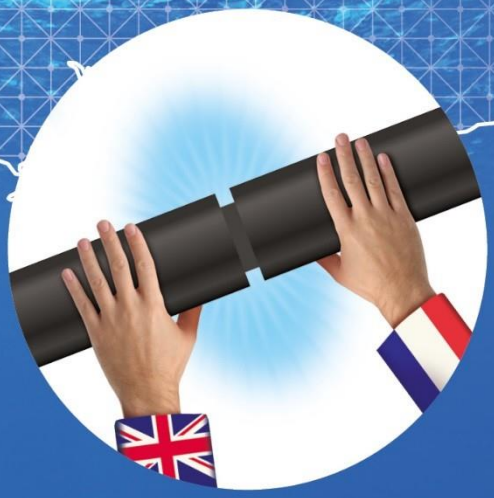
Réseau de transport d'électricité

TRANSMISSION INVESTMENT

ARE



FAB

France Alderney Britain Interconnector

Supply Chain Plan

September 2016

Co-financed by the European Union
Connecting Europe Facility

The information presented in this document is for information only and was correct at time of publication. It is subject to change and clarification. FAB Link Ltd takes no liability for any use that may be made of the information provided.

The European Union is not responsible for this publication nor for any use that may be made of the information contained therein.

Company Name	FAB Link Ltd
Authorised Representative	James Dickson
Address	17th floor, 88 Wood Street, London, EC2V 7DA
Contact number	+44 20 3668 6684
Email	james.dickson@transmissioninvestment.com
Alternative contact	Michael Carter
Alternative contact number	+44 20 3668 6694
Alternative email	michael.carter@transmissioninvestment.com

RESPONSIBILITY	NAME	DATE
Author	Michael Carter	05 September 2016
Checked	James Dickson	05 September 2016

REVISION NUMBER	DESCRIPTION	DATE
Draft Rev 1	First draft	05 September 2016
V2 Final	Final Version	18 November 2016

Contents

APPENDICES:

1. EXECUTIVE SUMMARY

The FAB Link project (www.fablink.net) ("the Project") is in development by FAB Link Ltd in Britain and Alderney, together with RTE (www.rte-france.com) in France. FAB Link Ltd is a joint venture company incorporated in Guernsey and is 50% owned by Transmission Investment LLP (www.transmissioninvestment.com) and 50% owned by Alderney Renewable Energy (www.are.gg). The Project has achieved a number of significant milestones including:

- being recognised as a Project of Common Interest and being awarded development funding under the Connecting Europe Facility and;
- receiving Initial Project Approval under the UK interconnectors "Cap and Floor" mechanism.

The Project is on target to achieve its non-recourse financial closing (for FAB Link Ltd) and final investment decision (for RTE) at the end of 2017, with construction starting shortly thereafter. The Project is based upon 2x700MW HVDC symmetrical monopole ±320kV VSC converter stations and has a target to enter commercial operation at during 2021.

It is envisaged that the Project will comprise the following elements[1], with FAB Link Ltd ownership covering items (i) through to the point that (vi) leaves Alderney territorial waters:

i) AC switchgear at the existing 400kV Exeter substation and AC cables from the substation to the British converter station.
ii) An AC/DC converter station in Britain.
iii) Onshore DC cables to the British landfall point.
iv) Offshore DC cables between Britain and the Channel Island of Alderney.
v) Onshore DC cables across Alderney.
vi) Offshore DC cables between Alderney and the French landfall point.
vii) Onshore DC cables from the landfall point to the French converter station.
viii) An AC/DC converter station in France
ix) AC cables between the French converter station and the existing 400kV substation at Menuel.

