AQUIND Limited

AQUIND INTERCONNECTOR

Needs and Benefits Addendum

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APPENDICES

EXECUTIVE SUMMARY

- There is an urgent need for new electricity infrastructure. This is established in Government policy. The Overarching National Policy Statement for Energy (NPS EN-1) outlines the need to ensure energy security, affordability, achieve carbon emissions reductions, replace fossil fuel energy generating capacity, support increased supply from renewables and cater for future increases in electricity demand.
- These trends have continued, and needs increased, since NPS EN-1 was published in 2011. Since then electricity generation in the UK has fallen to the lowest level in over two decades[1], the UK Government has committed to net zero emissions by 2050[2], the demand for electricity is projected to increase in response (for example, to uptake of electric vehicles and electric heating) and fuel mix continues the transition from coal to renewables - with renewables share of total generation at an all-time high.
- Electrical interconnectors are a key part of this transition – facilitating the integration of renewable generation sources - as well as playing an important role in addressing the other two limbs of the "energy trilemma" i.e. making electricity more affordable and enhancing security of electricity supply.
- The latest analysis from National Grid ESO finds that the outlook for interconnector growth remains strong and that increasing capacity will benefit GB consumers and contribute to net zero objectives. The January 2020 Network Options Assessment (NOA)[3] identified an optimal capacity between GB and European markets in the range of 18.1 to 23.1GW[4]. The existing interconnector capacity between GB and European markets stands at only 5.0 GW.
- France represents one of the most favourable countries in Europe for interconnection, due to low electricity prices and availability of clean energy. Currently only one interconnector – the 2GW IFA constructed in 1986 - connects GB and France. The January 2020 NOA specifically recognises the opportunities of greater interconnection with France. This supports analysis by AQUIND which concludes that the optimal capacity on the GB-French border is in excess of 8GW (refer to Appendix 2 of this report).

[1] DUKES 2019 identified that UK electricity generation in 2018 was at the lowest level since 1996. Available at https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes

[2] Through the Climate Change Act 2008 (2050 Target Amendment) Order 2019, replacing the former legally binding targets of reducing net greenhouse gas emissions by at least 80% of their 1990 levels by 2050

[3] January 2020 Network Options Assessment: [redacted]

[4] The July 2020 Future Energy Scenarios (which updates the scenarios to reflect the 2050 net zero targets) similarly projects installed interconnector capacity of up to 21.5GW by 2032 and increasing to up to 27GW by 2050

- Two interconnectors under construction - ElecLink and IFA 2 are to provide 1GW each and will therefore not achieve the required level of interconnection capacity. Two further planned developments FAB Link and GridLink would each provide 1.4GW, although the investment in FAB Link, which is partly owned by French national transmission operator RTE, was suspended by the French energy regulator at the end of 2017. Taking into account those existing, under construction and planned (even including FAB Link) interconnectors the total capacity between GB and France would be 6.8GW and short of the forecast requirement. AQUIND would take this total operational and planned interconnector capacity between GB and France to a total of 8.8GW.
- AQUIND will deliver quantifiable benefits to the three pillars of the energy trilemma:
    - **Reducing electricity prices for GB consumers and increasing social welfare**: French wholesale electricity prices are expected to continue to be lower than in GB at most times within any given year for the first fifteen years of AQUIND Interconnector's operation[5]. Importing electricity from France will result in lower prices for GB consumers – both through direct access to the cheaper sources of energy and increased competition between GB generators. During the 2030s, as the share of renewables in both countries continues to grow, it is expected that flows from GB to France will increase (though remaining below the total flow from France to GB)[6]. The introduction of AQUIND Interconnector is forecasted to provide GB-wide savings in wholesale electricity prices of between £2.0bn and £3.8bn[7], in net present value terms, over the first 25 years of operation[8], depending on economic scenarios.
    - **Enhancing security of supply**: The electrification of transport and heating will increase the future demand for electricity at the same time that many power generation plants in the UK are coming to the end of their life cycle. In addition, the UK committed to the closure of all coal plants by 2025[9]. Whilst significant strides are being made in renewable generation, a greater reliance on fluctuating intermittent energy sources increases the need for flexibility and margin in potential energy sources. AQUIND Interconnector will provide a reliable 2GW connection into the European markets – significantly enhancing GB's energy resilience (with the ability for flows to go the other way, contributing to the ability for the system's operators in both GB and France to

[5] Refer to Plate 2-1 of the Needs and Benefits Report [APP-115]
[6] Refer to Plate 1-2 of the Needs and Benefits Report [APP-115]
[7] AQUIND Cost Benefit Analysis
[8] A 25 year projection is a standard timeframe for a cost benefit analysis of an interconnector project used by Ofgem, and other regulatory bodies
[9] Department for Business, Energy and Industrial Strategy: Implementing the end of unabated coal by 2025, January 2018

respond to balancing needs more effectively). The greater the surplus and flexibility, the greater the security of supply and the reduction in the need for additional investments in firm capacity in both markets. The introduction of Voltage Sourced Converter (VSC) technology[10] also provides the system operators greater flexibility in balancing the respective grids in GB and France.

- **Integration of renewables and contributing to CO_2 reductions**: Renewable energy generation sources including wind and solar are intermittent in nature. Where conditions are good in one place, they may be poor in another. Interconnectors enable electricity to be moved efficiently from where it is abundant to where additional supplies are needed. It helps avoid instances of curtailment of renewable generation in the region with surplus generation and reduces reliance on fossil fuel flexibility power plants in the regions with insufficient supply. The contribution that AQUIND Interconnector can make in facilitating a transition to more renewable energy is specifically recognised in the Relevant Representation response from Havant Friends of the Earth [RR-057]. By facilitating better integration of renewable sources, AQUIND Interconnector will also help to achieve national decarbonisation targets in both countries by contributing to CO_2 emissions reductions. Several studies have pointed to the role of increased GB-EU interconnection as the least cost means of achieving such decarbonisation targets . AQUIND Interconnector is estimated to lead to a net reduction in emissions of approximately 1.53m tCO2e over its operational lifespan. This is supported by the findings of the independent report on the role of AQUIND Interconnector in achieving Net Zero, which also showed that AQUIND Interconnector will help reduce the costs of achieving Net Zero targets to British consumers by over £2.3bn[11].

- The wider economic benefits of AQUIND Interconnector are also substantial. The costs of the UK onshore components of the project in the UK (i.e. the onshore cable route, converter station and all construction works) are estimated at around £0.4bn[12], representing substantial investment in UK energy infrastructure. The construction of the onshore components in the UK will generate over 250 direct jobs (as well as additional indirect and induced jobs). A further 250-275 jobs are expected to be created during the marine installation, which requires support of various local marine service providers. This employment generation has the potential to contribute Gross Value Added (GVA) of up to £26 million per year for the duration of the construction phase[13].

[10] 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').

