XLINKS MOROCCO-UK POWER PROJECT

Statement of Need

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Prepared by:

Humbeat Ltd

Prepared for:

Xlinks 1 Limited

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Acronyms

Acronym	Meaning
BESS	Battery Energy Storage System
BEV	Battery Electric Vehicle
CCC	The Climate Change Committee
CCGT	Combined Cycle Gas Turbine
CCUS	Carbon Capture Use and Storage
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC)
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
DUKES	Government's Digest of UK Energy Statistics
FES	National Grid ESO's Future Energy Scenarios
GHG	Greenhouse Gas
HVDC	High Voltage Direct Current (Transmission Line)
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
LCOE	Levelised Cost of Energy
NDC	Nationally Determined Contributions
NESO	National Energy System Operator (was NGESO)
NETS	National Electricity Transmission System
NGESO	National Grid Electricity System Operator (now NESO)
NIC	National Infrastructure Commission
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PA	Planning Act
PV	Solar Photovoltaics
SP	Settlement Period (of the GB electricity market)
REPD	Government's Renewable Energy Planning Database
TEC	Transmission Entry Capacity
WMO	World Meteorological Organisation

Units

Units	Meaning
GWh / GW	Gigawatt hour (energy) / gigawatt (power). 1GW = 1,000 MW
kWh / KW	Kilowatt hour (energy) / kilowatt (power). 1MW = 1,000 kW
MtCO2 / MtCO2(e)	Million tonnes of carbon dioxide / Million tonnes of carbon dioxide equivalent
MWh / MW	Megawatt hour (energy) / megawatt (power)
TWh / TW	Terawatt hour (energy) / terawatt (power). 1TW = 1,000 GW

1 EXECUTIVE SUMMARY

1.1.1 This Statement of Need provides relevant legal, policy, and industry evidence in support of the urgent need to reduce carbon emissions from electricity generation and actions to support the security and reliability of electricity supplies in the UK. It also provides evidence in support of the benefits brought forward by the Proposed Development in relation to enabling a low-carbon, reliable, secure, and affordable energy system for consumers.

1.1.2 The policy basis for the determination of the application is set out in the **Planning Statement (Document Ref. 7.2)**. The Planning Statement explains why the Applicant considers that the Proposed Development, including the specified elements, should be determined under Section 104 of the Planning Act 2008 in accordance with the appropriate National Policy Statements (NPSs), and therefore where the NPSs contain policies relevant to the Proposed Development those should be given substantial weight by the SoS. In this case, this Statement of Need provides additional support to the arguments made in the NPSs which support the Critical National Priority for the Proposed Development because of the significant national security, economic, commercial, and net zero benefits the Proposed Development will enable for the UK.

1.1.3 However, if the SoS does not accept that this is the case, and instead the Proposed Development is determined under Section 105 of the PA 2008, this Statement of Need also provides evidence in support of the benefits brought forward by the Proposed Development in relation to enabling a low-carbon, reliable, secure and affordable energy system for consumers. In this case, the relevant NPSs are important and relevant considerations to the Application, rather than requiring the Proposed Development to be determined in accordance with them as a matter of law.

1.1.4 This Statement of Need concludes that the benefits brought by the Proposed Development to the national urgent need to reduce UK carbon emissions while ensuring a reliable, secure, and affordable supply, should be accorded very significant weight when assessing the planning balance.

1.1.5 Urgent and unprecedented actions are required on a global scale to halt climate change. A rapid increase in the supply of low carbon electricity is needed for the UK to meet its legally binding climate change targets. Increasing the supply of energy from renewable sources is a critical part of the UK's strategy to achieve net zero by 2050, a key step towards which is the government's national mission for 'Clean Power by 2030'.

1.1.6 However, the need for new clean power does not stop at 2030. The continued delivery of low-carbon generation facilities beyond 2030 is necessary to meet future electricity demand growth and achieve essential wider societal carbon savings. It is also important to continue to bring forward schemes in case 'Clean Power by 2030' is not achieved.