[1] Accompanied by fibre optic cables

This FAB Link Ltd Supply Chain Plan sets out the contribution to the industrial supply chain supporting the electrical interconnector sector under the headings (i) competition, (ii) innovation and (iii) skills. In this context the primary characteristics of the Project are that:

- It is the first privately developed UK interconnector granted an IPA[2] under the Ofgem cap and floor regime that will be project financed.
- It will provide for the possible future connection for the Race Tidal (Alderney)[3] renewable generation project.
- It will encourage innovation, particularly in the installation of submarine cable in high tidal energy environments and the further development of multi-terminal HVDC technology.

The procurement process for the main EPC contracts is underway. This document is based upon currently available information and strategy and is subject to change and will therefore evolve over time.

[2] Initial Project Assessment: see link: https://www.ofgem.gov.uk/sites/default/files/docs/2015/07/ipa_decision_july_2015_0.pdf

[3] http://www.openhydro.com/download/OPENHYDRO-RACE-TIDAL-PROJECT-FACT-SHEET.pdf

2. COMPETITION

"Support the development of competition in supply chains"

This section describes the measures the Project is taking in order to expand the potential suppliers to the Project and enhance competition in the procurement process.

2.1 Independent Interconnector Project

Interconnectors by their nature inherently encourage enhanced competition and liquidity to the markets being connected. However, the Project is the first brought forward by private developers to be granted its Initial Project Assessment (IPA) under the Ofgem Cap & Floor Regime. As such it is a new-entrant to the market in its own right. This combined with the fact that the FAB Link Ltd assets will be financed through construction and into operation through a non-recourse project finance process means that this innovative project will provide project finance lenders with opportunities to access a hitherto closed market in this form.

The cost benefits to the customer of this model would only be demonstrated post construction but the expectation is that the cost and business model will be competitive with the incumbent interconnector projects.

A report conducted by Poyry for Ofgem in 2014[4] showed that based upon a near-term cost benefit analysis the Project had a significant overall total welfare impact. The addition of the Project to the suite of interconnector projects under development increases competition in the industry on the interconnector projects and supply chain side.

2.2 Procurement Strategy

As the FAB Link Ltd assets that are the subject of this supply chain plan will be financed through non-recourse debt, this limits the procurement strategy options to Engineer, Procure, Construct ("EPC") style contracts, this is so that debt providers have confidence that the majority of construction risks are taken by the contractors. However, this style of contract is common for a project of the size and complexity of the Project regardless of financing arrangements.

[4] https://www.ofgem.gov.uk/sites/default/files/docs/2014/12/791_ic_cba_independentreport_final.pdf

Studies and Preliminary Design

EPC style contracting puts a heavy onus on suppliers to fully understand the scope of work, prepare preliminary designs and verify feasibility during the tendering phase. In order to enable bidders to provide bids with performance, schedule and price certainty, the developers are carrying out relatively detailed studies and investigations to inform the invitation to negotiate. These include:

- Preliminary survey to inform selection of submarine cable route
- Desktop studies to identify existing seabed use and other constraints to cable route options;
- Identifying a preferred submarine cable route;
- Detailed submarine surveys of the selected submarine cable route including bathymetric, geophysical, UXO and geotechnical;
- Metocean studies to understand the marine environment in which the suppliers will need to be able to operate;
- Burial assessment study to determine preliminary cable protection requirements;
- Assessment of available cable protection technologies including cast-iron shells alone or in combination with rock-berms;
- Identifying the AC system interface requirements with RTE and National Grid;
- Determining onshore cable routes and preparing preliminary trench designs, joint bay locations and identifying third party infrastructure and;
- Topographic, geophysical and geotechnical surveys of the converter station sites.

EPC Overview

The physical assets for the Project are to be procured through EPC type contracts, these contracts will constitute the vast majority of the final value of the Project. FAB Link Ltd and RTE will procure these contracts following a single open procurement process that will be compliant with the European Union Utilities Contracts Directive as enacted in under French law (Ordonnance n° 2005-649 – 6th of June 2005 and Décret n°2005-1308 – 20th October 2005)

2014/25/EU. The EPC procurement will be split into two main contracts, one for the HVDC

cables and one for the Converter Stations[5]. These OJEU notices for these contracts have been published, the details of which can be found in Appendix D.