[11] FTI, AQUIND Interconnector, Reducing the cost of transition to Net Zero for GB energy consumers, 2020. Available at: [redacted]

[12] Of the total cost of the Project of £1.26 (€1.4) as referenced at Paragraph 2.4.53 and the Executive Summary of the Needs and Benefits Report [APP-115]

[13] As set out at section 2.4.5 of the Needs and Benefits Report [APP-115]

- In light of the Covid-19 pandemic, there is an even greater need to support the UK economy to prevent and/or mitigate potential effects of an economic recession. Infrastructure investment can contribute to the recovery process by stimulating the creation of jobs and spending. AQUIND Interconnector is a particular example of a large-scale infrastructure project that is ready to start construction as soon as 2021, and would deliver this stimulus without any direct UK Government investment. AQUIND Interconnector therefore could be one of the key pillars of post Covid-19 recovery process in the UK whilst also being an integral part of the green recovery agenda on the path towards net zero.
- In summary, AQUIND Interconnector would deliver substantial socio-economic and environmental benefits on a national scale by delivering energy security, integrating of renewable energy sources, providing consumer benefits and contributing to major investment into UK infrastructure. The project will also deliver substantial local and regional benefits through employment generation, spending and business rate generation.

The consensus for increased GB Interconnection

There is a wealth of support for the role that more interconnectors can play in delivering energy security, integration of renewables and benefits for consumers.

"Greater interconnection is good for GB security of supply as we can import from a wider, deeper and cheaper pool of electricity available in neighbouring countries". (Dermot Nolan, Ofgem Chief Executive, October 2016)

"Increased level of interconnection bring significant benefits to GB and European consumers, in terms of lower wholesale energy prices and greater use of renewable power" (Network Options Assessment, National Grid ESO, January 2020)

"…not all new sources of supply in the 2020s need be renewable. Interconnectors, of which there is a large pipeline of projects, are likely to become of increasing importance throughout this period" (National Infrastructure Assessment, NIC, July 2018)

"…further interconnection… **has the potential to contribute to the three pillars of our energy policy – affordability, security and decarbonisation"** (More Interconnection: Improving Energy Security and Lowering Bills, DECC, December 2013)

"…offshore wind and nuclear have a big role to play, alongside greater interconnection with grids in neighbouring countries. We remain strongly supportive of new interconnectors". (Greg Clark, Secretary of State for BEIS, November 2016)

"The UK Government recognises a range of benefits that interconnection can provide and strongly supports greater electricity trading with our European partners" (The UK's Draft Integrated National Energy and Climate Plan, BEIS, January 2019)

"The rationale to build interconnectors and their contribution to energy and tackling climate change has long been recognised, but there is now an even greater need to construct them" (The Ecologist, January 2019)

"We will 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". (Clean Growth Strategy, BEIS, October 2017)

"With their flexibility, interconnectors will become increasingly important as renewable energy increases" (The National Options Assessment, January 2020)

1. INTRODUCTION

1.1.1.1. This report is an Addendum to the Needs and Benefits Report [APP-115] submitted with the DCO application. It serves to provide an update on available data, analysis and publications since the original report was prepared and to summarise the compelling case in the national interest for AQUIND Interconnector.

1.1.1.2. The Needs and Benefits Report set out the established need for greater interconnection (section 2.2) and the specific role of AQUIND Interconnector in resolving the "energy trilemma" of affordability, security and decarbonisation of energy supply (section 2.3). This is set within the context of UK Government Policy for Nationally Significant Infrastructure Projects (NSIPs) (section 3.2), the support for more electricity interconnector projects in other Government statements (section 3.3), the prevailing climate change targets (section 3.4), the European policy context and potential Brexit implications (section 3.5). The Needs and Benefits Report also identified the wider benefits of AQUIND Interconnector in relation to ancillary services, tax revenue, new employment opportunities and wider economic activity (section 2.4).

1.1.1.3. Since the Needs and Benefits Report was produced in November 2019 further important guidance, statements and analysis have been published, the UK Government has committed to net zero emissions by 2050 and the Covid-19 pandemic presents challenges for the UK economy which infrastructure investment can play a major part in addressing by stimulating job creation and spending. This Addendum also addresses matters raised in Relevant Representations in relation to the need for the project and the role of electricity interconnection with the European markets and renewable energy generation in the UK.

1.1.1.4. The current Covid-19 pandemic also has socio-economic and environmental implications, including for energy use and carbon emissions. Whilst short term effects can be quantified the implications going forward are difficult to predict. Some initial findings have, however, been put forward – for example through the IEA's Global Energy Review 2020 - which amongst other things highlights the increasing role of renewables and the need for a flexible electricity grid to which increased interconnection capacity can make an important contribution.

2. POLICY AND EVIDENCE UPDATE

2.1. INTRODUCTION

2.1.1.1. The Needs and Benefits Report [APP-115] provides a summary of key policy, guidance and analysis supporting electricity interconnector projects, including Planning our Electric Future (2011), NPS EN-1 (2011), More Interconnection: Improving Energy Security and Lowering Bills (2013), Getting More Connection (2014), Smart Power (2016), the 2016 Spring Statement, the National Infrastructure Delivery Plan (2016), Overseas Electricity Interconnection (2018), the 2018 National Infrastructure Assessment (2018), Future Energy Scenarios (2019) and the National Energy and Climate Plan (2019).

2.1.1.2. Additional analysis and publications in 2020 further support the role of interconnectors, including the general support for infrastructure and measures to meet carbon targets in the Budget 2020, analysis of future interconnection levels between GB and neighbouring countries in the latest Network Options Assessment 2019/20 (NOA) and Future Energy Scenarios (FES) (July 2020), and the National Infrastructure Commission's 2020 Annual Monitoring Report (AMR). Recent publications by the IEA highlight the implications of the Covid-19 pandemic on global energy infrastructure investment.

2.2. BUDGET 2020

2.2.1.1. The Budget 2020 reflected the UK Government's significant commitment in June 2019 to the target of net zero greenhouse gas emissions by 2050, and advised that "*increasing the UK's use of clean energy is a vital part of reducing carbon emissions and putting the nation at the forefront of new innovative industries*". The budget, therefore, set out various measures and policies to reduce emissions and *"generate green economic opportunities across the nations and regions of the UK".*

2.2.1.2. The Budget 2020 commits the UK Government to invest in innovation of new technologies but also to continue to take action to reduce emissions. It states that significant progress has already been made in reducing carbon emissions from electricity generation, from switching from coal and the growth in renewable sources – and that wind and solar are likely to be the UK's primary source of electricity in the future. It recognises, however, that the power generated by these sources is dependent on the weather and therefore the UK also needs other reliable low carbon power sources.

2.2.1.3. Whilst the Budget 2020 does not specifically refer to interconnector projects, these ambitions align with the important contribution interconnectors can provide in integrating renewables and balancing energy systems to increase security of supply.

2.3. NETWORK OPTIONS ASSESSMENT 2019/20 (JANUARY 2020)

2.3.1. INTRODUCTION

2.3.1.1. The latest annual Network Options Assessment (NOA), published by National Grid ESO in January 2020, provides recommendations for grid reinforcements which it

states are imperative for addressing the 'energy trilemma' of secure, sustainable and affordable energy and which are key stepping stones towards the 2050 net zero goals[14]. In particular, the 2020 NOA provides an assessment of the optimum level of interconnection between GB and other European electricity grids to maximise socio-economic welfare based on market driven analysis, without aiming to make judgements about specific projects.

