AQUIND Limited

AQUIND INTERCONNECTOR

Needs and Benefits Report

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CONTENTS

BOXES

PLATES

APPENDICES

EXECUTIVE SUMMARY

The changing nature of consumer electricity demand (for example from electric vehicles, electric heating and air conditioning) means that the total demand for electricity in Great Britain (GB)[1] is expected to grow in the future.[2] Meanwhile, the decarbonisation agenda is driving a rapid shift in the generation mix, with an increasing penetration of intermittent renewable generation such as photovoltaics ('PV') and wind. Both factors drive a need for a stronger electricity transmission network to enable electricity to flow from generation sources to the final users.

Electricity interconnectors are a key part of this transition: they are physical transmission assets that enable electricity to flow between regions. Their key benefits include:

- Enabling cheaper sources of generation to be utilised and shared across borders by connecting countries with different sources of electricity supply, thus reducing total cost of meeting a given level of electricity demand.
- Increasing competition among generators in the electricity markets, thus reducing electricity prices for end users.
- Contributing to the security and flexibility of the electricity system by responding to fluctuations in supply and demand and providing a source of supply at times of system stress.
- Helping integrate renewables by providing an export route at times of excess intermittent generation and thus reducing overall carbon emissions. This is increasingly important as Europe increases its deployment of renewable intermittent generation, the supply of which fluctuates significantly.

Recognising the benefits that electricity Interconnectors can bring, both the UK Government and European Union ('EU') policy-makers strongly support further increases in existing Interconnector capacity through regulatory arrangements (e.g. Cap and Floor in GB and the Cross Border Cost Allocation ('CBCA') process in the EU) as well as explicit EU targets for electricity Interconnection and financial support (e.g. Connecting Europe Facility).

Interconnectors are a well-established feature of electricity markets in Europe. GB is currently connected by five existing Interconnectors to France, Ireland, the Netherlands and Belgium with a combined capacity of 4,500 Megawatts ('MW'), with an additional connection between Scotland and Northern Ireland (with a capacity of 500 MW). A further nine Interconnectors (in addition to AQUIND Interconnector) are currently being planned to be developed by 2025

[1] Whilst NI is part of the UK, a single electricity market operates on the island of Ireland encompassing NI and Ireland
[2] National Grid (2019). 'Future Energy Scenarios'.

between GB and neighbouring countries, amounting to more than 10 Gigawatts ('GW') of additional capacity.

Once operational, AQUIND Interconnector ('the Project') would add to the existing capacity by providing an additional 2,000 MW[3] of interconnection between France and Great Britain. It will be able to transmit up to 16,000,000 Megawatt hours ('MWh') of electricity per year, which equates to approximately 5 % of the UK's current annual total electricity consumption,[4] enough to meet the electricity needs of over 5 million households each year.[5]

AQUIND Interconnector has been awarded the status of a Project of Common Interest[6] ('PCI') by the European Commission ('EC') and approved by the European Parliament[7] which recognises that the Project will:

- have a significant positive impact on energy markets and market integration;
- boost competition on energy markets; and
- help the EU's energy security and contribute to climate and energy goals by integrating renewables.

Whilst Interconnectors are not directly listed among the types of energy infrastructure that are assigned the status of Nationally Significant Infrastructure Project ('NSIP') under the Planning Act 2008, the UK Government has directed[8] that the Overarching National Policy Statement for Energy (NPS EN-1) should apply to the Project. As such, the Project "*is to be treated as development for which development consent is required*".

The Project will raise investment from the market sources without upfront contribution from British networks users and have a total upfront investment cost of €1.4 bn and an expected operational lifetime of 40 years. During the first 25 years of its operation, it is expected to deliver net socio-economic benefits to Europe of €1.3 bn (in present value terms and net of the development, capital and operating costs associated with the Project). The Project will benefit the UK on all aspects of the "energy trilemma" by **reducing wholesale electricity prices** (delivering a total benefit of €2.2 billion for GB consumers), by enhancing the **security**

[3] Each circuit will have the export capacity of 1037.5 MW and the import capacity of around 1000 MW, net of transmission and conversions losses. Such an arrangement provides at least 50% power, as the two circuits are designed to be completely electrically independent, with no overlapping equipment or services. Throughout this Application, the Project's capacity is referred to as 2000 MW.
[4] Based on a current final consumption level of 300TWh. Source: 'Digest of United Kingdom Energy Statistics' (2019) Chapter 5 - Electricity, page 80.
[5] Based on a weighted average of the UK Profile Class 1 household medium usage of 3100 kWh/year and of the UK Profile Class 2 household medium usage of 4200 kWh/year. Source: Office for Gas and Electricity Markets (2017). 'Typical Domestic Consumption Values'.
[6] The PCI list is updated every two years in accordance with Regulation (EU) 347/2013
[7] Commission Delegated Regulation (EU) 2018/540 of 23 November 2017, Annex VII, Part B, Item 1.7.4, available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.090.01.0038.01.ENG&toc=OJ:L:2018:090:TOC
[8] Direction issued under section 35 of the Planning Act 2008 relating to Aquind Interconnector, 30 July 2018

of supply (€333 m benefit from reduced Expected Energy Non Served[9]) and by helping **renewables integration** (reducing in renewables curtailment by 6.2 Terawatt hours ('TWh')). In addition, it is expected to support the System Operator by providing **ancillary services**, generate **tax revenue** for the Treasury and create **new employment opportunities** during the construction and operation of the asset.

[9] Expected Energy Not Served represents is the amount of electricity demand that is expected not to be met by generation in a given year, and is used to therefore measure security of supply in the electricity sector.

1. INTRODUCTION AND CONTEXT

1.1. OVERVIEW OF AQUIND INTERCONNECTOR

1.1.1.1. AQUIND Interconnector will be a high voltage direct current ('HVDC') power transmission link with a net transmission capacity of 2,000 MW connecting the British and French transmission systems.

1.1.1.2. With commissioning expected in 2023, AQUIND Interconnector will significantly increase the transmission capacity on the congested GB-French border. GB and France are currently connected by only the 2,000 MW IFA Interconnector, built in the 1980s using technology that has since been superseded by more advanced Voltage Sourced Converter technology. Two further interconnectors at the same border are currently under construction – IFA2 and ElecLink – with a capacity of 1,000 MW each. AQUIND Interconnector will represent a significant step towards full market integration between GB and mainland Europe and will deliver considerable benefits to GB, France and Europe.

1.2. PURPOSE OF THIS REPORT

1.2.1.1. This 'Needs and Benefits Report' demonstrates the needs case for the Project from the UK perspective. It presents the overarching need for increasing electricity interconnection between the UK and the neighbouring countries, and the positive contribution that AQUIND Interconnector brings in terms of the socio-economic benefits, energy security and wider benefits of the Project.

1.3. STRUCTURE OF THIS REPORT

1.3.1.1. This report is structured as follows:

- Chapter 2 – The need for AQUIND Interconnector: Sets out the need for more GB interconnection and the specific need for AQUIND Interconnector and the benefits arising from the Project.
- Chapter 3 – Policy and Legislation: Sets out the relevant UK Government Policy for nationally significant energy infrastructure projects (notably NPS EN-1) and the support expressed by the UK Government in relation to electricity Interconnectors. The section then addresses current EU Policy and the potential implications of Brexit.
- Chapter 4 – Summary and Conclusions: Concludes that there is a compelling need for the delivery of the Project from a UK perspective.

2. THE NEED FOR AQUIND INTERCONNECTOR

2.1. INTRODUCTION

2.1.1.1. The UK's reliance on electricity is expected to rise significantly going forward to 2035 and beyond to 2050 – driven by a combination of moving away from the use of fossil fuels in order to meet climate change objectives, increased electrification of heat and transport as well as demographic changes and economic growth.

2.1.1.2. There are significant benefits from increasing the interconnection capacity between GB and other European countries. In particular, new interconnection can reduce the total costs of generation by improving efficiency of dispatch, reduce electricity prices for GB consumers, contribute to more secure supply of electricity and integrate renewables. As such, projects such as AQUIND Interconnector contribute to all three legs of the "energy trilemma": decarbonisation, affordability and security of supply.

2.1.1.3. AQUIND Interconnector is also expected to generate wider benefits for the UK by providing ancillary services to the National Grid ('NG') Electricity Systems Operator, generating tax revenue for the Treasury, creating new jobs and stimulating wider economic activity in the UK.

2.1.1.4. This section presents the need for an increase in interconnection capacity between GB and Europe (Section 2.2). It then sets out the quantified estimates of the positive impact of AQUIND Interconnector on the energy trilemma (Section 2.2), and finally its wider positive economic impacts (Section 2.3).

2.2. THE NEED FOR MORE GB INTERCONNECTORS

2.2.1.1. The need to build more Interconnectors between GB and Europe is well understood: it has been recognised by the UK Government and reflected in its policy, and it also aligns well with the current European Interconnector policies (see Section 3).

2.2.1.2. Recent quantitative studies have shown that additional GB electricity Interconnectors are highly desirable:

- National Grid has identified, in the two most recent Network Options Assessments, that the optimal level of interconnection from GB to France is 6.8 GW.[10]
- An independent report for Ofgem has found that interconnection between GB and France of 8.8 GW (including AQUIND Interconnector) would be socially beneficial.[11]
- The Office of Gas and Electricity Markets ('OFGEM') is, on the basis of

independent analysis, minded to award the Cap and Floor regime to two interconnectors (FAB Link and Gridlink), over and above the development of AQUIND Interconnector, IFA2 and ElecLink.[12] The Cap and Floor regime provides developers of energy projects to whom an award is made with a degree of price certainty designed to support and de-risk delivery of such projects.

