on the devices of the FLCB. Limitations on the number of outputs meant the amount of information to be transmitted was reduced to a minimum. This challenge highlights the difference in design approach between continental European and British utilities. A lesson learnt from this experience is to engage with technical experts of organisations based beyond Great Britain and review the design early in the process to ensure the development aligns with the technical standards of the network; and
- Several days ahead of the planned type tests at the end of March, the high power test laboratory in Ratingen, Germany informed ABB that there were issues with the bearings of the generator used for high energy tests. The laboratory advised that the generator may be available soon but no confirmation could be given prior to the completion of their internal investigations. The outcome of the investigation confirmed that three to four months were required to repair the generator. To avoid a significant impact on project timelines, the project team made a collective decision with ABB to secure the services of an alternative certified laboratory to conduct the type tests. ABB identified that KEMA Laboratories in the Netherlands had availability to complete the outstanding type tests. The tests were subsequently rescheduled for 20th May; a two month delay from the originally planned date at the end of March. As the delay had a knock on effect on the production of final test reports and hence SDRC 9.1.1, the project team decided to shift this

deliverable to November 2019 to fully capture all the learnings from the testing activities. Ofgem was notified of this non-material change in May.

Outlook for next reporting period

- It is expected that the FLCB will be manufactured by ABB over Q2 and Q3 and delivered to the trial site by mid-August following retesting of internal arc tests. The live network trial is planned to commence by October 2019 once the device is commissioned and energised;
- Upon completion of the device and all test reports finalised, SDRC 9.1.1 will be published. This SDRC will include recommendations for:
    - Specifying a substation-based FLCB;
    - Results and learning from type tests; and
    - Requirements for integrating FLCBs into existing networks and ensuring safety.
- Following the publication of the preliminary safety case report in 2018, it is proposed that Phase 2 of the safety case will be completed in 2019. Phase 2 of the safety case primarily lies with WS2 however there is overlap with WS1 as any additional learnings from the development of the FLCB will be added.

2.4 Workstream 2 – Network Demonstration

WS2 is responsible for the following activities:

- Designing the interface between the FLCB and the existing network;
- Installation and commissioning of switchgear including the FLCB and ancillary equipment;
- Conducting the network demonstration;
- Collecting adequate data to prove the FLCB is safe and effective; and
- Updating the preliminary safety case.

Within WS2, UK Power Networks will continue to collaborate with ABB, and our safety case expert to develop the engineering knowledge necessary to safely and effectively demonstrate FLCBs on GB networks. We will investigate issues such as:

- Use cases for FLCBs – for example in parallel with a bus section/coupler or in series with a transformer;
- Protection and control philosophy – FLCB trip settings, reclosing scheme, coordination and discrimination and how to handle failure of the FLCB; and
- The safety case which will be developed in parallel with the engineering investigations to ensure that safety is considered in every aspect of the business as usual (BAU) solution.

Where appropriate we will seek to engage with the Health and Safety Executive (HSE), the Energy Networks Association (ENA), and other Licensees, especially Electricity North West (ENWL) and Western Power Distribution (WPD) who have investigated similar issues with the Respond and FlexDGrid projects respectively. The learning from this phase will be captured in engineering policies, standards, and procedures and shared via learning dissemination.

Progress during this reporting period

During this reporting period, WS2 focused on the following activities:

- Completing civil, mechanical, cable routing and the following electrical items at the trial site:

- Switchgear design drawings;
- Protection drawings;
- Multicore cable schedules;
- Autoclose relay drawings;
- Procurement of materials completed or ordered this period;
- Retrofitted circuit breakers that will be used to extend the existing switchboard;
- Additional CTs needed for unit protection of the FLCB branch ordered;
- All the protection relays and panels have been ordered;
- SCADA panel request to the internal manufacturing team has been placed; and
- The demonstration specific drawings are pending feedback from commissioning engineers.

- A document explaining the autoclose philosophy for the scenario, which identified the potential for an unwanted dead busbar (causing loss of supply to customers), has been produced in collaboration with UK Power Networks subject matter experts and stakeholders to agree the running arrangements during the trial;
- Site preparation work to ready the site for installation of the FLCB. The stored equipment in the room was relocated and the existing durasteel wall replaced as it contained asbestos. A second durasteel wall was also installed near the entrance of the building. The floor had to be levelled, holes drilled for cable access and the entrance door to be replaced to allow access for equipment of larger height. Figure 6 below show the existing room and an in-progress stage of the works;

Figure 6 Existing room prior to site works commencing (left) and progress of completing site works (right)

- The civil, mechanical and small power & lighting works have all been completed. This includes modifying the fire suppression system and adding a new set of substation batteries;