2.3.1.2. In providing this analysis, the 2020 NOA uses the Future Energy Scenarios (FES) analysis published every year to provide scenarios for a range of credible futures - which allow National Grid ESO to provide supply and demand projections to 2050. The 2020 NOA was based on the, then latest, scenarios published in July 2019 (FES 2019). The FES 2019 provides a range of scenarios, two of which would reflect the former targets under the Climate Change Act 2008 of 80 per cent decarbonisation against 1990 levels (namely the "Two Degrees" and "Community Renewables" scenarios). These scenarios do not, therefore, reflect the 2050 net zero targets (the 2020 FES, as considered below, updates the scenarios) but already recognises that reaching net zero carbon emissions by 2050, whilst achievable, requires immediate action across all available solutions.

2.3.1.3. The 2020 NOA provides specific interconnection analysis through the Network Options Assessment for Interconnectors (NOA IC). The purpose of the NOA IC is to inform the industry of the potential benefits of future interconnection, with the goal of encouraging the development of efficient levels of interconnection capacity between GB and other markets. In doing so it identifies how much interconnection with GB would provide the most value to consumers. The assessment calculates the optimal level of interconnection between GB and European markets by looking at three elements, namely the benefit to society, the impact of interconnectors on the GB network and the likely capital cost of the interconnector and any necessary network reinforcements. The 2020 NOA IC notably involved a revised methodology for identifying a baseline that provides a fairer starting point for the assessment of interconnection capacity.

2.3.1.4. The high-level results of the NOA IC, set out at page 63 of the NOA, provide further significant support for the role of interconnection between GB and European markets:

- *"This year's analysis identifies many potential opportunities for additional interconnection to create value for GB and Europe, both economically and environmentally.*
- *Increased levels of interconnection bring significant benefits to GB and European consumers, in terms of lower wholesale energy prices and greater use of renewable power.*

[14] [redacted] (page 2)

- *A total interconnection capacity in the range of 18.1GW and 23.1GW between GB and European markets by 2032 would provide the maximum benefit for GB consumers.*
- *This is between three and five times the current level of operational GB interconnection of 5GW"*

2.3.1.5. The NOA IC goes on to reiterate the key benefits of interconnection in relation to the three strands of the energy trilemma (as already recognised by the UK Government, regulators and other key stakeholder as outlined above, and in the Needs and Benefits Report):

- Greater security of supply: recognising the benefits of markets on either end of the interconnector being able to access increased levels of generation to secure their energy needs (p67).
- Greater access to renewable energy: through *"increased access to intermittent renewable generation, consequently displacing domestic non-renewable generation"* (p67). The NOA IC also recognises that *"interconnection allows surplus power from renewable generation to be exported, rather than curtailed. This may also replace more expensive fossil fuel generation, resulting in a reduction in prices and reduced curtailment levels…".*
- Increased competition: noting that *"increased access to cheaper generation and more consumers leads to increased competition allowing some participants in both markets to benefit financially. These benefits are measured as social economic welfare ".*

2.3.2. OPTIMAL INTERCONNECTION RANGE

2.3.2.1. National Grid ESO's Interconnector Register records all interconnector projects currently operational, those under construction and other projects in the pipeline (including any that are subject to planning but have currently signed a connection agreement with NG ESO). The total potential capacity figure is 21GW, including AQUIND Interconnector. The NOA IC applied a scaling factor of 25% for projects under development to provide a reasonable baseline interconnection level of 13.6GW.

2.3.2.2. The NOA IC provides a range of optimal interconnection levels of between 18.1GW and 23.1GW depending on FES scenario (i.e. the level of interconnection which would cause price convergence between markets and after which the benefits of further interconnectors would diminish). The assessment of each FES scenario in NOA IC show higher optimal interconnection levels than previously identified within the FES 2019 report of between 12GW and 20GW. This was driven by "the potential for additional value creation" (page 75). The higher end of the range (23.1GW) result from the two scenarios ("Community Renewables" and "Two Degrees") that would achieve an 80 per cent reduction in greenhouse gas emissions by 2050 compared to 1990 levels - which both include greater volumes of intermittent renewable energy generation across Europe which lead to additional benefits of interconnection through

balancing renewable generation volumes. As noted above, these scenarios do not reflect the 2050 net zero goals. The FES 2020 scenarios (see section 2.8 below), which reflect the net zero targets, all see a growth in renewable energy generation and all include a greater role for flexible services to help manage the variable nature of wind and solar generation.

2.3.2.3. In the meantime, the NOA IC analysis (based on the FES 2019 scenarios) presented the level of interconnection between GB and different European markets for each of the FES 2019 scenarios, compared against the existing level of operational interconnectors and the baseline. This demonstrates that both scenarios which target the former emissions targets, project a greater level of interconnection with France than the baseline case. The Two Degrees scenario suggests an optimal level of interconnection with France of around 9GW. The current level is 2GW.

2.3.2.4. This correlates with AQUIND's own analysis (see extract from AQUIND Cost Benefit Analysis at **Appendix 2 -** which is currently being assessed by the energy regulators of the UK and France). This analysis considered the optimal capacity on the GB-French border by calculating the total project benefits under a range of interconnector investment assumptions. This finds that although the pipeline of planned GB-French interconnector projects has increased, GB interconnection is still below other European countries. The CBA analysis concludes that the optimal capacity on the GB-French border is in excess of 8 GW.

2.3.3. GB CONSUMER BENEFIT

2.3.3.1. The NOA IC confirms that the GB consumer gains from interconnection to markets with lower wholesale electricity prices. In all scenarios analysed by the NOA, the French wholesale electricity prices remain lower than in Britain. The two scenarios that achieve the decarbonisation target of an 80 per cent reduction in emissions achieve roughly a net balance of imports and exports by the end of the forecast period (i.e. to 2039) as high volumes of renewable generation are traded across the interconnectors.

2.3.4. INTERACTION BETWEEN INTERCONNECTORS AND ONSHORE GRID CONSTRAINTS

2.3.4.1. This considers the location of interconnectors and the level of onshore reinforcement necessary to accommodate them. The NOA IC finds that additional interconnection to GB could either help or hinder system balancing depending on location. It notes at page 85 that *"flows across the GB network are from high levels of generation in the north to high levels of demand in the south. Interconnectors in the north may help alleviate constraints when exporting from GB and increase constraints when importing. Conversely, interconnectors in the south of England may reduce network constraints when importing and exacerbate constraints when exporting".* As AQUIND flows will be predominantly from France to GB in the early years this confirms that AQUIND may help to alleviate network constraints in the south of England.

2.3.5. ENVIRONMENTAL IMPLICATIONS

2.3.5.1. The NOA IC finds that "increased levels of interconnection bring significant benefits to GB and European consumers, not only in terms of lower wholesale energy prices and greater use of renewable power, but also in terms of environmental benefits".

2.3.5.2. The report highlights that interconnection can increase access to renewable generation, resulting in reductions of CO_2, by allowing surplus power from renewable generation to be exported rather than 'switched off'. All FES scenarios tested through the NOA IC result in lower CO_2 emissions compared to the baseline scenario.

2.3.5.3. The NOA IC also highlights that "interconnection allows surplus power from renewable generation to be exported, rather than curtailed. This may also replace more expensive fossil fuel generation, resulting in a reduction in prices and reduced curtailment levels".