2.2.1.3. Moreover, building additional interconnection would help the UK meet the EU-wide interconnection targets of 10 % of installed generator capacity by 2020 (and 15 % by 2030). As of December 2018, the UK falls short of this target by a significant margin: the installed UK-wide generator capacity stood at 82.9 GW[13], while Interconnector capacity stood at 4 GW (this excludes NEMO, which only became operational in early 2019), i.e. less than 5 %.This means that to deliver the 15 % target (or 12.4 GW interconnector capacity[14]) the UK would need to install by 2030 at least an additional 8.4 GW of interconnection (and probably even more if, in the interim, the installed generator capacity increased). Some Interconnectors are more advanced than AQUIND (or even operational such as NEMO) and are expected to deliver around 4.4 GW of interconnection capacity.[15] However, there is a residual gap to meeting the EU-wide targets that could be bridged by AQUIND Interconnector.

2.2.1.4. Overall, this demonstrates that developing additional interconnection between GB and Europe is attractive from both the economic and policy perspectives. The following sections focus on the specific benefits that AQUIND Interconnector can bring to the UK.

2.3. AQUIND'S ROLE IN RESOLVING THE ENERGY TRILEMMA

2.3.1.1. In the UK, the so-called energy trilemma - the triple challenge of making energy supply affordable, decarbonised and secure - has been a key driver of energy policy and investments. Electricity Interconnectors, and AQUIND Interconnector specifically, are essential to achieving these three frequently conflicting goals of energy policy: by reducing the total cost of generation, by helping renewables integration and by improving the security of energy supply. Insufficient Interconnector development would likely either make electricity supply more expensive due to more

[10] National Grid Electricity Systems Operator (2019), 'Network Options Assessment 2018/19', Figure 6.5 and National Grid Electricity Systems Operator (2018), Network Options Assessment 2017/8, Figure 6.3.
[11] Pöyry (2017) Near-term Interconnector Cost-Benefit Analysis: Independent Report (Cap & Floor Window 2). A Pöyry report for OFGEM. This analysis considered the incremental capacity of 1.4 GW (GridLink), over and above an assumed future capacity of 7.4 GW (which includes AQUIND)
[12] Office of Gas and Electricity Markets (2017) 'Cap and floor regime: Initial Project Assessment of the GridLink, NeuConnect and NorthConnect Interconnectors.' https://www.ofgem.gov.uk/publications-and-updates/cap-and-floor-regime-initial-project-assessment-gridlink-neuconnect-and-northconnect-interconnectors
[13] Department for Business, Energy and Industrial Strategy (2019). 'Digest of United Kingdom Energy Statistics', 5.7 Plant Capacity – figures for the UK. Page 90
[14] Calculated as 15% * 82.9 GW.
[15] These include: NEMO 1 GW, ElecLink 1 GW, IFA2 1 GW and NSL 1.4 GW.

generation being built than is necessary, less sustainable due to more reliance on fossil fuels, less secure, or a combination of these outcomes.

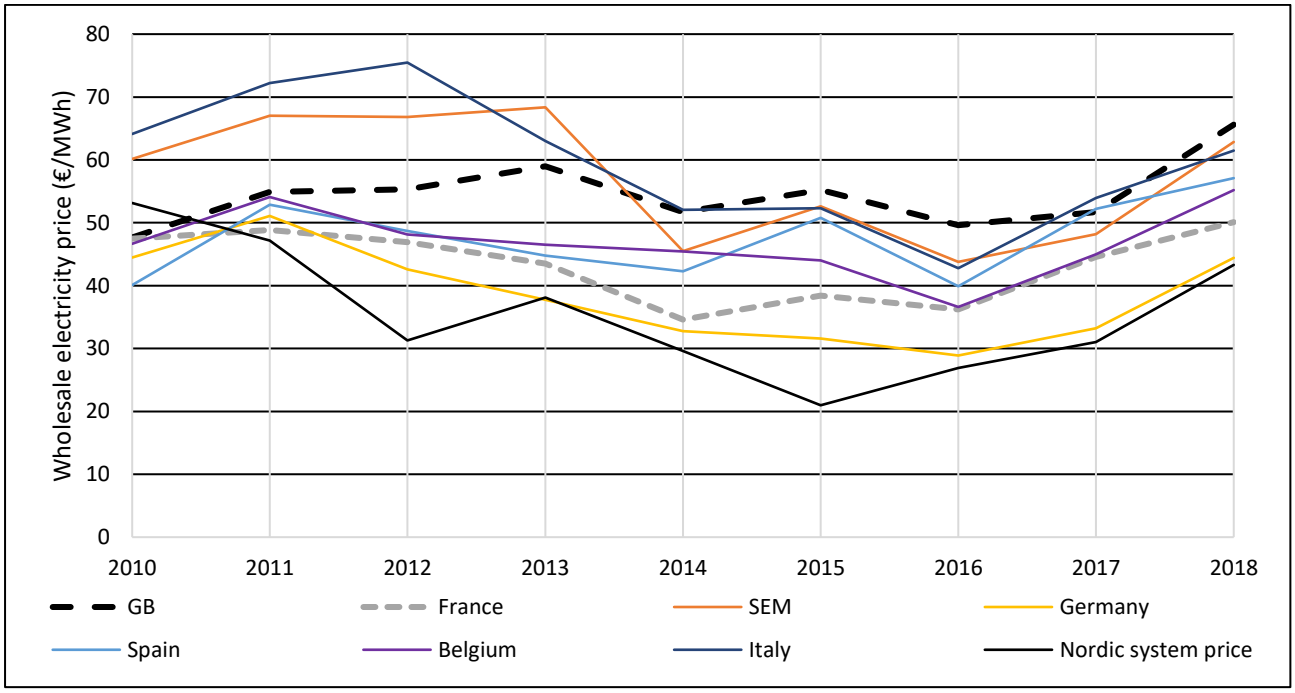
2.3.2. REDUCING ELECTRICITY PRICES FOR CONSUMERS AND INCREASING SOCIAL WELFARE

2.3.2.1. AQUIND Interconnector will provide three types of services:

- Transmission of electricity between GB and France and vice versa,
- Participation in GB capacity markets to enhance GB power system's ability to respond to system stress events, and
- Ancillary services such as reactive power, frequency control and others.

2.3.2.2. In the first fifteen years of its operation, French wholesale electricity prices are expected to be, on average, lower than the GB price (following the trend of the last eighteen years as shown at Plate 2-1. French energy producers will therefore be able to use AQUIND Interconnector to export power to GB, which will lead to lower wholesale prices in GB (with a consequent consumer benefit in the form of reduced consumer prices) due to the displacement of more expensive generation. The access of more suppliers to the GB market will also increase competition among GB generators.

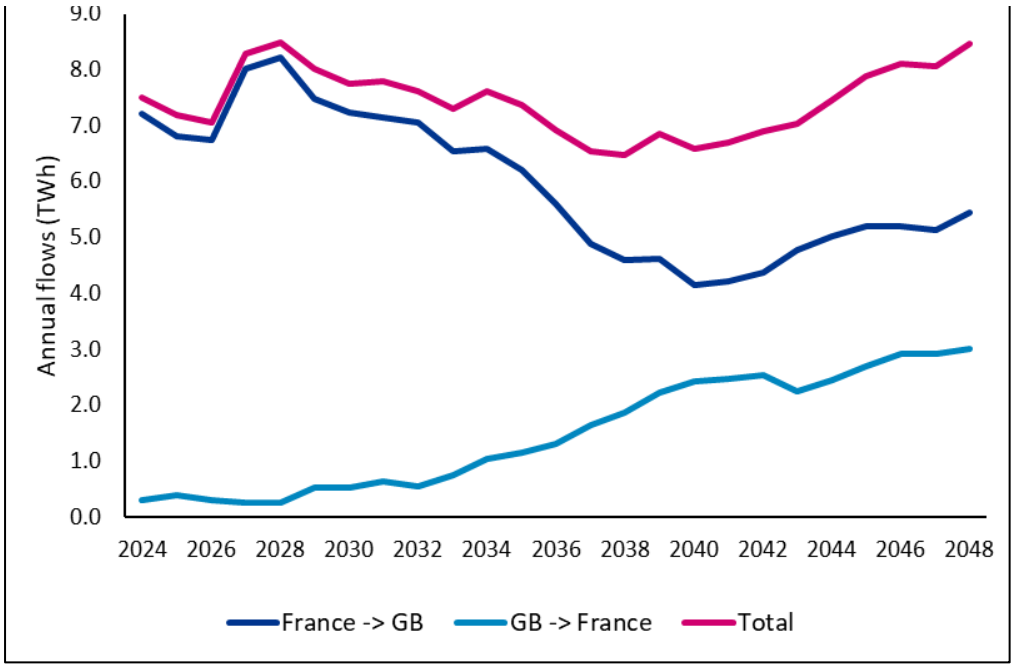
Plate 2-1 – Wholesale Electricity Prices in Key European Markets



Source: https://www.macrotrends.net/2553/euro-british-pound-exchange-rate-historical-chart

2.3.2.3. In the later years, the flows through AQUIND Interconnector in the opposite direction, i.e. from GB to France, are expected to grow in volume due to changes in generation mixes and demand profiles in the connected regions, as shown in Plate 2-2 below.

Plate 1-2 – Annual Flows across AQUIND, AQUIND Market Scenario



Source: Baringa analysis

2.3.2.4. Over the first 25 years of its operation, AQUIND Interconnector will reduce GB wholesale electricity prices, leading a consumer welfare benefit of £2.2 bn in present value terms.