Figure 7 Finished preparation of the room ready for FLCB installation

Challenges and lessons learned

This section describes the main challenges and lessons learned in the workstream during this reporting period:

- During this period, the electrical design was finalised for the substation selected for demonstration. This proved to be a time-consuming task where the workstream lead had to spend considerable time and effort to support the site designers to explain the finer details of the project as the interface and signals to the existing switchgear and autoclose scheme were non-standard. Furthermore, differences in engineering terms used between ABB and UK Power Networks' designers required regular meetings and ad-hoc communications to communicate effectively for the completion of design work;
- An important lesson learned in the design phase is regarding the nature of resource required for such projects. Due to the nature of innovation projects, the site designers assigned to the project need to be flexible, creative and capable of applying solutions out with existing standards and guidelines, and have the ability to break down problems in a systematic manner. Such engineers are critical resources and are generally earmarked for high priority BAU projects. It is vital for any innovation team to engage early with the relevant teams and secure the necessary skilled resources for these complex, non-standard projects; and
- A valuable lessoned learned was to ensure critical, scarce resources are secured for both design and construction. This is especially relevant when working in old substations where there are limited skilled resources to carry out the work. This was highlighted by the project where UK Power Networks had limited skilled resources, as did external parties, to complete the busbar extension. These skilled internal

resources are also used in many network reinforcement projects which can at times take precedence over innovation projects. However the project team is working closely with internal capital delivery teams to explore options and mitigate the risk of delays in installation works.

Outlook for next reporting period

The next period will see the completion of some key milestones for WS2 and these include:

- Extension of the existing switchboard including the addition of the retrofitted circuit breakers;
- FLCB delivery to the site and installation;
- Installation of the power cables and all the jointing work;
- Installation of the protection panels, SCADA panels and communications cables;
- Commissioning of the extended busbar, protection, autoclose scheme and FLCB;
- Energisation of the FLCB and thus commencement of the trial period; and
- As previously mentioned under WS1, Phase 2 of the safety case will be completed during the demonstration period. Phase 2 will include updating the preliminary safety with any lessons learned and additional safety requirements identified during the preparation, installation and commissioning of the FLCB. Phase 2 of the safety case will be completed by December 2019.

2.5 Workstream 3 – Understanding Customers' Requirements

WS3 is responsible for understanding our customers' needs, ensuring that we design the solutions to meet our customers' needs and to recruit a trial participant for the M2 demonstration.

As highlighted in the December 2018 PPR and following the removal of M2 from the project, SDRC 9.3.2 will no longer be produced and published. Further details of this SDRC can be found in section 7.

Progress during this reporting period

During this reporting period, the project team were awaiting final confirmation from Ofgem for the removal of M2 from the project. Once a confirmation is received, the project team will inform all interested stakeholders involved about the removal of M2.

UK Power Networks still intends to build upon the learnings generated from our engagements with customers willing to participate in such a trial, and continue to see real value in the customer placed FLCB. As such we are joining forces with Western Power Distribution for a NIA project called EDGE-FCLi (Embedded Distributed Generation Electronic – Fault Current Limiter interrupter). The scope is similar to that of M2 and we aim to deliver similar benefits to the customers once the project is complete and proved to be successful. The technology readiness level (TRL) of the device being developed is lower than what was originally proposed with AMAT in M2 which provides a great opportunity to increase choice for customers.

Challenges and lessons learned

The project team experienced no challenges under WS3.

Outlook for next reporting period

During the next reporting period the project team intends to keep recipients on the project mailing list (which constitutes all interested stakeholders) informed about how M1 is progressing as it transitions from the development phase to the network demonstration phase of the project.

2.6 Workstream 4 – Knowledge Dissemination

WS4 oversees the dissemination and activities for learnings generated throughout the project. These are critical aspects of the project and will ensure that DNOs across GB can build on Powerful-CB, avoiding unnecessary duplication of work at customers' expense. Internal stakeholder engagement activities also play an important role in guiding the development and deployment of the new FLCB within the business and support the successful transition into BAU.

Progress during this reporting period

As mentioned in Section 2.3 a technical paper for the FLCB, titled, "Fault Current Limiting Circuit Breaker in Distribution Systems" was submitted for review and participation in January for the international conference CIRED. The paper details the drivers behind the device development, the unique characteristics of the device compared to existing fault level mitigation technology (FLMT) and the implementation plans. The paper was approved and presentation was requested; the conference will be held in Madrid on 6 June 2019.

CIRED is the International Conference and Exhibition on Electricity Distribution. CIRED works for the purpose of increasing the business relevant competencies, skills and knowledge of those who see themselves as a part of the electricity distribution community, whether they are from the utility, product, consultancy, service, business or academic sector. CIRED is dedicated to the design, construction and operation of public distribution systems and of large installations using electrical energy in industry, services and transport.