2.4. NATIONAL INFRASTRUCTURE COMMISSION - ANNUAL MONITORING REPORT 2020 (FEBRUARY 2020)

2.4.1.1. The Needs and Benefits Report [APP-115] noted the specific recognition in the first National Infrastructure Assessment (2018) that interconnectors are likely to become of increasing importance and the need for more flexibility in the electricity system to match supply and demand. The Needs and Benefits Report also identified the recommendations in the NIC's 2016 report Smart Power which highlighted the benefits of interconnectors as a key source of flexibility to the electrical system.

2.4.1.2. Flexibility is a key focus in the NIC's 2020 Annual Monitoring Report, which provides further recommendations in relation to interconnector projects, namely that "… *in 2020, to further the recommendations from Smart Power, the government should prioritise ensuring there are no barriers to future interconnector projects as the UK exits the EU…"*[15].

2.5. OFGEM DECARBONISATION PROGRAMME ACTION PLAN

2.5.1.1. The Ofgem Decarbonisation Programme Action Plan is mostly relevant to the distribution side of the electricity network, though further supports the objectives of integrating renewables, delivering flexibility, enhancing security of supply and achieving decarbonisation whilst protecting consumers.

2.5.1.2. The plan highlights the challenges of meeting the 2050 net zero goals (page 4), noting that only 5% of the energy used to heat homes in the UK is currently from low carbon sources and the use of electric vehicles may need to grow from 230,000 today to 46 million by 2050. The report is clear that "*to achieve net zero will require a huge increase in renewable and low carbon electricity*" and that *"we will also need an energy system which can continue to reliably supply energy when consumers need it".*

[15] h[redacted]

2.5.1.3. The action plan sets out a series of actions towards the path to net zero (page 5), which include:

- Encouraging network companies to invest in the necessary infrastructure to decarbonise
- Meeting the need for the energy system to be more flexible to balance supply and demand
- Through flexibility reducing the need for more power generation saving customers money on their energy bills

2.5.1.4. This is reinforced at page 14 which states that "we need to help achieve rapid decarbonisation alongside the other two pillars of our strategic narrative, namely: protecting consumers, especially those in vulnerable situations; and enabling competition and innovation that drives down prices and results in new products and services."

2.5.1.5. The plan also emphases that "the increasing amount of renewables on the system is expected to make the ESO's balancing role more difficult. However, this capability will be essential to reaching net zero" (page 22).

2.5.1.6. It also highlights the need to ensure that networks are able to integrate new sources of low carbon power (page 23).

2.6. GLOBAL ENERGY REVIEW 2020 (APRIL 2020)

2.6.1.1. The Global Energy Review 2020 published by the IEA in April 2020[16] examines the impacts of the Covid-19 pandemic on global energy demand and CO_2 emissions. The report provides real time data on energy usage and CO2 emissions in 2020 to date as well as looking forward for the rest of the year.

2.6.1.2. Unsurprisingly, the report documents a decline in global energy demand in the first quarter of 2020[17], with fossil fuel demand being hit the hardest, whereas renewables posted a growth in demand. The short-term demand for electricity during global lockdown measures has reduced – as a result of reductions in commercial and industrial operations – outweighing an increase in domestic demand. The report notes that demand reductions have lifted the market share of renewables.

2.6.1.3. The report seeks to predict the effect on global energy demand for the rest of 2020 and again unsurprisingly concludes an overall annual contraction, although the extent will largely depend on the speed of economic recovery. Even in a scenario where overall demand falls, the demand for renewables is predicted to increase because of low operating costs and preferential access to many power systems.

[16] [redacted]

[17] Although not all declines in demand in Q1 2020 were a result of Covid-19, with milder weather conditions through the northern hemisphere pushing down demand.

2.6.1.4. Looking further beyond 2020 is difficult and the IEA have stated that it is still too early to determine long term impacts of Covid-19. The report does, however, highlight how the Covid-19 pandemic has put energy security to the test and specifically that "*electricity security's place at the heart of modern economies has been underscored by the Covid-19 crisis*" (page 43). This relates not only to the short-term response measures to the crisis (in terms of supporting the functioning of the healthcare system and online economic activity) but also specifically highlights the challenges to electricity security posed by the rise in renewables. The report notes that *"in advanced economies, the main cause of blackouts is the inability of the system to manage sudden changes in power flows and various network problems".* The report continues, to highlight the potential flexibility and security challenges in restarting dispatchable power capacity and the need for continuous vigilance from systems operators, regulators and governments.

2.6.1.5. The report does not specifically refer to electricity interconnectors, though in recognising the challenges posed by a decarbonised energy supply to electricity security, it supports the existing body of evidence which recognises the beneficial role of an increase in interconnection capacity.

2.7. WORLD ENERGY INVESTMENT (MAY 2020)

2.7.1.1. The IEA subsequently published their World Energy Investment report in May 2020 which highlights the impact of the Covid-19 pandemic on energy investment, suggesting that global energy spending has dropped to historical lows as a result of the crisis. The report suggest that global investment is now expected to decrease by 20%, or around £320bn, compared to last year. It also reports that revenues going to governments and industry are set to fall by over £0.8trn and power sector spending is on course to decrease by 10% in 2020.

2.7.1.2. This global picture further highlights the value of AQUIND Interconnector going ahead and bringing forward major investment into the UK economy. There is an even greater need to support the UK economy to mitigate the potential effects of an economic recession. AQUIND Interconnector (with a total investment value of around £0.4bn for the UK onshore elements of the project) is a prime example of the kind of large scale infrastructure project that can commence in the short term and deliver important economic stimulus in the UK economy without any direct UK Government investment.

2.8. FUTURE ENERGY SCENARIOS (JULY 2020)

2.8.1.1. The 2020 FES sets out the new scenarios developed by National Grid ESO to update the previous scenarios to reflect the UK's commitment to net zero by 2050. The scenarios explore how this objective can be achieved through variations in the levels of societal change and the speed of decarbonisation (as set out in the extract from the FES 2020 below[18]).

[18] Extract from the July 2020 Future Energy Scenarios [redacted]

2.8.1.2. The 2020 FES provides strong support for the role of interconnection in the net zero scenarios.

2.8.1.3. With regard to electricity interconnector capacity the report states that "*the outline for interconnector capacity growth remains strong*" and projects interconnector capacity to grow in all scenarios. The report states that interconnector capacity is projected to increase in all scenarios reaching 16-21.5 GW by 2030[19] (although note that the lower end of the scale represents the Steady Progression scenario which would not achieve the net zero policy objectives). This is generally consistent with the projections of optimum interconnector capacity of 18.1 and 23.1 GW by 2032 in the January 2020 NOA based on the 2019 FES (as set out above).

2.8.1.4. The variances between the scenarios represent different assumptions in relation to societal change, with higher projections where intermittent generation is greater which favour the benefits of flexible sources like interconnection. The need for flexibility in achieving decarbonisation is also highlighted at page 86 which states that *"in the net zero scenarios new sources of flexibility beyond generation become more important to meet peak demand*". The report confirms (page 96) that interconnectors *"play an increasingly important role providing flexibility in the net zero scenarios".*

2.8.1.5. This is emphasised in the section of the report on supply side electricity flexibility which contains a section on electricity interconnectors at page 113. This states that *"with their flexibility, interconnectors will become increasingly important as renewable energy increases. Interconnector flows operate on a market basis, with energy typically sold from the higher-priced market to the lower-priced market. Across our scenarios we model price differentials between GB and European markets and flex carbon prices which help drive trading activity. This can also provide the flexibility to help meet demand on particularly cold winter days*….