2.3.2.5. The European Network of Transmission Operators ('ENTSO-E') Ten-Year Network Development Plan ('TYNDP') (2016), on the basis of which AQUIND was awarded the PCI status on the Third List, demonstrates that in two of the scenarios tested (Vision 3 and Vision 4), AQUIND Interconnector will create 120 (+ / -20) m € / year and 130 (+ / - 10) m € / year of social economic welfare benefits across Europe respectively[16] These two scenarios were used for the formal assessment of candidate projects by the EC.

2.3.2.6. In addition to reducing GB wholesale electricity prices, AQUIND Interconnector will be able to participate in the GB capacity market mechanism (assuming it will be

[16] European Network of Transmission Operators (2016). 'Combined TYNDP project fact sheets, Project 247 – AQUIND Interconnector'. https://docstore.entsoe.eu/Documents/TYNDP%20documents/TYNDP%202016/projects/TYNDP2016-project-sheets.pdf

reinstated following the current suspension). The GB capacity market is designed to procure capacity to be available to deliver an adequate level of security of supply, particularly under system stress events. This capacity is provided by flexible sources of generation (often gas or diesel peaker plants), storage or demand-side response on the basis of capacity contracts allocated to individual participants via an auction mechanism. Since 2015, Interconnectors have been allowed to participate in the GB capacity market auctions. As price-takers in these auctions (i.e. may only submit final bids at a price lower than a threshold set by the Secretary of State), Interconnectors have contributed to lower prices of capacity contracts, thus reducing the overall costs of electricity for consumers.

2.3.2.7. National Grid also procures various types of ancillary services on a bilateral basis and via public tenders, to support the operation and stability of the national transmission system. AQUIND Interconnector will be using a state-of-the-art Voltage Sourced Converter ('VSC') technology, which will enable the Project to provide a range of ancillary services to National Grid. As a result, AQUIND Interconnector will help introduce more competition securing better value ancillary services for consumers. National Grid recognised the potential of AQUIND Interconnector to provide voltage stability services, which will help avoid new capital investment in shunt compensation by National Grid, as well as frequency stability services at lower costs than existing sources.[17] By providing voltage and frequency response services, AQUIND Interconnector will also be able to play an important role in preventing and / or mitigating power interruption events similar to that on 9 August 2019.[18]

2.3.3. ENHANCING SECURITY OF SUPPLY

2.3.3.1. To have resilient and secure supply of electricity, the UK needs to have sufficient capacity to meet current and future demands at all times including a margin to accommodate unforeseen fluctuations in supply or demand and to mitigate against risks such as extreme weather events. The larger the margin, the more resilient the system will be.

2.3.3.2. AQUIND Interconnector will provide additional connection capacity of 2,000 MW. As such, it will be the largest new interconnector on the GB-France border. It will enable the UK to diversify its electricity mix by enabling more electricity to be imported from Europe. It will improve the UK's energy security by helping to meet the increasing demand for electricity and helping to mitigate the phasing out of coal power by 2025 and the closure of UK nuclear power plants due for retirement.

2.3.3.3. AQUIND Interconnector is a highly reliable source of supply and is projected to

[17] National Grid', (2017). 'SO Submission to Cap and Floor' https://www.ofgem.gov.uk/ofgem-publications/127664, p.10
[18] Dr Norman MacLeod, Widespread Power Interruption on 9 August 2019, available at https://www.linkedin.com/pulse/widespread-power-interruptions-friday-9th-august-norman-macleod/.

achieve over 98 % technical availability over the Project lifetime, significantly higher than most conventional thermal assets.

2.3.3.4. The Interconnector owner has a strong commercial incentive to make the Interconnector available to deliver power to those countries that experience a system stress event (which manifests itself in higher electricity prices). Thereby, AQUIND Interconnector provides a critical source of flexibility and support where there is unexpectedly high demand and / or low supply.

2.3.3.5. The Project itself is highly reliable from a technical perspective – more so than generating plants. It is designed as two symmetrical monopoles, each of which can operate independently from the other, which ensures its greater availability and reliability even in the case of damage to Marine or Onshore Cables.

2.3.3.6. The value of increased security of supply that AQUIND Interconnector delivers can be monetised in terms of the Project's impact on Expected Energy Not Served ('EENS') – which represents the amount of electricity demand that is expected not to be met by generation in a given year (thereby representing a metric for the security of supply in the electricity market). AQUIND Interconnector's modelling has quantified the EENS benefit through a 'Monte Carlo' simulation[19] of generation and transmission systems, simulated across several climatic years and estimated a total benefit of €333 m in present value terms over the 25 years of operation. AQUIND Interconnector will also contribute to system stability through the improved transient stability, voltage stability, and frequency stability of the power system in both GB and France.

2.3.4. INTEGRATION OF RENEWABLES

2.3.4.1. The UK will become increasingly reliant on renewable generation to meet its future electricity needs. In turn, this will require additional flexibility on the grid to ensure security of supply and system stability are maintained.

2.3.4.2. AQUIND Interconnector, like other Interconnector projects, can deliver the required flexibility to balance supply and demand, and thus facilitate the integration of renewable generation.

2.3.4.3. In the absence of the ability to store significant amounts of electricity, excess electricity from one location needs to be transported to another location or otherwise 'curtailed'. AQUIND Interconnector provides an alternative outlet for UK's renewable generation, and thereby facilitates the export of excess supply at times of high renewables generation that cannot be consumed domestically.

2.3.4.4. The ENTSO-E TYNDP (2016), showed that AQUIND Interconnector will have a positive impact on renewables integration of 1,330 (+ / - 440) GWh / year in Vision 3

[19] A Monte Carlo simulation is a mathematical technique that generates random variables for modelling uncertainty of a certain system.

scenario and 750 (+ / - 290) GWh / year in Vision 4 scenario.[20] In addition, AQUIND Interconnector was estimated to reduce CO_2 emissions by 700 (+/-100) kilotonnes (kt) CO_2/year in Vision 3 scenario and 900 (+/- 400) kt CO_2 / year Vision 4 scenario.[21]

2.3.4.5. The ENTSO-E TYNDP (2018)[22] provides additional confirmation of the benefits that AQUIND Interconnector is expected to deliver. The TYNDP 2018 analysis shows that AQUIND Interconnector will have a positive benefit on renewable integration, of 235,660 MWh / year on average in years from 2025 to 2030 and 186,820 MWh / year from 2030 in the Distributed Generation scenario, which has been used for the purposes of PCI assessment by the European Commission. The TYNDP results also show that AQUIND will reduce CO_2 emissions by 47 kt CO_2 / year from 2025 to 2030 and 43 kt CO_2 / year post-2030.[23]

2.3.4.6. The Applicant has modelled the impact of the proposed development on carbon emissions within the Environmental Statement Chapter 28 (Carbon and Climate Change) (document reference 6.1.28).

2.3.4.7. The Applicant's central scenario shows that AQUIND Interconnector will reduce renewables curtailment 6.2 TWh over the 25 year assessment period (in the central AQUIND Interconnector Market Scenario). In terms of carbon emissions, AQUIND Interconnector is estimated to help avoid at least 2.78 Mt (metric tonnes) CO_2 over the same period.

2.4. AQUIND'S WIDER BENEFITS

2.4.1.1. In addition to its contribution to decarbonisation, affordability and security of supply, AQUIND Interconnector is also expected to generate wider benefits for the UK by providing ancillary services to the NG Electricity Systems Operator, ('ESO'), by generating tax revenue for the Treasury, by creating new jobs and by generating wider economic activity in the UK.

[20] European Network of Transmission Operators (2016). 'Combined TYNDP project fact sheets, Project 247 – AQUIND Interconnector'. https://docstore.entsoe.eu/Documents/TYNDP%20documents/TYNDP%202016/projects/TYNDP2016-project-sheets.pdf The range of benefits of renewables integration included four estimates: <10 GWh/year in Vision 1; 840 (+/-560) GWh/year in Vision 2; 1,330 (+/-440) GWh/year in Vision 3; and 750 (+/-290) GWh/year in Vision 4.

[21] The change in total CO_2 emissions included four estimates: +1,600 (+/-300) kt CO_2 in Vision 1; +400 (+/-400) kt CO_2 in Vision 2; -700 (+/-100) kt CO_2 in Vision 3; and -900 (+/-400) kt CO_2 in Vision 4.

[22] European Network of Transmission Operators (2016). 'Combined TYNDP project fact sheets, Project 247 – AQUIND Interconnector'. https://docstore.entsoe.eu/Documents/TYNDP%20documents/TYNDP%202016/projects/TYNDP2016-project-sheets.pdf

European Network of Transmission Operators (2016). 'Combined TYNDP project fact sheets, Project 247 – AQUIND Interconnector'. https://docstore.entsoe.eu/Documents/TYNDP%20documents/TYNDP%202016/projects/TYNDP2016-project-sheets.pdf

2.4.2. ANCILLARY SERVICES

2.4.2.1. Ancillary services are services and functions, which extend beyond generation and transmission, provided to the Systems Operator that facilitate and support the continuous flow of electricity so that supply will continually meet demand.

2.4.2.2. AQUIND Interconnector is equipped with state of the art VSC technology which means that it will be able to provide valuable ancillary services to National Grid and RTE (the French transmission system operator).

2.4.2.3. AQUIND Interconnector considers that the VSC technology is preferable to Line Commutated Converter ('LCC'), which is an older conversion technology currently used on the existing interconnection between GB and France ('IFA'). Two main advantages of VSC are (i) lower harmonic emissions which make it easier to accommodate on the transmission networks and (ii) enhanced reactive power / voltage control functionality which provides the Transmission Systems Operators ('TSO') with greater flexibility of how they manage their networks. As a result, AQUIND Interconnector is expected to provide more flexible services compared to the existing IFA link.