CIRED covers the following topics:

- Electricity Distribution Systems and associated services, including dispersed and embedded generation issues;
- Technical aspects of Electricity Supply; and,
- Related aspects such as cost reduction, environment, organisation and skills.

The technical content of CIRED is based on six sessions. The Powerful-CB paper will be presented at the first session whose subject is "Network Components". Additionally the paper will be presented during the poster session. At the time of writing this report, the conference has more than 1300 confirmed attendees across the globe.

The project team have also made efforts during the reporting period updating the project website in readiness for the launch of the new UK Power Networks innovation website.

Challenges and lessons learned

No challenges were encountered with respect to WS4 during the reporting period.

Outlook for next reporting period

The following activities are planned for the next reporting period:

- Engage with internal technical experts in the preparation for the network demonstration. We expect to capture the knowledge gained from the installation work and commissioning and share that knowledge with our stakeholders through SDRC 9.2.1;
- Produce external press releases following the completion of the FLCB and commencement of network demonstration;
- Continued updating of the project website;
- The project will be presented in this year's LCNI conference along other projects; and
- It is also expected to feature in other UK Power Networks led external events.

3. Business case update

We have not discovered any new information that affects the business case; thus the business case remains consistent with our FSP. As previously highlighted in the December 2018 PPR, a change request has been submitted to request the removal of M2 from the project. Based on this, the project assumes 100% deployment of M1 across GB and the delivery of committed benefits of up to £403m by 2050.

4. Progress against plan

This section summarises the project's progress in the period January to June 2019. It describes issues we faced and how we managed them, key achievements, notable events, key planned activities for the next reporting period and any issues we expect in the next reporting period.

4.1 Summary of changes since the last Project Progress Report

Since the last reporting period, the following notable changes have been made to the project plan:

- For WS1 the prototype development has progressed as per plan, with device prototype being developed and assembled in time for the scheduled type test. However risks R4, referring to delay in prototype development, and R41, relating more specifically to the delays in type testing and/or FAT (expanded in section 4.3) have materialised and impacted the programme.
    - The high power test laboratory in Ratingen, Germany had a fault with the generator used for high energy tests and as a result three of the five type tests could not be completed. ABB were informed of this fault one day before the scheduled test dates;
    - The number of accredited high power test laboratories is limited and as such, the lead-times for booking are long – in this case the slot for Powerful-CB was booked 4 months in advance. In addition to long lead-times the costs to book a test laboratory are high so booking multiple laboratories is not practical;
    - To minimise the impact on the delivery of the FLCB to site, the project team worked with representatives of the laboratory in Ratingen to find an alternate laboratory to complete the remaining type tests. The type tests were conducted at KEMA in the Netherlands on 20th May. Although the delay has been minimised, a two month delay in type testing has occurred; and
    - Failure of internal arc testing has affected the readiness of the FLCB and hence the delivery to site which is now expected to be mid-August.
- For WS2 we identified in the previous reporting period that delivery of the electrical design of substation and resourcing for the electrical site works was open to risks R40 and R17 respectively. These risks were mitigated by working closely with capital delivery teams and the works were subsequently rescheduled from January to mid-May for the electrical design works. However, we had a few events that have driven us to accept a further delay to the start of the trial.
    - The increased time and effort required for the completion of site electrical design;
    - Our capital delivery team had requested an increased time period for the test and commissioning of the site due to the increased complexity of the scheme. This time increased beyond the initial agreement during concept design; and
    - R17 is at risk of materialising as the busbar extension site works require a specialist resource. At the same time that we need the resource for the works, there are other high profile BAU projects that target the improvement of CIs and CMLs. These projects are higher priority and innovation

has to wait for the resource to be made available. In order to mitigate this risk, a preliminary market engagement has taken place however the parties contacted to not have the necessary skills to complete the works.

As it currently stands there is no impact on the critical path however the project team are exploring further options to mitigate risk R17 so that the busbar extension of the existing switchgear is not delayed. During the next reporting period the project team will reassess this risk, work with the capital delivery team and make a decision on how to proceed with the aim of having no impact on the project plan.