….In the net zero scenarios flows become more variable, with increased interconnector capacities transporting large volumes of electricity in both directions. As renewable generation capacities increase across GB and Europe, interconnectors help balance supply and demand with flows responding to price differences between countries that are increasingly driven by variable renewable generation output."

2.8.1.6. The 2020 FES confirms that in the short to medium term GB will be a net importer via interconnectors then switching to net exports by 2030 or later into the 2040s depending on the scenario. All scenarios show net exports by 2050.

[19] Which, for direct comparison with the January 2020 NOA, remains constant to 2032 (as set out in the FES Data Workbook 2020)

3. THE NATIONAL NEED FOR AQUIND

3.1.1.1. The evidence in favour of increasing interconnection between the GB and European markets is compelling. The Needs and Benefits Report set out the wealth of the Government support for additional interconnection between the GB and European markets, supported by analysis from National Grid ESO. The latest NOA analysis outlined above, and the increased need for flexible electricity systems to cope with the transition to renewable supply (highlighted by the Global Energy Review 2020), further reinforces the message.

3.1.1.2. AQUIND Interconnector will significantly increase the cross-border capacity between GB and France delivering an additional 2GW of capacity on the congested GB-French border. AQUIND will be the largest GB interconnector built since IFA in the 1980s.

3.1.1.3. The contribution of AQUIND Interconnector towards energy security, consumer welfare and integration of renewables is significant and plainly in the national public interest. This section draws on the information already contained in the Needs and Benefits Report, as supplemented by the further evidence outlined earlier, to highlight the overriding need for AQUIND Interconnector, in the context of the 'energy trilemma'.

REDUCING ELECTRICITY PRICES FOR GB CONSUMERS AND INCREASING SOCIAL WELFARE:

- Wholesale electricity prices are higher in GB than in other countries in Europe, including France. Electricity prices in GB were on average £13/MWh higher than electricity prices in France in 2018[20]. Research has shown that *the difference in prices have been driven in particular by the fact that some of our key continental neighbours tend to be better interconnected and engage in more cross-border electricity trading*[21].
- French wholesale electricity prices are expected to continue to be lower than in GB at most times in any given year for the first 15 years of AQUIND Interconnector's operation, which will result in lower prices for GB consumers (through direct access to the cheaper sources of energy and increased competition between GB generators). In the second half of 2030s, as the share of renewables in both countries continues to grow, it is expected that flows from Britain to France will be increasing. This is supported by the projections in the 2020 FES.

[20] ACER Market Monitoring Report 2018 – Electricity Wholesale Markets Volume. The average 2018 GBP to EUR rate of 1.13 was used.

[21] [redacted]

- The reduction in wholesale electricity prices as a result of AQUIND Interconnector is predicted to result in net consumer benefit ranging from between £2bn and £3.8bn over the first 25 years of operation (in net present value terms) depending on economic scenarios. This value represents the predicted reduction in spend on electricity as a result of AQUIND Interconnector when compared to the cost of generating the equivalent electricity by other means, including fossil fuels (see section 4 and **Appendix 1** for more details on the impact on consumers).
- This is supported by analysis undertaken by National Grid which concluded that the projects identified in the Clean Growth Strategy that would deliver a further 9.5GW of interconnector capacity would deliver at least £11bn of benefits to consumers over 25 years, compared to a scenario where additional power stations are built to provide GB with the same level of flexibility and security of supply[22].
- AQUIND Interconnector will also increase competition in Europe by creating new opportunities for cross-border trade. This will increase the opportunity to trade across a larger market and therefore the potential to displace more expensive generation in the importing market leading to price convergence.

ENHANCING SECURITY OF SUPPLY

- As recently recognised in the Global Energy Review 2020, electricity security is at the heart of modern economies;
- Greater interconnection creates significant security of supply benefits and reduces the need for additional investments in firm capacity in both markets. Interconnectors provide GB with greater access to other energy resources, particularly during times were the GB energy system is facing "system stress"[23].
- AQUIND Interconnector will, by providing an additional connection capacity of 2GW with France, improve the UK's energy security by helping to meet increasing demand for electricity and closure of existing energy generation in the UK;
- AQUIND Interconnector will provide a reliable alternative source of electricity for GB and French consumers and network users over its operational life. The nature of interconnection technology is such that AQUIND is projected to achieve over 98% technical availability over its operational period, significantly higher than most conventional thermal assets;

[redacted]

[23] FTI, AQUIND Interconnector, Reducing the cost of transition to Net Zero for GB energy consumers, 2020. Available at: [redacted]

- AQUIND Interconnector, like other Interconnector projects, can deliver flexibility to balance supply and demand, to facilitate the integration of renewable generation; The delivery of state of the art VSC technology will provide more flexible interconnection between GB and France;AQUIND Interconnector will also be able to participate in the GB Capacity Market, which has been set up as an auction system through which resources (generators, interconnectors and demand-side response) can contribute to ensuring an adequate capacity margin across GB. By increasing the pool of participants, AQUIND Interconnector will contribute to (i) reducing the average price at which a given level of system security can be achieved or (ii) an increase the level of security of supply in the system (or a combination of the two).[24]
- The benefits to security of supply are quantified through estimated impact on reducing Expected Energy Not Served (EENS)[25]. The value of EENS benefits for network users in connected markets to be created by AQUIND Interconnector is estimated, depending on a scenario, in the range between £91m and £517m in net present value terms over a 25 operational period; and
- AQUIND Interconnector also delivers additional security of supply benefits through improved system stability - through the improved transient stability, voltage stability, and frequency stability of the power system in GB and France.

INTEGRATION OF RENEWABLES AND CONTRIBUTION TO CO2 REDUCTIONS

- Renewable energy is expected to meet the majority of the country's increasing electricity needs and significant progress is being made through major investment in wind and solar power. These technologies are, however, intermittent by their nature;
- Interconnectors enable countries to collaborate and use renewable energy more efficiently by providing instant responsiveness to changes in renewables generation. Where conditions are poor in the UK more can be imported and vice versa. Put simply, interconnectors enable electricity to be moved from where supply is abundant to where supplies are needed. The contribution that AQUIND Interconnector can make in facilitating a transition to more renewable energy is specifically recognised in the Relevant Representation response from Havant Friends of the Earth (RR-057);
- Interconnectors therefore complement renewable energy generation in the UK by facilitating their integration into European energy markets;

[24] FTI (2019) report for National Grid Ventures, identified that interconnectors "contribute greatly to GB security of supply by enabling the import of electricity at times of so-called 'system stress', when GB might have insufficient generation available to meet the country's needs" (link).

[25] i.e. the annual electricity demand that is expected not to be met by electricity generation, which represents an indicator of security of supply as explained at para 2.3.3.6 of the Needs and Benefits Report.