2.4.2.4. The system operators will therefore have an additional lever to use when balancing the respective electricity grids in GB and in France. While the exact monetary value of those services is not possible to estimate at this moment, that fact has been recognised by the TSOs (notably NG ESO in the context of Window 2 Cap and Floor assessment).

2.4.3. TAX REVENUE

2.4.3.1. AQUIND Interconnector will be subject to all applicable taxes in the UK, including corporation tax and business rates associated with its converter station infrastructure.

2.4.3.2. Commercial owners or occupiers of properties in England are required to pay business rates, which are a form of taxation and established on the basis of the rateable value of the property. Business rates are estimated on the basis of the open market value of a property by the Valuation Agency Office. Since AQUIND Interconnector's Converter Station will be a bespoke asset, it is difficult to accurately determine the market value of this prior to the final stages of procurement, but it is expected to generate revenue to HM Treasury and thereby benefit UK taxpayers.

2.4.3.3. Overall, AQUIND Interconnector estimates that it will make around €101 m of tax transfers to HM Treasury over the first 25 years of operation.

2.4.4. NEW EMPLOYMENT OPPORTUNITIES

2.4.4.1. During construction, the Project will generate approximately 525 direct (i.e. those directly given employment opportunities from the Proposed Development) full-time equivalent ('FTE') jobs. Allowing for a rate of displacement of 25% the net direct construction employment would be approximately 394 FTE jobs.

2.4.4.2. The construction would also lead to increased economic activity in the local area in sectors that are not directly part of the transmission investment supply chain (for example catering and accommodation business for the construction workers).

2.4.4.3. Given the construction of the Project is relatively specialised (requiring specialist contractors) it is anticipated that a large proportion of the workforce would come from outside the local area, utilising and beneficially supporting hotels, guesthouses, restaurants and other services in the Portsmouth area.

2.4.4.4. A number of employment opportunities are, however, likely to be generated in the regional area, and therefore represent a positive regional economic effect for the local population during the construction phase.

2.4.4.5. Over the course of the construction period, AQUIND would therefore generate around 196 indirect and induced employment opportunities within the transmission supply chain in adjacent sectors.

2.4.5. WIDER ECONOMIC ACTIVITY

2.4.5.1. The employment generated by the construction of the Project will contribute to the Gross Value Added (GVA) in the wider economy. It is estimated that over the duration of the construction period the additional employment would result in GVA of £17.87 million per year for the duration of the construction phase. Taking into consideration the indirect and induced employment this would equate to GVA of £26.34 million per year for the duration of the construction phase.

2.4.5.2. The wages generated by the construction jobs are estimated to be in the region of £13.4 million per year over the duration of the construction period. Taking into consideration the indirect and induced employment this would equate to GVA of £18.15 million per year for the duration of the construction phase.

2.4.5.3. The development will have a total cost of €1.4bn (£1.2bn) representing significant investment in the UK's energy infrastructure, and is being developed without government subsidies.

2.4.5.4. Research by the Civil Engineering Contractors Association / Centre for Economics and Business Research has found that every £1bn of infrastructure construction increases overall economic activity by £2.84 bn.[1] While we recognise that this is a high-level estimate, it corroborates the expectation that the construction of a large-scale and capex-intensive asset such as AQUIND Interconnector will have economic repercussions that fall far beyond its immediate supply chain.

[1] Civil Engineering Contractors Association and Centre for Economics and Business Research (2018). 'The social benefits of infrastructure investment'. P.52. https://www.ceca.co.uk/wp-content/uploads/2018/12/Cebr-CECA-report-The-Social-Benefits-of-Infrastructure-Investment-FINAL-December-2018-compressed-2.pdf

3. POLICY AND LEGISLATION

3.1.1.1. Large-scale infrastructure developments such as electricity Interconnectors are underpinned by a complex set of policies implemented both at the UK and European level. These include renewable-supporting policies which indirectly influence the value that interconnectors capture in the wholesale electricity market, and direct policies that target the development of Interconnectors.

3.1.1.2. This section presents the policy and legislative drivers in the UK and in Europe that are most relevant for AQUIND Interconnector. The Applicant sets out, in turn:

- The UK Government Policy (including National Policy Statements);
- Wider support for Interconnectors expressed by the UK Government;
- Decarbonisation targets set at the European level;
- EU Interconnector policy; and
- The potential implications of Brexit.

3.2. UK GOVERNMENT POLICY

3.2.1.1. The UK Government energy strategy and policy is contained within a number of different documents. The most relevant ones include:

- In 2011, Overarching National Policy Statement for Energy (NPS EN-1),[24] which identified that new low carbon generation is required which is reliable, secure and affordable.
- In 2017, the Clean Growth Strategy articulated by the Department for Business, Energy and Industrial Strategy ('BEIS') indicated that it will support *"investment in new electricity interconnectors, which will help keep prices low for consumers, ensure a more secure grid and help integrate clean generation*"[25]
- In 2018, National Infrastructure Commission's ('NIC') National Infrastructure Assessment considered that "*interconnectors, of which there is a large pipeline of projects, are likely to become of increasing importance…"*[26]

[24] Department of Energy and Climate Change 'Overarching National Policy Statement for Energy (EN-1)'. July 2011.
[25] Department for Business, Energy and Industrial Strategy. 'The Clean Growth Strategy' (2017), Page 100
[26] National Infrastructure Commission 'National Infrastructure Assessment', (2018). Page 42

- In 2019, the UK's draft National Energy and Climate Plan ('NECP') indicated that the "*UK Government recognises a range of benefits that interconnection can provide […] it can improve security of supply [and] help with the integration of intermittent sources of energy".*[27]

3.2.2. NATIONAL POLICY STATEMENT FOR ENERGY (EN-1), 2011

3.2.2.1. AQUIND Interconnector does not currently fall within the existing definition of an NSIP, but the Overarching National Policy Statement for Energy (NPS EN-1) has effect.28 The Secretary of State ('SoS') has directed that:[29]

- the Proposed Development "*is to be treated as a proposed application for which development consent is required";* and
- *"the Overarching National Policy Statement for Energy (EN-1) has effect in relation to an application for development consent under this Direction in a manner equivalent to its application to development consent for the construction and extension of a generating station within section 14(a) of the Act of a similar capacity as the proposed project so far as the impacts described in EN-1 are relevant to the proposed Development".*

3.2.2.2. On this basis, AQUIND Interconnector will be treated in line with the policies set out in NPS EN-1 (insofar as they are relevant). The four key implications of the NPS EN-1 for AQUIND Interconnector are set out in turn below.

3.2.2.3. First, NPS EN-1 highlights that the UK's transition to a low-carbon economy can pose security of supply challenges:

- Meeting the UK's legally binding targets to cut greenhouse gas (GHG) emissions will require, amongst other measures, the electrification of much of UK's heating, industry and transport, which will in turn increase demand for electricity.
- To continue to have secure and reliable supply of electricity, the UK needs to have sufficient generation capacity to meet demand at all times including a 'safety margin' to accommodate fluctuations in supply or demand (EN-1 paragraph 2.2.20).
- The main objective of the GB energy regulator (OFGEM) is to protect the interest of GB consumers, including their interest in reducing carbon emissions and in security of energy supply (paragraph 2.2.4).

[27] Department for Business, Energy and Industrial Strategy (2019). The UK's Draft Integrated National Energy And Climate Plan (NECP)', p.32.
[28] The NPS EN-1 sets out the UK Government policy on energy and energy infrastructure development (Part 2) and the need for new nationally significant energy infrastructure (Part 3).
[29] Department for Business, Energy and Industrial Strategy (2018). 'Direction issued under Section 35 of the Planning Act 2008 relating to the AQUIND Interconnector'.

- A key security of supply challenge for the UK during the transition to a low carbon economy, is the *"requirement for substantial and timely private sector investment"* including in electricity networks (paragraph 2.2.25).

3.2.2.4. AQUIND Interconnector can help address all four challenges above, because it provides an additional source of electricity supply to meet growing demand, it enhances security of supply by providing an additional source of electricity when it is needed in GB and it enables renewable integration (and thereby reduces carbon emissions). AQUIND Interconnector also represents substantial private-sector investment in electricity networks in the UK.

3.2.2.5. Second, NPS EN-1 establishes the fundamental principles that the SoS, as a key decision-maker,[30] should apply in relation to NSIPs (which would also apply to AQUIND Interconnector). This is summarised in Box 3-1 below.

Box 3-1 Decision Making on New Nationally Significant Energy Infrastructure Projects[31]

"*The UK needs all the types of energy infrastructure covered by this NPS in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions.*

It is for industry to propose new energy infrastructure projects within the strategic framework set by Government. The Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.

The [SoS] should therefore assess all applications for development consent for the types of infrastructure covered by the energy NPSs on the basis that the Government has demonstrated that there is a need for those types of infrastructure and that the scale and urgency of that need is as described for each of them in this Part.

The [SoS] should give substantial weight to the contribution which projects would make towards satisfying this need when considering applications for development consent."

3.2.2.6. In addition, NPS EN-1 notes that the SoS should "*start with a presumption in favour of granting consent to applications for energy NSIPs*".[32]

3.2.2.7. The SoS is therefore required to assess AQUIND Interconnector on the basis that there is an established need for the Project and this should be given considerable weight in the decision-making process.

3.2.2.8. Third, NPS EN-1 emphasises that electricity is a critical and increasingly important component of the UK's overall energy needs, and that this drives an *"urgent need for new electricity NSIPs".* These are summarised in Box 3-2 below.

[30] Formerly the Infrastructure Planning Commission (IPC).
[31] Department of Energy and Climate Change (2011). National Policy Statement EN-1, p.16 paragraphs 3.1.1 – 3.1.4.
[32] Department of Energy and Climate Change (2011). National Policy Statement EN-1, p.44 paragraph 4.1.2.