4.2 Detailed progress in the reporting period

The project has made significant progress during this reporting period, as shown below:

Task description	Workstream	Status at start of period	Status at end of period
Testing and validation of FLCB	1	In progress	Complete
Type Testing of FLCB	1	Started in period	Complete
Completion of SDRC 9.1.1	1	Started in period	In progress
Detailed design (civil, mechanical, electrical)	2	In progress	Complete
Detailed design (SCADA)	2	Started in period	In progress
Site works (civil)	2	In progress	Complete
Site works (small lighting and power)	2	Started in period	Complete
Procurement of relays	2	Started in period	Complete
Retrofit of CBs	2	In progress	Complete
CT end boxes upgrade	2	Started in period	In progress
Procurement of SCADA panel	2	Started in period	In progress
Engage with UK Power Networks' internal stakeholders in design phase	1 and 2	In progress	In progress

4.3 Identification and management of issues

The following issues have been reported in the workstream reports and are also captured below:

Ref	Risk/issue	Impact	Mitigation	Target close date
R4	Delay and/or cost overrun – prototype development	Cost overruns will cause the project to be over budget. Delays in the prototype development has an impact on the project schedule and the potential to either reduce the trial period or extend the duration of the project.	ABB and AMAT have agreed to take all risk of cost overruns within their control. UK Power Networks will use our existing change control procedures to minimise the risk of changes that cause additional costs for ABB and AMAT. The risk of delay in prototype development is still present. See risk R41 for more specific risk.	August 2019

Ref	Risk/issue	Impact	Mitigation	Target close date
R17	UK Power Networks not able to deliver on commitments because other teams supporting the project are under-resourced	We have engaged the relevant business units within UK Power Networks to confirm their support of the project, and will confirm resourcing commitments during project mobilisation.	We are working with the relevant business units to secure resourcing. Specialist resources requirement for busbar extension works is increasing the risk of a delay to the start of the network demonstration period. Preliminary external engagement for skilled resource has not helped as the parties approached do not have the necessary skills to complete the work.	September 2019
R40	Delay in completion of electrical design (CPP)	Close support of the electrical design team from the project team. Monitoring of progress and assistance from the supplier.	Electrical design completed in this period. The risk remains open for any changes that might be identified during commissioning.	December 2019 (open in case changes are identified during commissioning)
R41	Delay in testing and/or FAT of FLCB device. The FLCB failed internal arc testing which will require retesting.	Change order of type tests depending on what is causing the delay.	This risk has become an issue due to the original high power test laboratory having a fault with the generator required for the type testing. Due to the long lead time (3-4 months) for repair of the generator, an alternate high power test laboratory has been booked. This will minimise the impact on the readiness of the FLCB for delivery to site.	August 2019

4.4 Key achievements and notable events

Key achievements and notable events in the reporting period are shown below:

- Design and assembly of FLCB device for type testing;
- Successful completion of type testing of FLCB device;
- Completion of civil, mechanical and electrical design works; and
- Completion of civil, mechanical, small power & lighting at the trial site which will allow for the installation and commissioning of the equipment for the next reporting period.

4.5 Look-ahead to next reporting period

The following major tasks and milestones are planned for the next reporting period:

- Completion of FLCB and delivery to trial site (WS1);
- Installation, commissioning and energisation of FLCB and switchgear (WS1 and WS2);
- Commence network demonstration period (WS2);
- Complete Phase 2 of the safety case (WS 1 and WS2);
- Presentation at CIRED conference in Madrid (WS4); and
- LCNI Conference 2019 (WS4).

5. Progress against budget

This section is provided in the Confidential Appendix A.

6. Project bank account

This section is provided in the Confidential Appendix A.

7. Successful Delivery Reward Criteria (SDRCs)

This section provides a brief narrative against each of the SDRCs set out in the Project Direction. The narrative describes progress towards the SDRCs and any challenges we may face in the next reporting period. We have struck-through the SDRCs that we have requested to be removed as part of the change request.

Project Deliverable	Deadline	Evidence	Progress
9.1 Work with industry to advance new FLMTs based on FLCB technology			
9.1.1 Prototype and lab test a substation-based solution (Method 1)	31 May 2019	**Publish Learning Report – Development of a FLCB for substations**, which will include: recommendations for specifying a substation-based FLCB; results and learning from type tests (including a short circuit test) conducted at an accredited high power laboratory; and requirements for integrating FLCBs into existing networks and ensuring safety.	Due 1 November 2019
~~9.1.2 Prototype and lab test a customer-based solution (Method 2)~~	~~31 August 2019~~	~~**Publish Learning Report – Development of a FLCB for customers**, which will~~	Removed from project