- France is able to provide a source of clean energy as the French energy network is considered to be low carbon. For reference, in 2017 (the most recent data) the UK residual grid carbon intensity was 367 gCO2/kWh whereas the French residual grid carbon intensity was 57 gCO2/kWh.
- In 2019, the UK Committee on Climate Change (CCC) recommended new UK greenhouse gas targets of net zero by 2050[26]. Several studies have pointed to the role of increased GB-EU interconnection as the least cost means of achieving such decarbonisation targets[27].
- By facilitating better integration of renewable sources AQUIND Interconnector will also help to achieve national decarbonisation targets in both GB and France by contributing to CO2 emissions reductions. AQUIND Interconnector would allow the expected increase in renewable capacity in both GB and France to translate into a greater flow of low-cost renewable electricity across the two countries[28].
- The costs and benefits of the integration of renewable energy sources are valued as part of the total Social Economic Welfare (SEW) for AQUIND Interconnector and can also be estimated in terms of Mtonnes of CO_2. AQUIND Interconnector is estimated to lead to a net reduction in emissions of approximately 1.53m tCO2e[29] over its projected operational lifespan.
- This is supported by the findings of the independent report on the role of AQUIND Interconnector in achieving Net Zero, which also showed that AQUIND Interconnector will help reduce the costs of achieving Net Zero targets to British consumers by over £2.3bn[30].

3.1.1.4. The wider economic benefits of AQUIND are also substantial. Out of the total investment of £1.2bn, the investment in the UK onshore components of the project are estimated to comprise £0.4bn with the potential to increase overall economic activity in the UK by over £1.1bn[31].

3.1.1.5. The construction of the onshore components in the UK will generate over 250 direct jobs (as well as around 100 additional indirect and induced jobs). Further 250-275

[26] Committee on Climate Change, "Net Zero – The UK's contribution to stopping global warming", published 2 May 2019.
[27] E3G, "UK-EU Electricity Interconnection: The UK's low carbon future and regional cooperation after Brexit", Briefing paper published January 2019. [redacted] (page 6)
[29] Environmental Statement - Volume 1 - Chapter 28 Carbon and Climate Change [APP-143]
[30] [redacted]
[31] Based on Civil Engineering Contractors Association and Centre for Economics and Business Research (2018). 'The social benefits of infrastructure investment'. P.52. [redacted] which found that every £1bn of infrastructure construction increases overall economic activity by £2.84 bn

jobs are expected to be created during the installation of marine components, which requires support of various local marine service providers. The total employment generation[32] has the potential to contribute to a GVA of up to £26 million per year for the duration of the construction phase.

3.1.1.6. In summary, it is evident that AQUIND Interconnector would deliver substantial socio-economic and environmental benefits on the national scale by delivering energy security, integration of renewable sources and consumer benefits and contributing to major investment into UK infrastructure.

[32] Up to 590 FTE jobs including direct, indirect and induced jobs and taking into account potential displacement.

4. LOCAL AND REGIONAL BENEFITS

4.1.1.1. There is a clear and compelling national need for AQUIND Interconnector - as established in the preceding sections of this Addendum. The national scale benefits of AQUIND Interconnector of increasing social welfare, enhancing security of energy supply and integration of renewables would benefit the UK population as a whole, as would the substantial investment in energy infrastructure and contribution to wider economic activity. This section briefly addresses some of the benefits that would be specific to the local and regional level.

4.1.2. EMPLOYMENT GENERATION

4.1.2.1. As recognised in Chapter 25 of the ES, the construction of the Proposed Development is relatively specialised with elements of construction requiring specialist contractors. A large proportion of the total potential number of jobs created would be drawn from outside the region. Some aspects of construction can, however, be undertaken by local contractors and provide opportunities for local businesses – with the potential to generate around 90 regional jobs for the duration of the construction period.

4.1.2.2. Workers coming from outside the region are likely to stay in the local area and would support local business through expenditure on materials and services during construction.

4.1.3. HOUSEHOLD SAVINGS

4.1.3.1. As outlined in section 3 and **Appendix 2** the total UK net consumer benefit is estimated at between £2bn and £3.8bn over the first 25 years of operation.

4.1.3.2. The analysis at **Appendix 1** applies the reduction in wholesale costs to average customer consumption to estimate the potential reduction in customer bills in the South East of England. The savings as a direct result of AQUIND would be ~£3.15 per residential consumer per year in the South East Region. This represents a total annual saving of £12.3m for consumers per year in the region[33]. As noted in the Baringa analysis contained at **Appendix 1**, actual savings could be significantly larger than this for customers who opt for electrification of heat and transport.

4.1.3.3. A reduction in consumer spending on electricity will be particularly beneficial in Portsmouth, for example, which shows slower rates of economic development than the wider region[34]. The South East region currently has the highest average fuel

[33] Based on a total of 3,906,700 domestic meters in the South East [redacted]

[34] https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/regionaleconomicactivitybygrossdomesticproductuk/1998to2018

poverty gap[35] in England. Portsmouth City Council are actively taking measures to support households struggling to pay energy bills, with 12.1% of households in Portsmouth (11,000 households) in fuel poverty[36].

4.1.4. FLEXIBLE AND CLEAN SUPPLY

4.1.4.1. We have addressed the benefits of flexibility of electricity supply on a national scale and the in terms of contribution to better energy security. On a regional level, the South East is the most populated region in the country (and projected to grow[37]) with high demand for electricity, which is not met by generation capacity within the region.

4.1.4.2. The South East[38] consumes the largest amount of electricity of any region in the county (13.5%, or 37,466 GWh according to the latest statistics from BEIS[39]) including domestic consumption that is higher than the national average and the largest number of domestic electricity metres (at around 3.91m growing from 3.76m in 2013 [40]).

4.1.4.3. The South of England (including Hampshire, Portsmouth and Surrey) rely on back up gas generation for the majority of the time, which consequently has a direct correlation with carbon intensity[41].

4.1.4.4. AQUIND Interconnector could therefore deliver additional benefits to consumers in the South East by offering a flexible source of electricity to an area that is characterised by a concentration of local demand along with insufficient local clean power generation capacity.

4.1.5. BUSINESS RATES

4.1.5.1. Non-Domestic Rates, more commonly known as business rates, is a form of taxation paid by owners or occupiers of commercial property in England, with the amount of rates payable based on the rateable value of the property. The majority of the rateable infrastructure for the AQUIND Interconnector in the UK (including the Converter Station) would be located within the area for which Winchester City Council are the responsible billing authority.

4.1.5.2. Since AQUIND Interconnector's Converter Station will be a bespoke asset, it is difficult to accurately determine the market value and therefore the applicable

[35] i.e. the reduction in fuel bill that a fuel poor household needs in order to not be classed as fuel poor

[36] https://www.portsmouth.gov.uk/ext/news/new-energy-and-money-saving-website-launched-to-tackle-fuel-poverty-in-portsmouth

[37] The population within Hampshire alone is forecast to grow by around 64,000 by the time the AQUIND Interconnector would be operational in 2024 with a forecast increase of an additional 47,500 additional dwellings https://www.hants.gov.uk/landplanningandenvironment/facts-figures/population/estimates-forecasts#step-2

[38] Which excludes London for the purposes of reporting in the BEIS statistics

[39] [redacted]

business rates at this stage. This will be carried out at a later stage through engagement with the Valuation Office Authority. The IFA Interconnector, however, provides the most directly comparable proxy for business rates (the IFA Interconnector has the same 2GW capacity and is similarly located on the south coast). The IFA Interconnector has a rateable value of £4,150,000 in the 2017 business rates list. Using the current Uniform Business Rates (UBR) multiplier this equates to rates payable of over £2m per annum from commencement of operation. Under the business rates retention arrangements introduced from the 1st April 2013, authorities keep a proportion of the business rates paid locally.