The future contracts are set out as follows:

Part B – HVDC Converter Stations and UK AC Connections	Part A – HVDC Cables
Two HVDC converter stations at Menuel on the Cherbourg Peninsula and in the area around Exeter Airport, south Devon	25 km onshore DC cables in France
400kV switch-bays at Exeter substation	30km offshore DC cables between France and Alderney
5km 400kV AC underground cables between converter station and NGET substation	1 km onshore cables across Alderney[6]
Maintenance / Service	140km offshore DC cables between Alderney and Britain
	20km onshore DC cables in Britain
	Maintenance / Service

Note – all quoted distances are approximate

This split of contracts is designed to ensure the Project can be project financed (by keeping the packages large enough for liquidated damages to cover lost revenue due to contractor delays) whilst ensuring a good level of competition. Opportunity is provided to suppliers to offer technically and economically optimised solutions.

[5] This contract will also include the UK HVAC land cables and substation connection works. The French HVAC cables package will be covered under an RTE framework contract.

[6] There are also Options in the cable contract to connect to the Alderney terminal.

The key dates in the process are:

Milestone	Timing
Initial Supplier Engagement	Q3 2015
Issue Pre-qualification Questionnaire (PQQ)	Q1 2016
Receive PQQ	Q2 2016
Decide Pre-qualified bidder list and issue Invitation to Negotiate (ITN)	Q3 2016
Receive tenders	Q4 2016
Contracts effective (Notice To Proceed)	Q4 2017

Supplier Engagement

FAB Link Ltd and RTE have carried out a supplier engagement process designed to:

- Ensure the anticipated supplier base is aware of the Project and prepared for the planned procurement process;
- Ensure key technical challenges are highlighted to give suppliers the maximum opportunity to participate;
- Understand the strengths and weaknesses of suppliers and constraints in the market;
- Encourage emerging suppliers to participate through their inclusion in the engagement process.

PQQ Process

The PQQ process is complete and was open to any company worldwide who wished to participate. It was advertised in the Official Journal of the European Union (OJEU).

The criteria for determining the list of pre-qualified bidders was set out in the questionnaire and each successful bidder showed that they:

- have proven technology and manufacturing experience for an equivalent project;
- have suitable financial capacity to take-on the risks and liabilities of an EPC contract of equivalent scale; and
- have demonstrated experience of undertaking an EPC contract of an equivalent scale and complexity in Europe or otherwise outside their home region.

Prospective tenders that did not successfully comply with the specific PQQ requirements tended to be due to either non-compliance in the area of sub-marine cable manufacturing capability for the HVDC cables package or due to the lack of a successfully commissioned similar project for the VSC converters package.

ITN Process

The Invitation To Negotiate was issued at the end of July 2016. In order to deliver a fair and non-discriminatory process to all Tenderers, strict confidentiality and communication protocols will be adhered to by FAB Link Ltd and RTE. Tenderer information events and site visits are planned in accordance with these procedures.

2.3 Technology Choices

Part B: Converter Stations

There are two current technologies for the implementation of HVDC transmission systems. These are:

- Line Commutated Converters (LCC) based on thyristor technology; and
- Voltage Sourced Converters (VSC) based on Insulated Gate Bi-polar Transistors (IGBT's)

LCC converters have been manufactured since the 1980's and are a mature technology for long distance high power DC links. VSC converters have been in production since the late 1990's and to date have been used primarily for lower power interconnectors. More recently, larger VSC interconnectors have been built, for example France-Spain (2 x 1,000MW).