Box 3-2 Urgent Need for New Electricity NSIPs[33]

NPS EN-1 sets out five key drivers of the urgent need for new electricity NSIPs:

Meeting energy security and carbon reduction objectives: there are benefits of having a significant surplus in capacity over demand ensuring resilience of the system in dealing with unexpected events and lowering the risk of a supply interruption, which helps protect consumers. There are also benefits of having a diversified mix of generation sources.

The need to replace energy generating capacity: there is a need to replace existing electrical generating capacity as a result of environmental regulation and ageing power stations. At the time of publication of EN-1 it was estimated that at least 22 GW of capacity would need to be replaced in the period to 2020.

The need for more electricity capacity to support an increased supply from renewables: whilst an increase in renewables is essential to meeting the UK's climate change commitments, some renewable sources such as wind, solar and tidal are intermittent and cannot be adjusted to meet demand. More flexible generating capacity is needed to provide backup at times when availability of intermittent sources is low.

Future increases in electricity demand: Electricity demand will continue growing as industry, heating and transport move away from fossil fuels to using electricity. Total consumption of electricity could "double by 2050" and the capacity of electricity generation "could need to triple" in order to be robust to intermittent electricity generation.

The urgency of the need for new electricity capacity: Based on the Updated Energy and Emissions Projections published by Department for Energy and Climate Change (DECC) in 2010, the NPS EN-1 estimated that a minimum of 59 GW of new electricity capacity would need to be built by 2025 (based on the capacity of 85 GW in 2011 for a total of at least 113 GW capacity in 2025).

3.2.2.9. NPS EN-1 is now eight years old and the exact figures are likely to be out of date, but the qualitative findings still hold: there is a growing need to deliver additional supply source to meet growing UK electricity demand and to help balance the potential fluctuation in supply from renewables. AQUIND Interconnector can provide GB consumers access to an additional source of electricity and, due to its flexibility, can help balance the growing renewable generation in GB.

3.2.2.10. Fourth, NPS EN-1 notes that new large-scale electricity generation capacity is not the only way to meet growing electricity demand. Alternative (or complementary) measures include reducing demand, smarter use of electricity and the interconnection of electricity systems.

3.2.2.11. Specifically on interconnection, EN-1 notes that the GB only had 4 GW of interconnection capacity (as of 2011), but new projects, including to Norway and Belgium, could increase this capacity to *"over 10 GW by around 2020".*[34] While this projection has not materialised, at least one of the projects has become operational: the NEMO interconnector between the UK and Belgium has been completed and a further nine Interconnector projects (excluding AQUIND) are in the pipeline in various stages of the development.

3.2.2.12. As a complement to the generation capacity, NPS EN-1 also notes that network infrastructure "*will add to the reliability of the national energy supply*" and "*provide crucial national benefits, which are shared by all users of the system*".[35] AQUIND Interconnector would be an example of cross-border network infrastructure that delivers these benefits to GB.

3.2.3. CLEAN GROWTH STRATEGY (2017)

3.2.3.1. The 2017 Clean Growth Strategy[36] sets out the BEIS policy to "*work to ensure significant private investment in new electricity interconnectors, which will help keep prices low for consumers, ensure a more secure grid and help integrate clean generation*". It indicates that by the mid-2020s there is the potential for 18 GW of interconnection, compared to 5 GW of interconnection capacity that is in place as of September 2019.

3.2.4. NATIONAL INFRASTRUCTURE ASSESSMENT (2018)

3.2.4.1. In 2018 the NIC[37] published the first National Infrastructure Assessment[38]. This identified and updated the conclusions of NPS EN-1 in relation to increasing demand for energy, suggesting that in the short term *"increasing population and electric vehicle uptake means that energy demand could increase by 9-26 per cent from today to 2030"*. The report recommends continuing to build more renewable energy generation for a cost-effective system in the future. It proposes that in 2050, the same energy services required now could be provided at the same cost by a low-carbon system. Notably, the report states that not all sources of supply need to be renewable.

3.2.4.2. It specifically recognises that "*interconnectors, of which there is a large pipeline of projects, are likely to become of increasing importance throughout this period, and the Government should ensure that the current pipeline is not affected by the UK's exit from the EU*". The NIC recommended that "*at least 50% of generation should be renewable in 2030*" but warns that if the future benefits of Interconnectors are not realised, then "*up to 65% of generation may need to be renewable to meet 2030 carbon targets*," which can make investments in renewable capacity and associated grid infrastructure less efficient and more expensive per MWh of electricity actually delivered to the consumer.

[33] Department of Energy and Climate Change (2011). National Policy Statement EN-1, p.17 paragraph 3.3.
[34] Department of Energy and Climate Change (2011). National Policy Statement EN-1, p.25 paragraph 3.3.33
[35] Department of Energy and Climate Change (2011). National Policy Statement EN-1, p.33 paragraph 3.7.3.
[36] HM Government (2017). 'The Clean Growth Strategy'.
[37] The NIC provides the government with impartial, expert advice on major long-term infrastructure challenges.
[38] 'National Infrastructure Assessment', NIC, July 2018

3.2.4.3. The NIC also identifies the need for more flexibility in the electricity system to match energy supply and demand. Flexibility through a variety of sources (including interconnection and storage) would reduce total energy system costs and help build robustness to adverse weather conditions. This is likely to be increasingly important in the future, as climate change poses challenges to our current forecasting capabilities.

3.2.5. NATIONAL ENERGY AND CLIMATE PLAN (2019)[39]

3.2.5.1. Most recently, the UK's Draft Integrated National Energy and Climate Plan published by BEIS described the UK Government's intention to continue cooperating with the neighbouring European countries in energy matters. In particular, the draft plan notes that the UK Government continues to be highly supportive of new private investments in interconnectors. In particular, the UK Government:

- Is looking to maintain efficient trade on Interconnectors: *"On energy, the UK is seeking cooperation with the EU to support the delivery of cost efficient, clean and secure supplies of electricity and gas, based on competitive markets and non-discriminatory access to networks. This includes a framework to facilitate technical cooperation between electricity and gas network organisations and agreement on mechanisms to ensure efficient trade over the interconnectors over different timeframes."*
- Recognises the benefits of Interconnectors, including improvements in the "*security of supply when market prices reflect scarcity and flows across interconnectors follow prices [and] integration of intermittent sources of energy and the associated system balancing."*
- Recognises that further interconnection can help address the challenges of the energy trilemma and that it *"supports projects which support these outcomes".*
- Considers that the supportive Cap and Floor regulatory regime has been instrumental in driving new investment in interconnection and that it "*will work to ensure significant private investment in new electricity interconnectors, which will help reduce prices for consumers, ensure a more secure grid and help integrate clean generation".*

[39] BEIS (2019). 'The UK's Draft Integrated National Energy and Climate Plan (NECP)'

3.3. OTHER UK GOVERNMENT SUPPORT FOR INTERCONNECTORS

3.3.1. PLANNING OUR ELECTRIC FUTURE: A WHITE PAPER FOR SECURE, AFFORDABLE AND LOW-CARBON ELECTRICITY (JULY 2011)

3.3.1.1. A White Paper[40], published at the same time as NPS EN-1, set out the energy challenges facing the UK, including the threat of existing plant closures, the need to decarbonise electricity generation, the likely rise in energy demand and the expectation that electricity prices would rise. The paper noted that interconnection has the potential to contribute to "*cost-effectively delivering security of supply*" through:[41]

- a more efficient use of available generation across countries;
- a cost-effective integration of low-carbon energy;
- increase competition and market participation among generators; and
- sharing of balancing and ancillary services over a large geographic footprint.

3.3.1.2. It concluded that "*current and future interconnection will continue to play a key role in providing secure and sustainable sources of electricity*".[42]

3.3.1.3. Although this White Paper is relatively dated, it indicates that the UK Government's understanding and recognition of Interconnector benefits is a long-standing feature and a robust driver of its policies. More recent papers described in this report further reinforce the UK Government's position.

3.3.2. MORE INTERCONNECTION: IMPROVING ENERGY SECURITY AND LOWERING BILLS (DECEMBER 2013)

3.3.2.1. The DECC Report "More interconnection: improving energy security and lowering bills"[43] set out Government's views on further interconnection. It confirms Government support for appropriate further interconnection and states that

> *"interconnection has the potential to contribute to Government's energy security, affordability and decarbonisation objectives, including through facilitating the single European electricity market. Government supports an appropriate increase in interconnection capacity through projects that efficiently deliver on these objectives*".

