FINANCING

Electricity Interconnectors and offshore transmission in the EMEA region

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Contents

Introduction

While interconnection is not a new technology; the first UK-France HVDC interconnector became operational in 1961 , it is only in recent years that the sector has seen renewed interest, innovation and investment. The trend has primarily been driven by cross-country trading, a requirement and desire to geographically diversify power generation due to the increased penetration of intermittent renewables, and the emergence of ever larger offshore windfarms requiring significant submarine connections. Such large windfarms also reinforce the need to have interconnection between markets, given the amount of bulk power they deliver.

In Europe in particular, interconnectors are seen as fundamental for Europe's energy market to operate as efficiently as possible, allowing countries to share surpluses of renewable electricity and provide balancing services.

Still, a combination of adverse investment conditions and regulatory ambiguity with a general lack of incentives has led to interconnection levels lagging behind targets.

Separately, driven by the developments in the offshore wind space and enabled through regulatory changes, offshore wind transmission infrastructure has become an asset class in itself.

Considering the co-location of interconnectors and large offshore wind farms in the North and Baltic Seas, as well as the cost impact of exporting electricity over longer distances, there is logic in exploring future hybrid, offshore grid solutions which drive efficiencies, simplify connections and enable economies of scale.

As investment in renewable technologies further accelerates and regulators and industry come together to find investment-enabling business models, we expect to see an increased focus on and accelerated rollout of new interconnectors.

In this paper, we explore some of bankable business models for these technologies and provide commentary form a commercial bank perspective.

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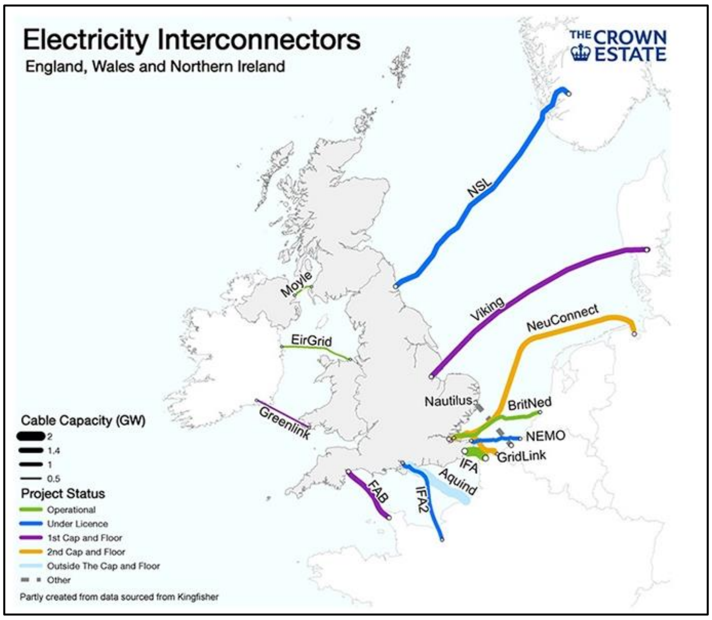
Regions

The UK

Britain's electricity market currently has 4GW of interconnector capacity including 3GW to mainland Europe, 500MW to Northern Ireland and 500MW to the Republic of Ireland. Additionally, there are a large number of new interconnectors with up to 14GW of capacity at varying stages of development.

The interconnection with both Ireland and mainland Europe is considered fundamental in the UK's current and future energy market, as it provides the ability to import balancing power reducing the reliance on carbon emitting peaking plants, as well as export surplus electricity during times of high renewables output.



Source: The Crown Estate

Previously, the Projects of Common Interest status of interconnectors has helped to facilitate investment in projects between the UK and mainland Europe. In addition to the simplified development requirements, the European Energy Programme for Recovery has awarded over €100 million to support GB interconnection (12% of funding awarded).

Looking ahead, one of the key challenges facing UK's interconnectors is the uncertainty posed by Brexit around the UK's future relationship with the EU's Internal Energy Market. The UK is already physically connected to Europe by a series of cables and pipelines which supply a significant proportion of the country's energy.

> *During the current Transition Period, the UK is still part of the EU's Internal Energy Market which was designed to integrate EU wholesale power markets by making capacities implicitly available on exchanges, rather than explicitly auctioning them to users. In case of a "no-deal" Brexit however, the UK would become a third country exiting the EU's Internal Energy Market and existing interconnectors would no longer be treated as EU interconnectors. This means that interconnectors and UK-based transmission system operators ("**TSOs**") - including National Grid - will have their certifications revisited and may have their status amended to reflect the less favourable trading terms afforded by the EU to third countries.*

The future relationship with the EU's Internal Energy Market will be less of a concern for offshore wind transmission assets owners and developers, although they too will be monitoring Brexit development due to general issues around trade and regulation. Offshore wind transmission assets in the UK have become an asset class in their own right, supported by the offshore transmission owner ("**OFTO**") regime.