For the Project, the preferred technology is VSC due to the grid connection requirements for the Project. An advantage of VSC converters is the simpler design of the converter transformers which should enable a wider supplier base than might be the case for the more specialist transformers in an LCC solution. VSC converters also need fewer or no filters and therefore require less land than the equivalent LCC converter. A further advantage of VSC is that it enables the use of either XLPE or MI cables, whereas LCC converters are unproven with XLPE due to the need to reverse polarity to achieve a reversal of power direction.

Part A: Cables

There are two main types of cable in use for HVDC applications:

- Mass Impregnated (MI) and;
- Cross-Linked Polyethylene (XLPE).

MI cables have been in reliable service for over 50 years. XLPE has a long service record in AC applications and has been in use for DC applications at lower voltage levels for 15 years. More recently XLPE has been used in high voltage applications (up to 320kV) and is considered to be proven technology at that voltage. The Project considers 320kV to be the

highest proven DC voltage for XLPE.

The operating voltage for the Project has therefore been selected to allow either cable technology (MI or XLPE) to be employed and hence maximise the competition for the supply of cables. This is important as the capacity of submarine cable factories is limited and the market very active. To meet the Project's planned construction schedule it is considered essential to maintain as many manufacturing options as possible. XLPE cables are expected to be cheaper than MI for the Project.

2.4 Procurement in place as at time of writing

The following main work elements have been contracted for:

Marine Surveys

A geophysical reconnaissance survey was conducted by iXSurvey (having been selected by competitive tender) in mid-2014. Following on from this, a contract was entered into by FAB Link Ltd in August 2015 with Swedish survey company MMT AB to conduct the detailed marine surveys. This contract was tendered through the OJEU process, the details of which can be found in Appendix B. The bathymetric, geophysical, benthic (marine biological) and geotechnical surveys are complete. This package of work was required to feed into both the permitting and procurement processes.

Marine Consultancy Services

Wood Group Kenny have been the Marine Engineering Advisors to FAB Link Ltd since 2013 and to date have advised on:

- Establishment of parameters for marine engineering design and route analysis and refinement;
- Support during the reconnaissance marine survey and subsequent main marine survey.

This contract was tendered through the OJEU process, the details of which can be found in Appendix A.

Environmental Consultants

RPS conducted the initial environmental work for FAB Link Ltd and, their scope of work to early 2016 included;

- Conducting a selection process for the UK landfall and UK converter station;
- Leading a selection process for the UK onshore cable route;
- Identifying and documenting environmental constraints and describing environmental impacts of the UK and Alderney portions of the Project;
- Preparing the onshore environmental screening report for the UK and Alderney portions of the Project.

An OJEU tendering process was conducted in Q1 2016 to appoint onshore and offshore environmental consultants to conduct the environmental studies and permit applications. RPS and Intertek were appointed as onshore and offshore consultants respectively. The OJEU details can be found in Appendix C.

Draft environmental reports have been issued for public consultation that cover both onshore and offshore elements of the project.

Land Agents

Dalcour McLaren are the UK onshore land agents appointed for the UK portion of the Project, their scope of work includes:

- Advising on land use constraints;
- Negotiating land rights agreements with landowners
- Arranging access for cable route assessments and surveys.

Project Counsel

Linklaters were appointed after a competitive tending process conducted in Q1 2016 to provide legal support to the Project. Legal services are exempt from the OJEU process.

FAB Link Ltd has also been supported to date by other legal counsels, accountants, macro-economic study consultants, engineering, regulatory, public relations and other specialist support as required. The following additional main items of support are currently identified as envisaged for the project to complete the development phase:

- Engineering consultancy support (lenders technical advisor, owners engineer)
- Project financing support (lenders legal, technical & insurance advisor etc)

2.5 Support of New Entrants

The supplier engagement process and PQQ criteria were designed to encourage emerging suppliers to participate in the EPC Contracts for execution of the Project. Outside the usual European group of converter and cable suppliers, prospective suppliers include Chinese, Japanese and Korean businesses.

These emerging suppliers were encouraged, where appropriate, through the PQQ criteria to partner with installation and civil engineering contractors who have experience delivering EPC projects in Europe, in order to ensure credible proposals that would gain them entry to the ITN process.