5. COMMERCIAL USE OF FIBRE OPTICS CABLES

5.1.1.1. As set out in the Statement in Relation to Development Associated with AQUIND Interconnector (document reference 7.7.1) the industry standard single Fibre Optic Cable (FOC) has up to 192 fibres, but the number of fibres required for cable protection purposes is less than this. There will therefore be spare capacity on the fibre cables forming part of the Proposed Development.

5.1.1.2. Whilst it would be possible to install a cable with fewer fibres in connection with the operation of the Project only (and therefore less spare capacity) this would not alter the appearance, characteristics or impacts to any degree. There is no benefit to such an approach being taken and it is considered this would limit the overall benefits to be provided by the Proposed Development.

5.1.1.3. For the reasons set out below, we consider that it would be highly beneficial, in particular from a UK telecoms policy perspective, to utilise the spare FOC capacity for commercial use.

5.1.2. THE IMPORTANCE OF SUBSEA FIBRE OPTIC TELECOMMUNICATIONS CABLES

5.1.2.1. It is estimated that approximately 99% of international telecommunications is transmitted through subsea telecommunications cables[42]. Fibre optic cables are preferred over satellite as a means of transmitting data since, on a bit-for-bit basis, fibre optic cables can carry far more data at a lower latency and at far less cost than satellites.

5.1.2.2. Today, over 1.2m kilometres[43] of submarine cables span the globe and, together with the telecoms exchanges and data centres to which they connect, form the backbone of the internet.

5.1.2.3. International subsea fibre optic cables are often a crucial part of the telecoms infrastructure required to enable an individual/entity/machine located in one country to send data to (or receive data from) an individual/entity/machine located in another country (particularly where the two countries are in different continents).

5.1.3. GROWTH IN DEMAND FOR INTERNATIONAL BANDWIDTH

5.1.3.1. Fibre optic cables are limited by the volume of data they can transmit over a given amount of time (i.e. the capacity or 'bandwidth'). The capacity of a fibre optic cable may be able to be increased through system upgrades and developments in data

[42] Submarine Telecoms Industry Report 2019/2020, p. 14 [redacted]

transmission and compression technology, but eventually a new cable will likely be required in order to increase fibre capacity between two countries/continents (this is borne out by statistics, which show that submarine cables with a combined construction cost of $7.9 billion (£6.1 billion) entered service between 2016 and 2018, with every major subsea route seeing new cables being deployed during this timeframe[44]).

5.1.3.2. Demand for international bandwidth is more than doubling every two years[45], as businesses, governments, organisations, and the public become ever more reliant on interconnectivity and expect to be able to send and receive increasingly large volumes of data at the same (or faster) speeds.

5.1.3.3. Whereas data capacity requirements have previously been based on general internet traffic, more recently there has been a surge in demand for capacity from content providers such as Facebook, Netflix and Amazon (who are streaming vast quantities of video content to users). There has also been a significant growth in the 'cloud computing' market meaning that cloud hosting and services organisations, such as Microsoft, AWS and Google, are also now becoming major players in the global fibre capacity market.

5.1.3.4. It is anticipated that demand for submarine cable capacity will continue to grow in this way for the foreseeable future.

5.1.3.5. Leasing 'dark fibre' (i.e. utilising unused fibre capacity such as the surplus capacity in the Proposed Development) allows bandwidth users to scale their bandwidth up and down in a flexible manner according to demand, without having to purchase or invest in additional bandwidth which they may not need to use all the time. Access to dark fibre is also particularly desirable for content providers and major social media platforms (including Netflix and Facebook) as it allows a secure connection between data centres and reduces the risk of piracy and data breaches.

5.1.4. UK TELECOMS INFRASTRUCTURE POLICY AND REGULATORY MEASURES

5.1.4.1. UK telecoms infrastructure policy presents a particularly compelling case for utilising the spare FOC capacity within the Proposed Development.

5.1.4.2. The UK Government has set a number of ambitious targets in relation to the rollout of next generation, gigabit-capable telecoms network infrastructure in the UK, in particular:

- to have 15 million premises connected to full fibre (i.e. gigabit-capable fibre-to-the-premises) by 2025, with coverage across all parts of the UK by 2033; and

44 [redacted]
45

- the majority of the population to have 5G coverage by 2027 (note that although mobile network signals are transmitted via radio waves between handsets and cell towers, the signal is then routed through the relevant mobile operator's fibre backhaul and, if the recipient of the call or message is in another country, it will likely be transmitted via submarine cables to reach its destination).

5.1.4.3. In addition, the Department for Culture, Media and Sport (DCMS) envisages that a nationwide switchover from legacy copper networks to new fibre networks will be in full swing by 2030.[46]

5.1.4.4. Ofcom (the independent UK communications regulatory authority) has for some time now also recognised that investment in the UK's telecoms infrastructure is needed to meet growing and future demand for ultrafast broadband. Ofcom has implemented a range of measures which support UK telecoms policy and which are designed to create the best possible conditions for companies to invest in ultrafast broadband so customers in all parts of the UK can enjoy the benefits it provides. This has resulted in a number of alternative network operators having begun new fibre rollout, and coverage of full fibre has more than tripled, from 3% to 10%, in three years since 2018. Ofcom is currently consulting on plans for further regulation of the fixed telecoms markets that underpin broadband[47], mobile and business connections, to further spur new fibre rollout.

5.1.4.5. This step-change in connectivity and availability of high-speed internet will in turn enable wide-scale roll-out and adoption of a host of new technologies (such as streaming of ultra HD content, the Internet of Things, autonomous vehicles and virtual reality to name a few), thereby driving a shift in our usage of telecoms networks and connected devices towards increasingly data-intensive applications. All of this is likely to lead to a surge in the UK's demand for international bandwidth (including cross-Channel bandwidth) over the next decade.

5.1.4.6. To meet this demand, telecoms service providers are already investing heavily in fibre networks, including submarine cables, however such investment is risky for a number of reasons including sunk costs, uncertainty about mass market willingness to pay for higher speeds, long pay-back periods and regulatory uncertainty. For this reason, DCMS recognises that opening up access to existing (non-telecoms) utilities' infrastructure (including access to spare FOC capacity or 'dark fibre') will be an important part of the solution when it comes to rolling out next generation telecoms infrastructure in order to meet the Government's objectives: '*Making sure existing, non-telecoms infrastructure can be used, as far as possible, is critical to enabling deployment at pace and supporting market entry […] the potential for the reuse of*

[46] DCMS: Future Telecoms Infrastructure Review (July 2018), https://www.gov.uk/government/publications/future-telecoms-infrastructure-review

[47] [redacted]

infrastructure assets includes not only the re-use of multi-utility ducts and poles, but also […] fibre embedded in power cables.'[48]

5.1.4.7. AQUIND Interconnector can meet some of the UK's additional bandwidth demand by delivering additional cross-Channel fibre capacity at the same time as the HVDC cable installation, thereby avoiding the considerable cost, disruption and risks of building and laying duplicative passive infrastructure to house new FOC infrastructure.

5.1.4.8. Taking advantage of these kinds of synergies will not only reduce the time it takes to rollout the required national infrastructure to achieve the Government's objectives, but will also contribute to the long-term benefits of increased connectivity and its 'positive relationship with economic growth and productivity' in the UK[49].