3.3.2.2. The report suggests that consumers could see benefits of more interconnection of up to £9 billion (net present value) to 2040 and that

> "*it is clear…that GB's security of supply would be enhanced by further interconnection providing that electricity prices reflect scarcity and interconnector flows reflect prices. Interconnection is also one of the technologies that can assist with the integration of further low-carbon generation*".[44]

3.3.2.3. The report also identifies that there are a range of benefits that interconnection can provide and states that

> *"it can enable the most efficient location of generation, increase competition and lead to reduced electricity bills. By giving access to generation beyond national borders it can improve security of supply, providing market prices reflect scarcity and flows across interconnectors follow prices. Interconnection can also help with the integration of intermittent sources of energy and the associated system balancing. It can also help provide ancillary services such as frequency response".*[45]

3.3.2.4. Chapter 4 of the report set out the Government's objectives for further interconnection, stating that the

> "*Government believes that further interconnection is likely to be beneficial for GB and GB consumers, as well as our European partners. It has the potential to contribute to the three pillars of our energy policy – affordability, security and decarbonisation, including through facilitating the single electricity market. We support interconnection projects which can efficiently support these outcomes*".[46]

3.3.3. GETTING MORE CONNECTED (2014)

3.3.3.1. At the time of introducing the Cap and Floor regime in GB, a National Grid paper highlighted that increasing interconnection of GB energy would be a

> "'*no regrets' investment by a wide range of informed stakeholders within the UK and beyond. This consensus includes the UK Government, the regulator, consumer organisations, green groups, think tanks, academics and the main European Union institutions."*[47]

3.3.3.2. The paper details four key benefits of greater interconnection: [48]

[40] Department for Energy and Climate Change (2011). 'Planning our electric future, a White Paper for secure, affordable and low-carbon electricity'
[41] Department for Energy and Climate Change (2011). 'Planning our electric future, a White Paper for secure, affordable and low-carbon electricity' p.78 Paragraph 3.2.59 and Box 7.
[42] Department for Energy and Climate Change (2011). 'Planning our electric future, a White Paper for secure, affordable and low-carbon electricity' p.135 Paragraph 9.2.11.
[43] Department for Energy and Climate Change (2013). 'More interconnection: improving energy security and lowering bills' p.4 paragraph 3.
[44] Department for Energy and Climate Change (2011). 'More interconnection: improving energy security and lowering bills'. P.4 Paragraph 4.
[45] Department for Energy and Climate Change (2011). 'More interconnection: improving energy security and lowering bills'. P.14 Paragraph 47.
[46] Department for Energy and Climate Change (2011). 'More interconnection: improving energy security and lowering bills'. P.17 Paragraph 56.
[47] National Grid (2014). 'Getting more connected', Page 3, 8-10, section 3.
[48] National Grid (2014). 'Getting more connected' Pages 2, 8-10, section 3.

- Decreasing consumer energy prices. "*each 1 GW of new interconnector capacity could reduce Britain's wholesale power prices up to 1-2%. In total 4-5 GW of new links built to mainland Europe could unlock up to £1 billion of benefits to energy consumers per year, equating to nearly £3 million per day by 2020."*
- Enhancing the security of GB energy. As the existing thermal capacity retires, greater interconnection can not only help secure additional capacity, but it can also play a role in "system balancing" as GB deploys more renewable energy.
- Helps integrate renewables. Interconnectors enable renewable electricity to flow between countries and "*could enable carbon and renewables targets to be met more cost effectively."*
- Boosting the wider economy. Electricity imports tend to reduce electricity costs, thus improving industry's competitiveness and reducing household bills. Conversely, exports give generators "*access a much wider consumer base across mainland Europe and thus earn additional revenues."*

3.3.4. SMART POWER (MARCH 2016)

3.3.4.1. The NIC's report, *Smart Power*, recommended that interconnection, storage and demand flexibility could save consumers up to £8 billion a year by 2030. In particular, the report noted that "*[i]nterconnectors offer a number of benefits to the UK and are a key source of flexibility to the electrical system."* [49]

3.3.5. NATIONAL INFRASTRUCTURE DELIVERY PLAN 2016-2021 (MARCH 2016)

3.3.5.1. The March 2016 National Infrastructure Plan published by the Infrastructure and Projects Authority reiterated the Government's support for interconnectors, noting: [50]

- *"the important role [interconnectors] play to support energy security, affordability and decarbonisation objective".*
- *the "Government has increased its ambition for greater electricity interconnection by 80%, now supporting at least an additional 9 GW of interconnection".*

3.3.6. 2016 SPRING STATEMENT

3.3.6.1. The UK Government endorsed the findings of 'Smart Power' in the 2016 Spring Statement by HM Treasury. It repeated the key findings that:[51]

[49] National Infrastructure Commission (2016). 'Smart Power' page 8.
[50] Infrastructure and Projects Authority IPA (2016). 'National Infrastructure Delivery Plan 2016-2021'. P.44, paragraphs 6.9 and 6.10.
[51] HM Treasury (2016). 'Budget Report' P.64, paragraphs 1.245 and 1.243

- *"the government recognises the important contribution interconnection can make to the future energy mix. There is a strong pipeline of projects in development, and the government supports the market delivery of at least 9 GW of additional interconnection capacity – an 80% increase on previous estimates";* and
- The government welcomes the "*opportunity to transform the future of the UK's electricity sector, saving consumers up to £8 billion a year*".

3.3.7. OVERSEAS ELECTRICITY INTERCONNECTION (FEBRUARY 2018)

3.3.7.1. In February 2018, the Parliamentary Office of Science and Technology published a report 'Overseas Electricity Interconnection', which assessed the Interconnector schemes already in operation and further planned Interconnector projects. The report identified multiple benefits including increased security of supply, increased resilience, greater flexibility in meeting variable demand, and the potential for price convergence between different national markets, leading to overall cost reductions.[52] The following benefits have been highlighted:

- Flexibility: "*New interconnector cables can accommodate changes in the amount of power flowing across them at very short timescales. This provides interconnected markets with a 'flexible' source of electricity, which can help ensure security of electricity supply cost-effectively, while reducing CO_2 emissions."*
- Cost reductions: "*Interconnection can be a cost-efficient method of providing electricity, as it can offset the need to build generating capacity and provides access to different sources of electricity from abroad."*
- Security: "*Interconnection can contribute to security of electricity across a range of timescales. Imports that are driven by long-term average price differences (such as differences in carbon prices) can help to meet total annual electricity demand. Interconnectors can also address risks to security of supply across shorter timescales (such as from change*s in wind output)."
- Reduction in curtailment of renewables: "*Without sufficient electricity storage or interconnection to move the power where it is needed, the excess electricity must be 'curtailed', or wasted."*

[52] Parliamentary Office of Science and Technology (2018). 'Overseas Electricity Interconnection' Pages 2 and 3.

3.4. CLIMATE CHANGE TARGETS

3.4.1.1. Climate change targets, whether at global, European and UK level, do not directly affect the development of Interconnectors in the UK. However, they underpin the UK's long-term ambitions to transition to a low-carbon economy. Deployment of intermittent renewable generation is, in turn, likely to increase the need for (and the value of) Interconnector projects such as AQUIND. In this section, we set out the two main supra-national frameworks that influence the UK's decarbonisation ambitions: the Paris Agreement of 2016 and the EU renewables targets.

3.4.2. THE PARIS AGREEMENT

3.4.2.1. The Paris Agreement[53] is an agreement within the United Nations Framework Convention on Climate Change that seeks to address GHG emissions mitigation, adaptation and finance. The Paris Agreement came into force on 4 November 2016 and, to this date, has been ratified by 185 of the 197 parties to the convention, including the UK.

3.4.2.2. The agreement is a main global climate change policy. It seeks to put in place measures for reducing global GHG emissions associated with human activity that would prevent global temperatures from rising above certain thresholds (1.5 - 2 ºC).

3.4.2.3. Only elements of the Paris Agreement are legally binding, but all countries, including the UK, must prepare national plans to achieve their intended GHG reduction targets (or 'contributions'). They must also report regularly on their emissions and the implementation of associated mitigation measures.

3.4.3. EUROPEAN RENEWABLES TARGETS

3.4.3.1. The EU has set climate and energy targets, including a target for reducing greenhouse emissions up to 2050. These are set out in the '2020 Climate and Energy Package'[54] and the 'Clean Energy for all Europeans Package'[55].

3.4.3.2. The '2020 Climate and Energy Package' set three targets in 2007, which were enacted in legislation through the Renewable Energy Directive (2009/28/EC) in 2009. Often referred to as the EU 20-20-20, the goals are:

- to cut GHG emissions by 20% (from 1990 levels),
- generate 20 % of energy from renewables, and
- deliver a 20 % improvement in energy efficiency.

3.4.3.3. In June 2019 the Climate Change Act 2008 (2050 Target Amendment) Order 2019 was brought into force, which legally committed the UK government to a shift from the 2050 target of an 80 per cent reduction in CO_2 from 1990 levels to a net zero target.

3.4.3.4. The Clean Energy for all Europeans package came into force in December 2018 which updated new EU renewables target to at least 32% by 2030; although these may be revised upwards by 2023[56].

3.4.3.5. The targets for renewable energy generation for each EU member state, under the Renewable Energy Directive, in order to achieve the 2020 and 2030 targets are different, reflecting the ability of different countries to generate renewable energy. The UK target is to meet 30 % of electricity demand from renewable generation by 2020 (compared to higher targets for example of 49 % in Sweden and lower targets of 10 % in Malta).[57]

3.5. EUROPEAN POLICY CONTEXT

3.5.1. PROJECT OF COMMON INTEREST (PCI)

3.5.1.1. The EC states that PCIs "*help the EU achieve its energy policy and climate objectives: affordable, secure and sustainable energy for all citizens, and the long-term de-carbonisation of the economy in accordance with the Paris Agreement*".[58]

3.5.1.2. PCIs are "*cross-border infrastructure projects that link the energy systems of European Union ('EU') countries."* They are to be given a priority status at national level and should be considered by the competent authorities as being in the public interest.

3.5.1.3. There is €5.35 billion in funding available for PCIs from the Connecting Europe Facility (CEF), intended to facilitate and speed up such projects.

[53] United Nations (2015). Paris Agreement,
[54] European Commission (2016). '2020 Climate and Energy Package' https://ec.europa.eu/clima/policies/strategies/2020_en

[55] European Commission (2016). 'Clean Energy for all Europeans Package' https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans
[56] European Commission (2018). 'Renewable Energy for all Europeans' https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive
[57] Renewable Energy Directive, European Commission (2019).'National Action Plans Progress Reports" https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive/overview

[58]European Commission (2019). 'Projects of Common Interest'. https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest/overview

3.5.1.4. PCIs are selected by twelve regional groups composed of representatives of Member States, the Transmission Systems Operators, project promoters, the EU Commission, the Agency for the Cooperation of Energy Regulators and the European Network of Transmission Systems Operators. PCIs are intended to support the EU's Trans-European Networks for Energy ('TEN-E') and help the EU achieve its energy policy and climate change objectives: affordable, sustainable and secure energy for all citizens and the long-term decarbonisation of the economy in accordance with the Paris Agreement. The PCI process is governed by Article 3(4) of the EU Regulation 347/2013, referred to as the TEN-E Regulation.