2.6 Improving Awareness

Awareness of the Project and the necessary supply chain is promoted through:

- OJEU notices;
- Information provided on FAB Link Ltd & RTE websites;
- Public consultations associated with the Project consenting;
- Promotion of the Project through the PCI or CEF funding processes;
- Direct supplier engagement.

2.7 Removing Barriers to Entry

Alderney Race Tidal Project

The Project is independent from the ARE Race Tidal generation project. The scope of the Project is solely the “two ended” link between Britain and France, however it is an ‘enabling’ project which would (subject to a separate planning process) create the opportunity for a future project to build an AC/DC converter on Alderney and allow renewable generation in Alderney waters – the location of one of Europe’s best resources for tidal-stream power – to access markets in Britain and/or France. In addition, through the sharing of information on offshore conditions, for example, the two projects assist in removing barriers to entry.

3. INNOVATION

"Support innovation in supply chains"

This section describes the measures the Project is taking in order to promote research and development into innovative technologies, installation methods, procurement practices, in order to deliver the Project more efficiently and minimise costs for consumers, within the constraints introduced by a project financed process which generally limits the project to selecting proven technology.

3.1 Metocean & Tidal Studies

The extreme nature of the currents around Alderney drives a need for good quality data as an input to the submarine cable engineering. Modelling of the metocean conditions was carried out by Caen University in early 2015. An additional study was commissioned from DHI Water Environments (UK) Ltd to produce a metocean model of the English Channel that combines hydrodynamics and wave conditions to inform the cable stability design criteria.

3.2 Submarine installation in High Tidal Zones

Rock Placement, Rock berm design & Post installation stability studies

The seabed conditions along parts of the proposed submarine cable routes are expected to be unsuitable for cable protection by burial. It is therefore expected that sections of the route will need to be protected by mechanical means including by rock placement. In itself this is standard industry practice, however the design, installation and maintenance of a rock berm in the challenging tidal conditions of the Alderney race requires additional consideration.

The laying of the cable in high metocean conditions, keeping it in situ while it awaits stabilisation by rock placement, ensuring the rock placement does not damage the cable and aspects associated with the stability and life of the rock berm itself has all formed part of initial study to set out the Project specifications and will feed into detailed discussions with suppliers in due course.

Cable Stabilization: Cast Iron Shell design

The Project is considering alternative solutions for the stabilisation and protection of the submarine cables such as extra heavy cast iron shells as an alternative to rock placement. The development of this solution would include the development of machines to install cast-iron shells on the vessel. A method would have to be developed to ensure the weight of the shells would be borne by the cable laying vessel and not by the cables themselves.

3.3 Landfall Techniques

FAB Link Ltd has worked closely with UK and Alderney statutory stakeholders such as Natural England, Alderney Wildlife Trust, Alderney Society and the Environment Agency and the local district and town councils to ensure impact of the landfall works will be minimised and due consideration of the peak tourist season is given. The details are yet to be established, however, horizontal directional drilling is the preferred solution and if so would demonstrate the feasibility of this established technique in challenging conditions.

3.4 UK onshore routing design & flood alleviation synergies

FAB Link Ltd has been liaising closely with the Environment Agency to ensure any proposed routing of the underground onshore cable route will be selected to be synchronous with future proposals for managed river realignment for flood alleviation for the River Otter valley. Furthermore, a key local landowner is closely involved in providing guidance on the suitability of the underground cable route to ensure minimal impact upon the day to day working of their large estate which includes numerous sustainability and conservation initiatives. There are a number of other stakeholders involved closely with the selection of the preferred onshore underground route.

3.5 Marine survey

The marine survey programme was structured such that the geophysical, cone penetration test (CPTs) and vibrocores data from the survey was processed and used to inform the subsequent rock core geotechnical programme that followed on from this. In doing so, it was possible to reduce the programme of rock cores required and consequently to reduce costs.