1.1.7 The NPSs do not set out any maximum targets for low-carbon infrastructure development [Ref. 1, Para 3.2.3]. The UK should be developing as much low-carbon infrastructure as is possible, and as quickly as possible, to meet the urgent need to reduce carbon emissions while ensuring a reliable, secure, and affordable supply.

1.1.8 Government has therefore concluded that there is a Critical National Priority for low-carbon infrastructure to come forward urgently to achieve the UK's energy objectives of delivering a low-carbon, secure, and affordable energy system. The Proposed Development is within the definition of Critical National Priority Infrastructure set out in the National Policy Statements. If the Proposed Development is determined under Section 104 of the Planning Act 2008, the policy test set out in NPS EN1 is that: *"Subject to any legal requirements, the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy. Government strongly supports the delivery of CNP Infrastructure and it should be progressed as quickly as possible"* [Ref. 1, Para 3.3.63].

1.1.9 The NPSs also confirm that assets which provide flexibility to the national electricity system, or to the energy system generally, are also needed to achieve national decarbonisation and energy security aims. The Proposed Development, which is critical infrastructure to transmit low carbon energy from an internationally located solar, onshore wind, and storage facility to the UK's electricity system, is therefore fully aligned with the government's aims.

1.1.10 Decarbonisation will increase demand for electricity. Policies are already in-flight which are increasing, or are set to increase, electricity demand. Therefore, a significant number of new low-carbon electricity schemes, including the Proposed Development, are required to meet that demand and enable an energy system which is consistent with the UK's objectives to reduce carbon emissions while ensuring a reliable, secure, and affordable supply.

1.1.11 Progress has been made in the development of different low-carbon electricity generation technologies in the UK and globally. However, many of the technologies with potential to play a role in the delivery of a net zero energy system currently have uncertain delivery timescales. All techno-commercial elements of the Proposed Development and the international generation assets to which it connects, are already proven in delivery at or approaching the scale proposed, in the UK or globally. Developments with the proven ability to achieve carbon savings comfortably within the next decade, such as the Proposed Development, are essential to keep the UK on its legally binding carbon reduction path.

1.1.12 Being comprised of many multiples of standard solar, wind, and battery storage components, should consent be achieved for all parts of the Project, including the Proposed Development, the construction and commissioning phase of the project development process would be able to proceed with pace to support the urgent need to enable carbon emission reductions in the UK.

1.1.13 The Proposed Development allows for a maximum export of 3.6GW to the UK's electricity system and the Applicant's analysis indicates that through the course of a year, energy exported from the international generation assets will be equivalent to approximately 18 hours of full export a day (i.e. an annual load factor of approximately 75%). The Proposed Development therefore presents a unique opportunity to connect a high capacity, high load factor low-carbon energy source to the UK electricity system through a single existing grid connection point, with a proposed first connection date in 2030.

1.1.14 This is a material issue when considering how the UK is to meet the urgent need for low-carbon generation as is set out in the NPSs, given the current constraint in configuring existing connections and delivering new connections for proposed low-carbon electricity generators in the UK.

1.1.15 The location of the Proposed Development enables the Project to make use of existing and available grid infrastructure. Further, no adverse grid operability effects or curtailments are anticipated because of connecting the Project to the UK's electricity system through the Proposed Development. The location of the Proposed Development is away from areas of the electricity system which have already been identified as needing network and capacity upgrades to support existing and new generation capacity connections.

1.1.16 The Proposed Development is needed so that the Project's international generation assets can enable an energy system that meets the Government's objectives to create a secure, reliable, and affordable energy supply for consumers to security of supply. Aggregated generation output from wind, solar, and storage is more predictable, less variable, and more flexible than output from a single generation technology, providing security and reliability of supply benefits for consumers.

1.1.17 Reliable and flexible low-carbon electricity supplies are needed to support a high level of reliability and security of energy supply for consumers. Storage facilities also contribute to security of supply by storing energy when it is generated in abundance and releasing it to the grid when it is needed. Storage facilities also provide grid balancing services which are essential for the safe and secure operation of the UK's electricity system.