		~~include: recommendations for specifying a customer-based FLCB; results and learning from type tests (including a short circuit test) conducted at an accredited high power laboratory; and requirements for integrating FLCBs into existing networks and ensuring safety.~~	
9.1.3 Independent review of safety case	31 May 2018	**Issue preliminary safety case to relevant ENA panel(s) for independent review** which will include: Definition and justification of acceptable levels of risk; analysis of failure modes and effects; details of proposed mitigations; and claims, arguments, and evidence to demonstrate that the proposed mitigations reduce the overall level of risk to an acceptably low level.	Complete
9.1.4 Safety case for FLCB installation without back-up	31 May 2018	**Publish preliminary safety case** which will include the technological and operational safety case to the time when the trial equipment could be deployed as BAU without the FLCBs being installed in series with a back-up circuit breaker.	Complete
9.2 Trial the technical suitability of these two technologies including effectiveness and safety considerations for relieving fault level constraints for 11kV networks			
9.2.1 Install and commission solution at an 11kV substation (Method 1)	31 July 2020	**Publish Interim Learning Report – Demonstration of a FLCB for substations**, which will include results	On schedule

		and learning from installation, commissioning, and operation to date of a FLCB at a substation.	
~~9.2.2 Install and commission solution at a customer's premises (Method 2)~~	~~31 July 2020~~	~~**Publish Interim Learning Report – Demonstration of a FLCB for customers**, which will include results and learning from installation, commissioning, and operation to date of a FLCB at a customer's premises.~~	Removed from project
9.2.3 Demonstration of solution at an 11kV substation (Method 1)	30 June 2021	**Publish Final Learning Report – Demonstration of a FLCB for substations**, which will include results and learning from operating and maintaining a substation containing a FLCB, and technical performance of the FLCB and overall solution under real network conditions.	On schedule
~~9.2.4 Demonstration of solution at a customer's premises (Method 2)~~	~~30 June 2021~~	~~**Publish Final Learning Report – Demonstration of a FLCB for customers**, which will include results and learning from operating and maintaining a FLCB at a customer's premises, and technical performance of the FLCB and overall solution under real network conditions.~~	Removed from project
9.3 Assess the suitability of the solutions against customers' needs			
9.3.1 Review the customer needs for these two FLCBs technologies on behalf of DNOs and DG stakeholders	31 October 2017	**Publish Learning report – Understanding customers' requirements**, which will describe our findings from customer dialogue sessions, i.e.	Complete

		understanding their requirements and concerns about FLCBs, and customer feedback.	
~~9.3.2 Assess the (commercial) business case based on the technical and customer findings, focusing on investment decision criteria and trade-offs, such as cost, time to connect, space and impact on security of supply~~	~~31 March 2020~~	~~**Publish Learning report – Suitability of FLCBs**, which will inform generation customers of the solutions, answer frequently asked questions, and provide enough information for customers to assess whether the solution meets their requirements (e.g. cost, time to connect, space required, operational impacts, etc.).~~	Removed from project
9.4 Share the learning throughout the project with the wider utility industry			
9.4.1 Share overall learning from the project with customers, regulators, other DNOs, other manufacturers, and academia via a stakeholder event	30 September 2021	Publish key materials from the stakeholder event (e.g. slides), and provide Ofgem with a list of invitees and attendees.	On schedule

8. Data access details

To view the full Innovation Data Sharing Policy, please visit UK Power Networks' website here: http://innovation.ukpowernetworks.co.uk/innovation/en/contact-us/InnovationDataSharingPolicy.pdf

UK Power Networks recognises that innovation projects may produce network and consumption data, and that this data may be useful to others. This data may be shared with interested parties whenever it is practicable and legal to do so and it is in the interest of GB electricity customers. In accordance with the Innovation Data Sharing Policy, published in 2017/18, UK Power Networks aims to make available all non-personal, non-confidential/non-sensitive data on request, so that interested parties can benefit from this data.

9. Learning outcomes

The project team recognises the importance of learning and dissemination. Specific lessons learned in each of the workstreams are captured in the workstream progress reports in Section 2 of this progress report. There were no SDRCs published during this reporting period as originally planned due to unavoidable circumstances.

During the next reporting period, the project team will publish the report for SDRC 9.1.1 as previous discussed and this will be published on the Powerful-CB website. In addition, UK Power Networks is expecting to host an external dissemination event where the project team will disseminate initial progress and learnings at this event to all peer DNOs and industry stakeholders.

10. Intellectual Property Rights (IPR)

This section lists any relevant IPR that has been generated or registered during the reporting period along with details of who owns the IPR and any royalties which have resulted, and any relevant IPR that is forecast to be registered in the next reporting period.