Mainland Europe

For Europe, the benefit of interconnected grids is clear – certain geographies such as those with ample sunshine and high temperatures are better suited for solar generation; a windy coastline with a solid and shallow seabed is best suited for offshore wind farms; and a mountainous region lends itself to hydro storage. Interconnection allows countries to share these resources, building on their geographical advantages while reducing the need for local back-up generation.

As such, interconnectors are a key focus for the European Council which is aiming for interconnection of at least 10% of each member state's installed electricity capacity by 2020, rising to 15% by 2030. To encourage development, interconnectors are recognised as Projects of Common Interest by the European Commission which means that they enjoy some key benefits such as accelerated planning and permitting procedures, a single national authority for providing permits, streamlining of environmental assessment procedures, and access to financial support by the Connecting Europe Facility. Still, investment is lagging behind targets and to date, only 17 out of 28 member countries are on track for their interconnection targets.

An increasing capacity of interconnectivity is being installed across the North Sea, with Germany leading the way on HVDC export systems for offshore wind farms. Currently, offshore wind connections in the North Sea are still dominated by radial, single connector type connections. This has been mainly due to legal, regulatory, financial and market barriers. However, regulators and lawmakers are actively looking at this area, hoping to enable better integration and closer cooperation going forward. Looking ahead, we expect this to become a key area of interest in the region.

Mediterranean Basin and Sub-Saharan Africa

A fully integrated energy market between Europe and the rest of the Mediterranean basin could facilitate the harmonious development of renewable energy sources (solar in particular) of the South which have a comparative advantage with the resources being ample to meet national needs as well as those of European countries that are prepared to pay a premium for clean energy. Policymakers are actively looking at ways to integrate the electricity systems around the Mediterranean Basin, to help improve stability and promote larger uptake of renewables from countries in Northern Africa. The Union for the Mediterranean provides a forum for such political cooperation to promote the economic integration across 15 countries in the EU's south and North Africa.

The energy systems of many African countries are still dominated by fossil-fuels and Sub-Saharan Africa in particular continues to suffer from huge deficits in the supply and distribution of energy. However the continent's endowment of renewable energy sources and the interconnectivity of the regional power systems have the potential to solve some of the energy access problems. The common power grid such as the Southern African Power Pool (SAAP) continues to be the most advanced regional power pool in Africa connecting the hydro-rich countries in the North and thermal-rich South Africa. Such interconnectivity should help to increase accessibility and optimise the use of electricity in the region.

Business Models and Trends

Cross-border interconnections traditionally operate under incentive regulation. Thus one the largest challenges with cross-border interconnections is that each end of the interconnector falls under a different and separate regulatory and/or licensing regime. While some markets, such as the EU, have tried to align regimes to simplify business models, trading, and licencing requirements, divergence in other areas such as the Mediterranean basin and the UK (particularly in the case of a no-deal Brexit) provide challenges for developers and financiers. Below, we focus on two successful business models suitable for project financing and conclude with the concomitant challenges we face in financing them.

The Cap and Floor Regime

In the EU, some progress has been made to align standards and simplify the requirements for developers but the market remains a long way from being truly integrated and interconnected. Most interconnectors are in fact being financed on a fully regulated basis by a TSO. However more recently, enabled by amendments to national regulations, we have seen an emergence of new merchant interconnector projects.

Merchant interconnectors, who are permitted by regulatory exemptions to trade on a merchant basis, generally base their business cases on price arbitrage and congestion charges. While some projects have been successful, development of new merchant interconnectors has proven challenging as the regulatory frameworks typically favour TSOs. From a commercial bank perspective, too, merchant projects remain difficult as banks grapple with merchant power risk, unable to take a long-term view on uncontracted trading revenues.

In 2014, the UK introduced a new, separate regulatory regime for interconnectors to encourage investment in new projects by the developer and finance communities. As such, the UK now offers two routes for investment: (i) through the cap and floor regime, and (ii) by exemption from regulatory requirements as a merchant project. Under the cap and floor regime, revenues are both limited to the upside by a cap, and supported on the downside by a floor (subject to a minimum level of availability), providing a level of revenue certainty. This downside protection is one of the key features in the model which enables banks to consider project lending.