5.1.4.9. The benefits of the proposals for AQUIND Interconnector to house commercial fibre has been recognised by Ofcom[50]. The Ofcom consultation in relation to AQUIND's application for Code powers states that *"We expect the proposed full fibre network, facilitated by the deployment of the UK Transmission Links in conjunction with the Aquind Interconnector Fibre, to improve the quality of services available and help meet the growing needs of consumers and businesses for connectivity. As the Applicant is a new provider, we expect the provision of its proposed network to improve competition and customer choice"* before explicitly recognising that the network planned by the Applicant *"would be a benefit to the public".*

5.1.4.10. Ofcom also recognise the environmental benefits of futureproofing demand, finding that "Network sharing will help to minimise the unnecessary proliferation of electronic communications apparatus, bringing environmental benefits aligned with long standing Government objectives in the public interest".

5.1.5. SUMMARY

5.1.5.1. The needs and benefits of utilising the spare FOC capacity within the Proposed Development for commercial use can therefore be summarised as follows:

- Meeting future UK and global demand for fibre capacity – additional fibre capacity will almost certainly be required between France and the UK over the next decade and beyond, as a result of improvements in national telecoms infrastructure and increases in the volumes of data consumed and transmitted by individuals and organisations as we become increasingly reliant on data-intensive technologies and services.

[48] DCMS: Future Telecoms Infrastructure Review (July 2018), https://www.gov.uk/government/publications/future-telecoms-infrastructure-review

[49] DCMS: Future Telecoms Infrastructure Review (July 2018), https://www.gov.uk/government/publications/future-telecoms-infrastructure-review

[50] "Proposal to apply Code powers to Aquind Limited" dated 21 January 2020, [redacted]

- Helping the UK to achieve its telecoms infrastructure policy and strategy – making the spare fibre capacity within the Proposed Development available will support the ambitious targets which the UK Government has set for rollout of gigabit fibre-to-the-premises broadband and 5G networks, all of which will rely to some extent on there being sufficient cross-Channel fibre capacity to transmit data between the UK and the rest of Europe.
- Cost efficiency and environmental benefits – leasing out the spare capacity within the Proposed Development will provide potential customers with a scalable, secure and cost-efficient and environmentally beneficial alternative to laying additional fibre cables to meet future capacity (which is costly, risky and disruptive).

5.1.5.2. Given the considerable benefits of utilising spare fibre capacity for commercial use outlined above, there is no rationale for adopting an approach that would not allow for the use of the fibres for commercial purposes, in addition to their primary use in connection with the operation of AQUIND Interconnector

APPENDIX 1 - AVERAGE UK HOUSEHOLD SAVING

AQUIND reduces customer bills by ~£3.15 in the South East

GB wholesale price projections from Baringa Market scenario from 2024 to 2033, have been used to calculate the potential annual cost saving to residential consumers. These wholesale price projections were produced with and without the addition of AQUIND Interconnector in the economic modelling. These were then compared to calculate AQUIND Interconnector's impact on wholesale prices in GB. This provides the reduction in wholesale prices that AQUIND Interconnector provides.

We have then taken this wholesale price impact and considered the impact on consumers. A key assumption is that a reduction in wholesale prices is passed directly through to the consumer. This assumption is commonly used, including for example, by Ofgem, and was applied for these calculations. It should be noted that the wholesale price constitutes ~50% of a consumer bill – the remainder being made up of network charges, operating cost and environmental and social obligation costs[51]. These additional costs are unaffected by the reduction in wholesale cost.

The reduction in wholesale cost is then applied to average customer consumptions[52]. Consumption differs by region, sometimes fairly significantly, so regional consumption figures were used in the calculations. The analysis was done for every year in a 10 year time span from commissioning in 2024, to understand how this differs with projected wholesale prices. This resulted in savings of ~£3.15 per residential consumer per year in the South East region – above an average UK saving of ~£2.88. The average saving in the South West was ~£2.19, and the Southern region as a whole ~£2.17.

Actual savings could be significantly larger than this for customers who opt for electrification of heat and transport. Consumer consumption patterns increase significantly for these customers – some studies predict an increase of 200-300% on current electricity consumption with both heat and transport electrified. These customers will benefit more from reduced wholesale prices. More broadly, if electrification of heat and transport accelerates faster than expected this will likely also drive up electricity prices, as demand increases relative to supply. These eventualities have not been modelled explicitly, but are possible scenarios given the expanding appetite for decarbonisation that is reflected in policy making.

There could also be additional benefits of AQUIND Interconnector in the South of England. The South of England tends to be a demand constrained area due to the concentration of local demand and lack of local power generation capacity. There are two ways that AQUIND Interconnector could lead to additional cost reduction for consumers by importing from France and offering a source of flexibility in the South:

[51] https://www.ofgem.gov.uk/data-portal/breakdown-electricity-bill

[52] [redacted]

- Transmission constraint resolution – alleviates pressure on the transmission network from reducing requirement of GB North to South power flow (AQUIND is expected to import into GB for the majority of the time)
- Distribution constraint resolution – potentially alleviates pressure on specific distribution network nodes, which would be otherwise demand constrained

APPENDIX 2 – OPTIMAL INTERCONNECTOR CAPACITY

AQUIND's CBA prepared by Baringa considers the optimal capacity on the GB-French border by calculating the total project benefits under a range of interconnector investment assumptions.

- The Market Scenario assumes a total GB-French cross-border capacity of 5.4 GW, with AQUIND taking the total capacity to 7.4GW from 2024.
- The Low Commodities Scenario assumes a total GB-French cross-border capacity of 4GW, with AQUIND taking the total capacity to 6GW from 2024.
- The High Commodities/Renewables scenario assumes a total GB-French cross-border capacity of 5.4GW with AQUIND taking the total capacity to 8.8GW from 2024, with a subsequent 1 GW of capacity built in 2030 taking the total to 8.8 GW.
- The High Interconnector sensitivity starts with the Market Scenario but adds an additional 1 GW of GB-French capacity in 2030 (in addition to AQUIND).

Table 1 shows the CBA results for AQUIND Interconnector in total and specifically in terms of net consumer benefits in Great Britain across each of these three scenarios and additional sensitivity.

Table 1 AQUIND CBA with a range of GB-French interconnection capacity assumptions[53]

Scenario/Sensitivity	GB-French capacity (GW)	CBA –Total welfare EU and GB (£m, NPV)	UK net consumer benefit (£m, NPV)
Market Scenario	7.4	424	2,055
Low Commodities	6	143	3,796
High Commodities	8.8	459	3,516
High Interconnection (Market Scenario plus 1.4GW)	8.4	195	2,225

We conclude from this simple comparison that AQUIND's CBA is robust across a range of interconnector capacity additions up to 8.8GW on the GB-French border. This leads us to a conclusion that there is demand for interconnection on the GB-France border in excess of 8 GW suggesting that based on this analysis, the optimal capacity on the GB-French border is in excess of 8 GW

[53] Comparing scenarios, as shown in Table 19, we note that the different scenarios include a range of other assumptions changes, not just differences in GB-French interconnector capacity. The High Interconnector sensitivity provides a direct reference point to the Market Scenario, with the only change being the additional of interconnector capacity on the GB-France border.