IPR generated last period (January–June 2019)

IPR Description	Owner(s)	Type	Royalties
Testing methodology of the FLCB	ABB UK Power Networks	Relevant Foreground IPR	Nil
Running arrangements for network demonstration	UK Power Networks	Relevant Foreground IPR	Nil

IPR forecast next period (July - December 2019)

IPR Description	Owner(s)	Type	Royalties
Data and performance of FLCB during network demonstration	ABB UK Power Networks	Relevant Foreground IPR	Nil

11. Risk management

This section lists the risks highlighted in the FSP plus any other risks that have arisen in the reporting period. We have described how we are managing the risks we have highlighted and what we have learned. Risks 1-36 are captured in the FSP although some have been updated. Risks 37-39 were identified during the progress of the project. The project continues to monitor risks and issues on a monthly basis where risk impacts and mitigation plans are updated.

Ref	WS	Status	Description	Mitigation/Planned Action	Current Status	RAG
R1	WS1	Closed	ABB's costs increase because of exchange rate movements due to Brexit developments.	ABB has agreed to hold their quoted price in GBP until the project commences. Once the project has commenced, we will agree the ABB contract price in GBP, or agree the price in EUR and take steps to hedge the exchange rate risk.	Now the contract has been agreed and signed in GBP, this risk is mitigated.	G
R2	WS3	Closed	Unable to find a suitable site / willing customer for customer trial.	We will engage with customers to understand their motivations for participating in the trial, so that we can design the trial and recruitment campaign to provide the right incentives and target the right customers. We will also consider relevant customer research and learning from ENWL's FCL Service trial.	We identified a potential customer and a location for trials.	G
R3	-	-	NOT USED.	NOT USED.	NOT USED.	-
R4	WS1	Issue	Delay and/or cost overrun – prototype development.	ABB and AMAT have agreed to take all risk of cost overruns within their control. UK Power Networks will use our existing change control procedures to minimise the risk of changes that cause additional costs for ABB and AMAT.	We have negotiated and signed the collaboration agreement with ABB to minimise the risk of cost overruns. The risk of delay in prototype development is still present. See risk R41 for more specific risk.	R
R5	WS1	Closed	Delay and/or cost overrun - safety case (due to unforeseeable requirements).	We have allowed specific contingency for the safety case, based on FNC's experience of required effort in the event of unforeseen requirements.	FNC delivered the preliminary safety case within the given timescales. SDRC 9.1.3 and SDRC 9.1.4 are complete.	G
R6	WS1	Open	Prototype as delivered is not fit for purpose.	UK Power Networks, ABB, AMAT, FNC to collaborate to develop the FLCB specifications; Safety consultant to develop safety case in parallel; engage with other HSE, ENA, and other DNOs.	Regular meetings and ad-hoc communications between ABB, FNC, and UK Power Networks technical experts has meant successful collaboration on the FLCB specification and safety case. The preliminary safety case is complete. The FLCB has undergone type testing.	G
R7	WS1	Open	Solution does not deliver the necessary reliability and/or redundancy to be able to prove the safety case.	Safety case feasibility study completed before full submission. Safety case to be developed in close collaboration with FLCB designers and engineering standards.	All key stakeholders, including ABB and UK Power Networks technical experts, attended the safety case workshops. The preliminary safety case is complete. Phase 2 of safety case to be completed during demonstration period.	G

Ref	WS	Status	Description	Mitigation/Planned Action	Current Status	RAG
R8	WS1	Open	Solution is not suitable for general population of GB sites due to operational or physical space constraints.	We will engage with other DNOs to understand any operational or physical space constraints that are unique to their networks.	N/A this period.	G
R9	WS2	Open	Trial site does not experience enough HV network faults to prove that the solution is safe and reliable.	We will use history of HV network faults as a criterion when selecting trial sites. We will use the safety case to determine how much data is required to prove that the FLCB is safe. Additionally a 24 month trial period will be completed.	We have used historic fault data when looking at potential sites – recognising that fault history is not necessarily an indicator of future faults. The trial period has been reduced due to delays but still sufficiently long enough to experience a number of faults.	G
R10	WS2	Open	Trial fails to capture the data necessary to prove that the solution is safe and reliable.	We will ensure that our data capture solution has adequate reliability and redundancy so that we don't miss any opportunities to capture data from real network faults.	N/A this period.	G
R11	WS2	Open	Solution fails to operate correctly during field trial (i.e. fails to limit fault current).	We will not allow fault levels to exceed equipment ratings until the FLCB has been proven safe and reliable. This minimises the risk of an unsafe situation if the FLCB fails to operate correctly.	N/A this period.	G
R12	WS2	Closed	Customer trial has adverse impacts on customer.	We will identify the potential impacts on the customer and work with them to ensure the risks are well managed.	M2 (customer site trials) will no longer be pursued as part of this project.	R
R13	WS4	Open	ABB decides not to offer a commercial product.	ABB have confirmed that if they are unable to offer their foreground IPR to Licensees in the form of a commercial FLCB product, they are willing, in principle, to licence any relevant foreground/background IPR to a third party for the purpose of developing a commercial FLCB product.	N/A this period.	G
R14	WS4	Open	Solution is not accepted by other DNOs.	We will engage with other DNOs at key stages of the design and specification processes to ensure that their requirements and concerns are addressed.	N/A this period.	G
R15	WS1	Open	Project partners unable to deliver on commitments on time because of lack of resources and/or other commitments.	We will agree heads of terms and scopes for collaboration agreements with all project partners in advance of project kick-off.	ABB have experienced issues with the high power test laboratory used for the type tests. An alternative laboratory will be used for the test.	G
R16	PM	Open	UK Power Networks not able to deliver on commitments because project delivery team is under-resourced.	We will secure resources for the core project delivery team in advance of project kick-off, and ensure adequate succession planning to manage the risk of staff movements.	No issues in this period.	G
R17	PM	Open	UK Power Networks not able to deliver on commitments because other teams supporting the project are under-resourced.	We have engaged the relevant business units within UK Power Networks to confirm their support of the project, and will confirm resourcing commitments during project mobilisation.	We are working with the relevant business units to secure resourcing. Specialist resources requirement for busbar extension works increasing the risk of a delay to the start of the network demonstration period. Preliminary external engagement for skilled resource has not helped as the parties approached do not have the necessary skills to complete the work.	A