The Nemo Link, the 1GW electrical interconnector between the UK and Belgium, was one of the first projects to employ this scheme when it was awarded in 2014. The project successfully reached project completion and commercial operation has started in January 2019. The following are all subsequent projects which have similarly been awarded a cap and floor regime with operation being expected to start between 2020 and 2022:

- NSL project to Norway
- Viking Link project to Denmark
- IFA2 project to France
- FAB Link project to France
- Greenlink project to Ireland

Despite the success of interconnectors brought forward under well-regulated models, or by TSOs, new projects face a number of financing challenges which need to be overcome to make new projects bankable. This includes uncertainty around Brexit, currency exposure, regulatory misalignment between regimes, as well as wider regulatory uncertainty driven by ever increasing pressure by regulators on developer returns and allowable costs.

Key Risks to be considered in Interconnector Financing

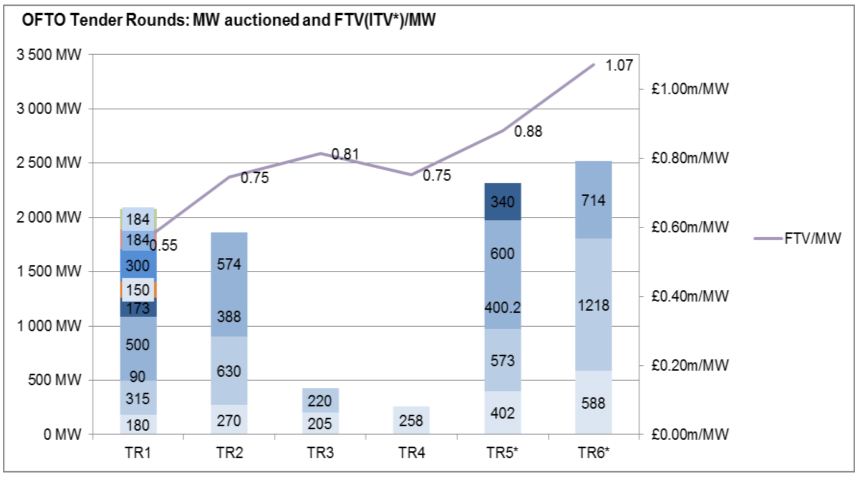
➢ Construction risk	➢ Operational risks
➢ Market risks	➢ Technology risks
➢ Counterparty risk	➢ Incentive mechanism
➢ Regulatory risk and alignment of regimes	➢ Currency risks
	➢ Brexit

Overall, we see significant opportunity in this sector, but any interconnectors considering project finance need to be well structured and have strong contractual protections against downside revenues.,

The OFTO Regime

In the UK, offshore transmissions are developed under the OFTO regime – a third party model whereby the OFTO transmission systems operate independently from the onshore transmission system, though they are still regulated by the same entity (Ofgem). The regime has proven to be a success since its initial launch in 2009 and the assets have attracted significant interest from the investor community by offering solid returns with a relatively low risk profile and under a stable regulatory framework. Total investments have amounted to over £3bn towards these assets to date through 6 rounds of tenders across 24 projects.

In the recent TR5 and TR6 tender rounds, as much as 2.3GW and 2.5GW was auctioned respectively as Transfer Values[1]* per MW have almost doubled since TR1, showcasing the increasing cost of transmission assets, as projects increase in size and move further offshore.



Source: Ofgem, MUFG analysis

Under the current regime, there is the possibility to have tenders for a generator-build (the generator finances and constructs the transmission assets before transferring those assets to an OFTO for the operational period) or an OFTO-build (OFTO appointed through a tender for constructing and operating the transmission assets). However, all of the projects to date have been procured based on the former with each being constructed with point-to-point connection between the offshore wind farm and onshore connection point.

With the increasingly ambitious offshore wind targets, government has recognised the need for a more efficient delivery of transmission connections and, in July 2020, has launched a BEIS-led review of the existing regime with the aim of releasing their findings by the end of 2020. Considering the popularity of the OFTO regime with financiers and the continuing roll out of offshore wind farms, we are watching this space closely.

Connections were traditionally dominated by High Voltage Alternating Current (HVAC) cables due to the trusted technology for control and protection, as well as ease of connection, voltage transformation and circuit interruption. However there has been a shift towards High Voltage Direct Current (HVDC) cables which offer lower losses and less space requirements in long distance and high voltage applications. HVDC converter costs tend to be higher but as the power and distance increase, these become more competitive. There are, however, a few challenges which will need to be overcome before HVDC can become the standard.