3.6 Project Finance for Cap & Floor supported project

FAB Link Ltd will be the first counterparty taking a Cap & Floor project forward through project financing. Consequently, the finer details of the Cap & Floor regime will be tested for bankability and the requirements associated with the full suite of revenue generating arrangements will be considered in a full lenders' due diligence process.

As a single stand-alone project, rather than part of a portfolio, FAB Link Ltd will look carefully at the EU and UK changing regulatory and market conditions for interconnectors, particularly regarding the route to market, firmness obligations and onshore capacity restrictions. This may lead to innovation and technical and/or operational decisions based upon this due to the

nature of the Project.

3.7 Multi-Terminal Converter Station project

Multi-terminal HVDC interconnectors are rare and designing multi-terminal links capable of power reversal is complex. In the future the tidal generation project could drive the development of multi-terminal capability. Multi-terminal capability is a step towards the development of DC grid systems, considered to be a significant for the long-term development of interconnected grid systems.

In the event that a future terminal is purchased through a competitive process it is possible that this could lead to a "multi-vendor" outcome. In order to enable the supply of the third terminal by a different supplier, it is necessary to specify the control systems interfaces. Ideally this would be done through development of a common standard (such as through IEC) and the development of such a standard is underway. Understandably this is a slow process and no standard is in place currently. The approach is therefore to require the successful supplier of the two-terminal interconnector to design and document the required interface to a third terminal. This interface specification would then be used by the supplier of the third terminal in its design. The Project benefits, through RTE's participation, from the innovation driven by the Best Paths project[7] whose focus is multivendor interoperability of HVDC VSC systems.

[7] http://www.bestpaths-project.eu/en/demonstration/demo-2

4. SKILLS

Support the development of skills in supply chains

This section describes the measures FAB Link Ltd is taking in order to assess and prepare for the skills required in order to complete the development, construction and operation of the Project.

4.1 Development

FAB Link Ltd has a dedicated team of experienced individuals focussing on the development of the Project to a FAB Link Ltd financial close and RTE final investment decision. In partnership with RTE, and through the support of consultants and other service providers the skills required to progress the Project are brought to bear as and when required. FAB Link Ltd is of the view that the skills are in place in the majority of the main potential counterparties to progress the Project, namely EPC contractors, permitting bodies & competent authorities, OFGEM and prospective project financiers.

FAB Link Ltd is an active member of the Renewables UK Consents & Licensing Group and the Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) hosted by The Crown Estate. These groups have enabled the Project to develop and share industry best practice experiences with regards consenting onshore & offshore cables and associated infrastructure. FAB Link Ltd plays an active part in the development of the regulatory regime and is actively involved in industry consultations and current events.

FAB Link Ltd is actively involved in the planning process for the South Inshore and the South Offshore Marine Plan Areas (Draft plan objectives and vision, MMO, March 2015), including attendance at a stakeholder workshop in Plymouth in July 2016 to ensure proposed route of the Project is incorporated into the proposed plans.

4.2 Construction

The arrangements for the construction phase are still under discussion, although the expectation is that any FAB Link Ltd contribution to the overall Project construction management team will be assembled from internal and external sources in the lead up to the start of construction.

4.3 Operation

One of FAB Link Ltd's shareholders is an experienced asset manager of transmission assets, and runs the connections to 1,060MW of offshore wind generation in the UK. The approach to

operations management of the interconnector and commercial sales of capacity and ancillary services is yet to be determined. Any FAB Link Ltd efforts in this regard will most likely be sourced from a combination of internal and external contributors.

APPENDIX A:

OJEU Notices for Marine Consultancy services

APPENDIX B:

OJEU Notices for Marine Survey Works

APPENDIX C:

OJEU Notices for Environmental Consultancy

APPENDIX D:

OJEU Notices for EPC Contracts