Ref	WS	Status	Description	Mitigation/Planned Action	Current Status	RAG
R18	PM	Open	Partner withdraws from project for financial, commercial, or technical reasons.	If one technology partner withdraws from the project, we will consider using the same technology at both substation and customer sites, or if this would not provide value for customers' money, we would de-scope the project to only trial one method. If FNC withdraw from the project, we will seek an alternative partner who can provide the necessary safety case expertise.	AMAT did not sign the collaboration agreement and have withdrawn from the project. Following this change, we engaged with the market to find an alternative partner for M2. However when no suitable replacement could be found, the project team decided to request a change from Ofgem to remove M2 from the project.	R
R19	WS2	Closed	Customer (trial participant) withdraws from the project because the trial is impacting their business activities.	To minimise probability, we will only consider customers where the risk of adverse impact on their business activities is minimal or can be managed.	Risk no longer valid. M2 (customer site trials) will no longer be pursued as part of this project. Change request submitted to remove M2 from the project.	R
R20	PM	Open	Breach of data protection regulations.	We will ensure that all customer's details are handled and stored in accordance with our data protection procedures.	N/A this period.	G
R21	WS2	Open	Solution has adverse impacts on protection grading, causing unacceptable fault clearance times.	We will complete a protection coordination study to ensure that the solution does not have any adverse effects on protection coordination.	We have engaged with the protection team and they have not indicated any initial issues.	G
R22	WS2	Open	Solution fails, causing unplanned outages.	We will install additional circuit breakers that enable the FLCB to be remotely bypassed and isolated to minimise the risk of unplanned outages in the event that it fails.	N/A this period.	G
R23	WS2	Open	Solution is not suitable for general population of UK Power Networks sites due to operational or physical space constraints.	We have already completed a preliminary feasibility study on a sample of LPN sites, and will complete a feasibility study on a sample of LPN, EPN, and SPN sites as part of the project.	N/A this period.	G
R24	WS3, WS4	Open	BAU method cost is higher than expected.	If we discover any issues that could increase the BAU method cost to the point where the project business case is no longer viable, we will assess whether the project should be halted or de-scoped.	N/A this period.	G
R25	WS1	Open	Equipment fails to pass high power type tests.	ABB and AMAT have both allowed adequate contingency to build another prototype, in the event that the device intended for the field trials fails catastrophically during type testing and cannot be salvaged.	4 of 5 type tests passed. Internal arc withstand will be re-tested.	G
R26	WS2	Closed	Unable to find a suitable site for substation trial.	If we are unable to find a suitable site in LPN (e.g. there are sites that would be suitable for a BAU deployment but not suitable for a trial for business/commercial/safety reasons), we will also consider sites in SPN or EPN that have similar operational and/or physical constraints as typical LPN sites.	This risk is closed as a trial site has been selected within LPN.	G
R27	WS4	Open	Learning from the project is not disseminated effectively to the DNO community.	We will benchmark our knowledge dissemination strategy against other projects and other DNOs to ensure its effectiveness.	N/A this period.	G