3.5.1.5. To become a PCI, a

> "*project must have a significant impact on energy markets and market integration in at least two EU countries, boost competition on energy markets and help the EU's energy security by diversifying sources as well as contribute to the EU's climate and energy goals by integrating renewables*".

3.5.1.6. The selection process for a PCI project gives preference to projects in priority corridors identified in the TEN-E strategy as requiring urgent infrastructure development in electricity, gas or oil. A priority electricity corridor has been identified in the North Seas offshore grid. This relates to integrated offshore electricity grid development and integrated Interconnectors in the North Sea, Irish Sea, English Channel and Baltic Sea and neighbouring waters to transport electricity from renewable offshore energy sources to centres of consumption and storage and to increase cross-border electricity exchange.

3.5.1.7. The TEN-E Regulation establishes that PCIs are necessary to take forward EU energy networks policy and should be given the most rapid consideration in the national permitting process that is legally possible.[59] It provides a series of measures to support the implementation of projects including:

- strengthened transparency and public consultation,
- accelerated and streamlined permit granting procedures,
- the potential to gain access to funding, and
- the determination by a single National Competent Authority (NCA) acting as a one-stop-shop for permit granting procedures.

[59] Department for Energy and Climate Change (2014). 'The TEN-E Regulation EU347/2013. Manual of Procedures: The permitting process for Projects of Common Interest in the UK'. p.1 paragraph 1.3

3.5.1.8. The NCA "*will co-ordinate and facilitate the comprehensive decision [on a PCI] and provide a single point of contact for developers.*"[60] PCIs which are in more than one member state will have a designated NCA in each member state.

3.5.1.9. The NCA for the UK for the Proposed Development is the SoS for Energy and Climate Change who will determine the DCO. The NCA has delegated tasks relating to the facilitation and co-ordination of the permit granting process to PINS for PCIs for which a DCO will be the primary consent required.[61]

3.5.1.10. AQUIND Interconnector was awarded PCI status by the European Commission in 2018 on the basis of the Ten-Year Network Development Plan 2016. The PCI list is updated every two years in accordance with Regulation (EU) 347/2013.

3.5.1.11. "*The TEN-E Regulation does not change the consenting regimes applicable to energy infrastructure in the UK*" and a project being a PCI "*does not mean that consent will necessarily be granted*". Furthermore, "*any permit required for a PCI to be constructed must be determined according to the requirements of the relevant consenting regime*", i.e. the PA 2008. However, PCI status establishes the need for the proposed infrastructure and is a factor that the Secretary of State may consider as "relevant and important" to the decision on whether or not to grant the DCO.[62]

[60] Department for Energy and Climate Change (2014). 'The TEN-E Regulation EU347/2013. Manual of Procedures: The permitting process for Projects of Common Interest in the UK'. p.5, paragraph 3.1. This document also sets out a more general guidance on the process.

[61] Justice and Environment (2017). 'Energy Infrastructure Projects of Common Interest'. P.9 Section 3. http://www.justiceandenvironment.org/fileadmin/user_upload/Publications/2017/TEN-E_Implementation_Study.pdf

[62] Department for Energy and Climate Change (2014). 'The TEN-E Regulation EU347/2013. Manual of Procedures: The permitting process for Projects of Common Interest in the UK'., p.6 paragraph 3.8.

3.5.2. EC INTERCONNECTOR POLICY

3.5.2.1. The targets set by the EC illustrate the importance of interconnection: these targets aim to achieve interconnection of at least 10% of each member state's installed electricity production capacity by 2020. The EU agreed in September 2016 to extend this aim to 15% by 2030.[63]

3.5.2.2. This means that by 2030 all EU countries should have the interconnection infrastructure in place to allow at least 15% of the electricity it produces to be exported across its borders.

3.5.2.3. An

> "*electricity interconnection Expert Group was established in 2016 to provide the EC with technical advice on reaching these targets. The Expert Group is made up of 15 leading experts on the European energy market from European industry organisations, academic and research bodies, Non-Governmental Organisations (NGOs), and international organisations*." [64]

3.5.2.4. These targets remain directly applicable while the UK remains part of the EU. Following the exit of the UK from the EU, these targets would not apply directly in the UK, but they would remain relevant for the connecting countries, including France. As such, it is helpful that the EU remains supportive of interconnection in general.

3.6. BREXIT IMPLICATIONS

3.6.1.1. The UK's electricity markets are currently integrated with the EU with flows between GB and the EU governed through EU legislation relevant to the Internal Energy Market ('IEM').

3.6.1.2. In the event of a 'no deal' Brexit, European energy law would no longer apply to the UK and it would no longer be part of the IEM. Given the benefits of interconnection, it is unlikely that trade would cease. This is because there are deep, structural and persistent differentials of the GB and French electricity markets, which create a strong commercial and operational incentive to continue developing additional interconnection between the two regions.

3.6.1.3. Nevertheless, Brexit creates a risk that the cross-border trading of capacity on AQUIND Interconnector may no longer be subject to market coupling and therefore trading may be less efficient than it would be if the UK stayed in the EU.

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[63] European Commission (2015). 'Energy Union Package') P.8
[64] European Commission (2019). Commission Expert Group on electricity interconnection targets, European Commission https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest/electricity-interconnection-targets/expert-group-electricity-interconnection-targets

3.6.1.4. AQUIND expect that suitable post-Brexit trading arrangements will be put in place prior to the Project being operational at the end of 2023, as this is in the interest of a significant number of parties involved in the operation and the development of all interconnectors between GB and other European countries.

3.6.1.5. AQUIND have also tested the unlikely outcome that such arrangements are in fact not put in place or are not sufficient to deliver market efficiency similar to the current levels. Even in this highly conservative scenario, we find that the economic benefits of the Project remain substantial. In particular, GB consumers continue to benefit significantly from lower wholesale electricity prices, which leads to a net consumer welfare benefit of €2.1 bn over the first 25 years of AQUIND Interconnector's operation (compared to €2.2 bn in the AQUIND Interconnector Market Scenario which assumes a 'soft' Brexit outcome). Therefore, the risks of reduced efficiency of AQUIND Interconnector trading its capacity outside of IEM are not prohibitive and the Project remains highly attractive even in a very conservative scenario.

3.7. SUMMARY

3.7.1.1. The UK Government policy identifies an urgent need for new energy infrastructure and establishes a presumption in favour of granting consent for applications for energy NSIPs.

3.7.1.2. The UK Government also recognises and emphasises the importance of electricity as part of the transition as we move forward to a low carbon economy. The associated growth in renewables generation is expected to drive a need for additional system flexibility to balance the intermittency.

3.7.1.3. NPS EN-1 specifically acknowledges the role that interconnector projects can play to complement new electricity generation, which has been reflected in subsequent UK Government policies and plans.

3.7.1.4. The EU policy recognises the importance of Interconnectors by setting targets for all EU countries to achieve electricity interconnection of at least 10% of installed production capacity by 2020, increasing to 15 % by 2030.

3.7.1.5. The role of AQUIND Interconnector has been recognised through its PCI status since 2018. This label is awarded to projects that have a significant impact on energy markets and market integration in the EU, boost competition on energy markets and help the EU's energy security by diversifying sources as well as contribute to the EU's climate and energy goals by integrating renewables.

4. SUMMARY AND CONCLUSIONS

4.1.1.1. The UK Government policy has, since 2011, consistently recognised an urgent need for developing new energy infrastructure, and in particular new electricity transmission. A key motivation behind this is the need to ensure a resilient and well diversified electricity supply. As we move towards a decarbonised economy, a significant amount of the UK's existing thermal capacity will be lost, whilst the demand for electricity is set to increase to meet future needs of industry, heating and transportation. Climate change targets will also place an increased reliance on renewable intermittent generation.

4.1.1.2. Cross-border interconnection can reduce wholesale electricity prices, and contribute to improving security of supply, resilience and flexibility by facilitating trade between markets. It can also help the UK meet its climate change objectives by facilitating renewables integration. All of these benefits have been recognised and accepted by a wide range of governmental and non-governmental organisations.

4.1.1.3. Interconnectors already exist providing Great Britain with connection to France, Ireland, the Netherlands and most recently Belgium. Collectively these existing connectors provide around 5 GW of capacity. More than 10 GW of further capacity (in addition to AQUIND Interconnector) is currently being planned.

4.1.1.4. AQUIND Interconnector would facilitate both the import and export of energy between France and GB depending on supply and demand in the two countries. GB is currently a net importer from France given the higher wholesale prices in the UK, and it is expected to continue being a net importer in the future, driven primarily by the French nuclear-based generation fleet. However, at times of very high renewable energy generation in GB, UK can export the excess renewables generation to France.

4.1.1.5. The merits of additional interconnection between GB and France have already been recognised in independent analysis published by National Grid and OFGEM.

4.1.1.6. AQUIND Interconnector in particular would make an important contribution to resolving the UK's energy trilemma of affordability, decarbonisation and security of supply. In addition, AQUIND Interconnector is also expected to generate wider benefits for the UK by providing ancillary services to the NG ESO, by generating tax revenue for the Treasury, by creating new jobs and by generating wider economic activity in the UK.

Appendix 1 – GB Interconnectors

This Appendix describes the existing and planned Interconnectors between GB and the neighbouring countries.