Industry limits for cables have consolidated around an export capacity of 900MW. While larger export cables may be deliverable in theory, there are both industry and technology constraints with only a limited number of players in the industry capable of delivering large scale projects. At the same time, offshore wind projects are getting larger every year, even if developers tend to breakdown their single developments across phases.

From a financing perspective, we have seen a naturally cautious approach being taken by banks to the first few HVDC cables in the market due to the lack of track record of installations in a submarine environment. However the sector appears to quickly be overcoming those concerns, with HVDC now expected to become the standard for most large offshore projects, particularly as distance from shore increases and supply chain develops.

While the market has adapted to new technologies on single connections, only limited steps have been taken to support integrated grid infrastructure structures connecting multiple offshore windfarms or even direct connections with cross-border interconnectors.

Going forward, we expect to see regulatory changes in regulatory regimes which could result in a shift towards more integrated and also hybrid grid solutions which combine offshore grid connections with cross-border interconnectors.

[1] As measured by the Final Transfer Value (FTV) for TR1 to TR4, and Developers Initial Transfer Value for TR5 and TR6. FTV is Ofgem's final assessment of the economic and efficient costs, while ITV is the developers' initial estimate.

Financing considerations

Energy markets are quickly evolving, and changing in ways which are hard to predict. Policymakers, developers, network operators and utilities all have a key role to play in ensuring the successful development of the interconnector market. If the aim is to unlock investment by private sector then stakeholders need to give upfront consideration to what is required in order to develop an investable project, as interconnectors carry both opportunities and challenges for financiers.

While some regimes, such as the UK's OFTO regime have considered mechanisms to enable the project financing of transmission assets, other regimes were born out of traditional regulatory models best suited for assets to be financed on the balance sheets of existing TSOs.

Projects also need to exhibit stable and predictable cash flows if they want to enable financings on a limited-recourse project basis. Considering the long-term nature of interconnection projects together with regulatory uncertainty and volatility of both price and demand for electricity, only those projects supported by solid regulatory regimes make viable candidates for project finance. Specifically, the regulatory regimes need to be both transparent and reliable with adequate risk protections, setting out clearly a framework to allow for review and readjustment of the parameters used for tariff calculation, and reflection of capex in the tariff through RAV accretion.

Key requirements for third party, private capital include, inter alia:

- ✓ a balance of cost, risk and uncertainty in the contractual arrangements underpinning the project;
- ✓ an adequate level of policy support and certainty;
- ✓ an attractive, investable revenue structure;
- ✓ a deliverable debt package;
- ✓ a level of equity balanced against the level of control required; and
- ✓ an understanding of how proven and reliable the technology is.

On the project side, developers need a detailed capex program with a clear allocation of risks, as well as a clear de-levering strategy (in terms of Net Debt/EBITDA and Net Debt/RAV) during the loan life. This needs to be supported by satisfactory downside sensitivity analysis to assess parameters such as interest cover ratios during the loan tenor, leverage ratio at the debt maturity and payback period.

Commercial bank financing has been deployed successfully on a number of cross-border interconnectors and many offshore wind connectors, but only limited to those jurisdictions which have an enabling regulatory regime with successful track record. Deepening existing interconnection will certainly be the key to enabling efficient electricity markets with high levels of renewable penetration, while efficiencies could be gained through close cooperation and better planning. At MUFG we are following the interconnector and offshore wind connector markets closely as we recognise the benefits of interconnected electricity markets.

Highlights

- ➢ Commercial bank financing has been deployed successfully on a number of cross-border interconnectors and many offshore wind connectors, but only limited to those jurisdictions which have an enabling regulatory regime with successful track record.
- ➢ The UK's OFTO regime has proven to be a success since its initial launch in 2009 and assets have attracted significant interest from the investor community.
- ➢ Currently, offshore wind connections in the North Sea, including the UK, are still dominated by radial, single connector type connections but looking ahead, we expect to see more coordination including hybrid projects integrating offshore wind transmissions into interconnector grids.
- ➢ Interconnection with both Ireland and mainland Europe is considered fundamental in the UK's current and future energy market.
- ➢ The UK's Cap and Floor regime provides a framework for new interconnectors, which has a number of key features that enable banks to consider project lending to projects.
- ➢ The uncertainty caused by Brexit and membership of the EU's Internal Energy Market is one of the key challenges facing new UK interconnectors with mainland Europe.
- ➢ On the technology side, HVDC is expected to become the standard for most large offshore projects,
- ➢ Looking ahead, we expect an increased focus on and accelerated rollout of new interconnectors.

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