Ref	WS	Status	Description	Mitigation/Planned Action	Current Status	RAG
R28	WS4	Open	Solution is not approved by UK Power Networks.	We will involve key UK Power Networks stakeholders to champion the design and specification of the solution to ensure that it is accepted.	Key UK Power Networks stakeholders (i.e. technical experts) are forming an internal working group to discuss issues that may arise in the BAU adoption of FLCB technology.	G
R29	WS3	Closed	Solution is not accepted by customers.	We will engage with customers to understand their requirements and motivations, and ensure the solution is designed to meet their needs.	The customer based solution for M2 was removed from the scope of the project.	G
R30	WS2	Closed	Delay and/or cost overrun – civil works.	We will leverage the expertise of our in-house capital delivery teams to ensure that all site works are well managed.	Civil works completed this period	G
R31	WS2	Open	Delay and/or cost overrun – electrical installation works.	We will leverage the expertise of our in-house capital delivery teams to ensure that all site works are well managed.	See R17 for the delay in electrical installation works.	A
R32	WS1	Closed	Project kick-off delayed by negotiations with project partners.	We have agreed heads of terms and scopes for collaboration agreements with all project partners before full submission.	AMAT withdrew from the project and ABB have signed the collaboration agreement.	R
R33	WS1, WS2	Open	Project delivery team lacks necessary technical expertise.	We have engaged technical experts within the business to serve as the project design authority. We will also engage an expert on power electronics to provide assurance on ABB designs and specifications.	We are working closely with any relevant business units where necessary.	G
R34	WS2	Open	Delay and/or cost overrun – commissioning.	We will leverage the expertise of our in-house capital delivery teams to ensure that all site works are well managed.	Commissioning team is engaged with the project and resources assigned. The required time might be longer than initially planned.	G
R35	WS3	Closed	Delay and/or cost overrun – customer engagement/recruitment.	We will leverage the expertise of our in-house capital delivery teams to ensure that all site works are well managed.	WS3 was removed from scope of project as it was related to M2.	G
R36	WS2	Closed	ABB-provided (conventional) circuit breakers do not comply with UK Power Network's requirements.	We have allowed adequate contingency for UK Power Networks to supply approved circuit breakers, which would be connected to the FLCB by joggle panels[1].	The CBs used in the project are retrofitted from existing ones and we have used the same supplier for the retrofit before.	G
R37	WS3	Closed	Delay in contract phase with the customer.	Shortlist a number of potential customers should the customer withdraw from the project. Engage with the customer and legal team early to allow sufficient time for contracts to be drawn up.	WS3 was removed from scope of project as it was related to M2.	G

[1] Joggling is a metalworking technique to attach two metal sheets together. It is an offset bending process in which the two opposite bends are each less than 90°, and are separated by a neutral web so that the offset (in the usual case where the opposite bends are equal in angle) is less than five workpiece thicknesses. Often the offset will be one workpiece thickness, in order to allow a lap joint, which is smooth on the 'show-face'.

Ref	WS	Status	Description	Mitigation/Planned Action	Current Status	RAG
R38	WS1	Closed	Unable to sign contract with Method 2 supplier.	Find an alternative supplier. Efforts were made to find an alternative supplier but were unsuccessful. The decision was made to remove Method 2 from the project and a change request was submitted to Ofgem. We are awaiting official response from Ofgem but has been agreed in principle.	Method 2 is removed from the project.	R
R39	WS2	Open	Delay in delivery of retrofitted CBs.	We have allowed adequate time contingency for ABB UK to supply approved circuit breakers.	The CB retrofit is complete and ready to be delivered to site.	G
R40	WS2	Open	Delay in completion of electrical design (CPP).	Close support of the electrical design team from the project team. Monitoring of progress and assistance from the supplier.	Electrical design completed in this period. The risk remains open for any changes that might be identified during commissioning.	G
R41	WS1	Issue	Delay in testing and/or FAT of FLCB device.	Change order of type tests depending on what is causing the delay.	This risk has become an issue due to the original high power test laboratory having a fault with the generator required for the type testing. Due to the long lead time (3-4 months) for repair of the generator, an alternate high power test laboratory has be booked. This will minimise the impact on the readiness of the FLCB for delivery to site.	R

12. Material change information

No material changes have been encountered during this reporting period and none are foreseen for the next reporting period.

13. Other information

Currently there is no other information to report to Ofgem.

14. Accuracy assurance statement

The project has implemented a project governance structure as outlined in our innovation policies and procedures that effectively and efficiently manages the project and all its products. All information produced and held by the project is reviewed and updated when required to ensure quality and accuracy. This report has gone through an internal project review and a further review within UK Power Networks to ensure the accuracy of information.

We hereby confirm that this report represents a true, complete and accurate statement on the progress of the Powerful-CB project in its fifth six-month reporting period and an accurate view of our understanding of the activities for the next reporting period.

Signed 

Date 11/06/2019

Suleman Alli
Director of Safety, Strategy & Support Services
UK Power Networks