EXISTING GB INTERCONNECTORS

In GB, the benefits of interconnectors are well known, and five Interconnectors are already operational (including the oldest one, IFA, from 1980s). Further nine Interconnectors (in addition to AQUIND) are currently being planned between GB and the neighbouring countries by the mid-2020s.

The GB's electricity Interconnector capacity is currently 5 GW, provided by the projects listed below:

Project name	Connecting Country	Capacity	Delivered
IFA (Interconnexion France-Angleterre)	France	2 GW	1986
Moyle	Northern Ireland	0.5 GW	2002
BritNed	Netherlands	1 GW	2011
East-West Interconnector (EWIC)	Republic of Ireland	0.5 GW	2012
NEMO	Belgium	1 GW	2019
Total		***5 GW***	

The Interconnexion France-Angleterre (IFA)

The IFA Interconnector is a 70 km link between Sellindge, UK and Bonningues-les-Calais, France. It was commissioned in 1986 and has a capacity of 2,000 MW.[65]

Moyle

The Moyle Interconnector is a 500 MW link between South Ayrshire, Scotland and Ballycronan More, Northern Ireland. It was commissioned in 2001 (following planning consent for the converter stations in 2000) and went into commercial operation in 2002.[66]

The Moyle Interconnector was particularly important as it marked the point at which the electricity systems and markets of GB and the European mainland became connected to

[65] Interconnexion France-Angleterre (n.d.). http://ifa1interconnector.com/about-us/
[66] Mutual Energy (n.d.). Moyle History and Development http://www.mutual-energy.com/moyle-history-and-development/

Northern Ireland. This not only helped to make the electricity prices in Northern Ireland more competitive but also benefitted the security of supply. The growing prevalence of wind energy in Northern Ireland and reduction in prices has led to the two-directional flow of energy between Northern Ireland and Scotland.

BritNed Interconnector

The BritNed Interconnector is a 260 km link between the Isle of Grain, UK and Maasvlakte, Netherlands. The Interconnector has a capacity of 1,000 MW and has been operational since 2011[67].

The East West Interconnector (EWIC)

The EWIC Interconnector is a 260 km link between Rush North Beach, Dublin, Ireland and Barkby Beach, North Wales. It has a capacity of 500 MW and was commissioned in 2012.[68]

NEMO

The NEMO Interconnector is the most recent addition to the UK's Interconnector capacity, extending 140 km between Herdersbrug, Belgium and Richborough, UK. It has a capacity of 1,000 MW and has been operational since 2019.[69]

The onshore section in the UK is from Pegwell Bay in Kent, to a converter station in Richborough. The onshore section in Belgium is from Zeebrugge beach to the converter station in Herdersbrug.

PLANNED GB INTERCONNECTORS

In addition to the five existing Interconnectors there are nine further Interconnectors in the pipeline, excluding AQUIND Interconnector, with a combined capacity of around 10.5 GW.[70] The planned GB projects are summarised below:

Project name	Connecting Country	Capacity	Status	CEF support[71]	Completion date[72]
ElecLink	France	1 GW	Under construction	€0.6 m + €0.2 m	2020
NSL	Norway	1.4 GW	Under construction	€31m	2020

[67] BritNed Development Limited. Source: https://www.britned.com/
[68] EirGrid and SONI. Source: http://www.eirgridgroup.com/customer-and-industry/interconnection/ and http://www.soni.ltd.uk/customer-and-industry/interconnection/ .
[69] Nemolink (2019). Source: https://www.nemolink.co.uk/
[70] https://www.ofgem.gov.uk/electricity/transmission-networks/electricity-interconnectors
[71] Innovation and Networks Executive Agency (2019). CEF Supported Actions – May 2019 (available here).
[72] The completion date is that reported in the NG Interconnector register. For ElecLink and IFA2, the register indicates a completion date in 2019, which is highly unlikely, so that has been changed to 2020. We do not express a view on the whether the other completion dates reported in the register are likely to be accurate.

Project name	Connecting Country	Capacity	Status	CEF support[71]	Completion date[72]
IFA 2	France	1 GW	Under construction	€6 m	2020
Viking Link	Denmark	1.4 GW	Consents approved	€14.8 m	2022
FAB Link	France	1 GW	Awaiting consents[73]	€7.2 m	2023
Greenlink	Ireland	0.5GW	Scoping	€4.76 m + €3.6 m	2022
NeuConnect	Germany	1.4GW	Scoping	-	2022
GridLink	France	1.4GW	Scoping**Error! Bookmark not defined.**	€15.2 m	2022
NorthConnect	Norway	1.4GW	Scoping	€10. 8m	2023
Total		**10.5 GW**			

ElecLink

ElecLink Interconnector will have a capacity of 1,000 MW and plans to connect Les Mandarins, France and Sellindge. It will run a total of 70 km, with 51 km of this inside the Channel Tunnel.[74] ElecLink has a PCI status[75] and is being developed as an exempted interconnector under Regulation 714/2009.

Construction began in 2017, and although the project has faced various challenges in the construction process, Getlink (owner of Eurotunnel) have stated that the challenges would not impact the 2020 commissioning target.[76]

[73] The assessment of FAB Link and Gridlink by the French regulator CRE has been put on hold until there is more clarity on the outcome of UK's planned departure from the EU. CRE, Deliberation No. 2017-253, 16 November 2017.
[74] ElecLink. Source: http://www.eleclink.co.uk/what-we-do.php
[75] *Commission Delegated Regulation (EU) 2018/540 of 23 November 2017 amending Regulation (EU) No 347/2013 of the European Parliament and of the Council as regards the Union list of projects of common interest C/2017/7834 OJ L 90, 6.4.2018, p. 38–58* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.090.01.0038.01.ENG&toc=OJ:L:2018:090:TOC
[76] Financial Times (n.d.) 'Eyebrows raised over Eurotunnel cable finance disclosure'. https://www.ft.com/content/1eb784b4-4cb9-11e9-bbc9-6917dce3dc62

North Sea Link (NSL)

The NSL will provide an electricity link between Kvilldal, Norway and Blyth, UK. The NSL will be the longest subsea Interconnector in the world, at 720 km, with a capacity of 1,400 MW. It has PCI status and is currently under construction, anticipated to be operational in 2021. Kvilldal was chosen as it is the location of Norway's largest hydro-power station and interconnected reservoir system.[77]

FAB Link

FAB Link is a proposed 220 km Interconnector between Manuel, France and Budleigh Salterton, UK, with a capacity of 1,400 MW. The project has PCI status and construction was scheduled to commence in 2020.[78] French national transmission system operator RTE is one of the shareholders of the project and the decision has been made a decision to postpone capital investments of public funds in the project in the view of Britain's withdrawal from the EU.[79]

The UK landfall is in Budleigh Salterton, before connecting to the converter station at Broadclyst near Exeter. The landfall in France is at Siouville-Hague with the converter in Manuel, in the north-west of France.

Interconnexion France-Angleterre 2 (IFA2)

The IFA2 is a proposed Interconnector between Tourbe, France and Fareham, England. The cable is 240 km will have a capacity of 1000 MW. The project has PCI status and is scheduled to be in operation by summer 2020.[80]

Viking Link

The Viking Link is a proposed 760 km interconnector, linking existing substations in Lincolnshire, UK and South Jutland, Denmark. It is scheduled to begin construction in Summer 2020 and have a capacity of 1,400 MW.[81] It is anticipated that the commissioning of the Interconnector will take place in 2023.[82]

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[77] North Sea Link (n.d.). : http://northsealink.com/
[78] FAB (n.d.). https://www.fablink.net/.
[79] Deliberation of the Energy Regulatory Commission of 16 November 2017 establishing guidelines for new interconnector projects with the United Kingdom and deciding to transfer the exemption request submitted by AQUIND Ltd. to ACER.
[80] National Grid (n.d.). 'IFA2 Connection'. https://www.nationalgridet.com/infrastructure-projects/ifa-2-connection
[81] Viking Link (2019). : http://viking-link.com/timeline/
[82] Viking Link (2019). 'Viking Link moves from development to construction phase'. http://viking-link.com/news/viking-link-moves-from-development-to-construction-phase/

Greenlink

The Greenlink Interconnector is a proposed 300 km, 500 MW, interconnector between Pembroke, Wales and Great Island substation, near Wexford, Ireland.

The project has PCI status and is currently at an advanced development stage. It is anticipated that construction will start in 2020, with the interconnector expected to be complete by 2023.[83]

NeuConnect

NeuConnect is a proposed 720 km link between Grain, England and Wilhelmshaven, Germany. It would be the first direct interconnector between Europe's two largest energy markets with a capacity of 1,400 MW. Following OFGEM's Initial Project Assessment decision in 2018, the target date for completion is currently 2023.[84]

GridLink

GridLink Interconnector is a proposed 160 km link between Kingsnorth, UK and Dunkerque, France. The project has PCI status and will have a capacity of 1,400 MW. Construction is due to commence in 2021 with commercial operation by Spring 2024.[85,86]

NorthConnect

NorthConnect Interconnector is a proposed 665 km link between Simadalen, Norway and just south of Peterhead, Scotland. The project has PCI status and will have 1,400 MW capacity.

The cable connection plans were approved in January 2019 and construction is scheduled to start in 2020, with anticipated final completion in 2022.[87]

[83] Greenlink Interconnector (2019). Source: https://www.greenlink.ie/
[84] Neuconnect (2019). 'Strong Market Interest in NeuConnect as major procurement deadline closes' Press Release,
[85] GridLink Interconnector (2019). https://gridlinkinterconnector.com/
[86] GridLink Interconnector (2019). Timeline. https://gridlinkinterconnector.com/timeline/
[87] NorthConnect (n.d.). Connecting Renewables. http://english.northconnect.no/project