1.1.18 Solar and onshore wind facilities are already among the cheapest form of electricity generation in the UK and globally. By generating low carbon electricity from low-cost, large-scale renewable supplies, the more expensive and more carbon intensive forms of generation are displaced from the grid. Low-cost, large-scale renewable supplies therefore enable a reduction in carbon emissions from UK generated electricity and lower the market price of electricity.

1.1.19 The generating facilities located in Morocco which are proposed to connect to the Proposed Development include co-located onshore wind, solar, and storage. The profile of low carbon energy generated at the Moroccan facilities would increase the diversity of supplies to the UK, complementing UK-based renewable supplies.

1.1.20 In combination, and at the capacities proposed, the facilities at Guelmim Oued Noun would also provide a significant element of dispatchability to the Proposed Development, meaning that it can be considered more as 'firm' generation rather than renewable generation. This will bring benefits to the UK by reducing the need for alternate back-up generation assets and displacing carbon-emitting thermal generation from the UK's energy system.

1.1.21 In summary, a significant capacity of low-carbon generation is urgently needed to enable carbon emission reductions in the UK. The Proposed Development will, if consented, transmit low-cost, large-scale renewable supplies from an international generation facility to the UK's electricity system. By doing so, the Proposed Development will address the climate change emergency that affects everyone's lives and the environment, by playing an important role in enabling an energy system with secure, low-carbon, and affordable supplies.

2 PURPOSE AND CONTEXT

2.1 Introduction

2.1.1 Xlinks 1 Limited (the Applicant) proposes to develop a new electricity generation facility entirely powered by solar and wind energy combined with a battery storage facility. Located in Morocco's renewable energy rich region of Guelmim Oued Noun, it will be connected exclusively to Great Britain via 4000km (2485 miles) HVDC sub-sea cables.

2.1.2 The Project comprises all of the elements which are expected to be delivered as part of this development, namely:

- 4GW onshore wind located in Guelmim Oued Noun, Morocco
- 7.5GWp single axis tracker solar PV, also located in Guelmim Oued Noun, Morocco
- 5GW / 22.5GWh storage, also located in Guelmim Oued Noun, Morocco
- HVDC sub-sea cables, allowing for a maximum export of 3.6GW to the UK's National Electricity Transmission System (NETS) at National Grid's Alverdiscott substation

2.1.3 The Proposed Development comprises all offshore elements of the Project which lie within the UK Exclusive Economic Zone (EEZ), as well as the onshore elements situated within the administrative areas of Torridge District Council and Devon County Council.

2.1.4 A direction was made on 26th September 2023 confirming the Secretary of State's conclusion that the Proposed Development is nationally significant and directed that development consent is required for the converter stations. The annex of the Secretary of State direction explains that:

"The Proposed Project is of national significance, taking into account that it forms part of a generation project which is comprised of 11.5GW of renewable power in Morocco, which is intended to deliver 3.6 Gigawatts (GW) of low carbon electricity to the UK's grid and could improve the security and diversity of the UK's electricity supply.

The Proposed Project could play an important role in enabling an energy system that meets the UK's commitment to reduce carbon emissions and the Government's objectives to create a secure, reliable and affordable energy supply for consumers" [Ref. 2].

2.2 Purpose

2.2.1 Section 1.4 of the **Planning Statement (Document Ref. 7.2)** describes that the Proposed Development is classed as a project of national significance by a Section 35 direction made by the Secretary of State on 26 September 2023. This direction confirmed that elements of the Proposed Development should be treated as development for which development consent is required. Energy NPSs have effect for decisions by the SoS on applications for energy developments that are nationally significant under the PA 2008.

2.2.2 Further, Section 1.4 of the **Planning Statement (Document Ref. 7.2)** sets out the reasons why the Applicant considers that the Proposed Development, including the specified elements, should be determined under Section 104 of the PA 2008 in accordance with the appropriate NPSs, and where the NPSs contain policies relevant to the Proposed Development those should be given substantial weight by the SoS.

2.2.3 If the SoS does not accept that this is the case, the **Planning Statement (Document Ref. 7.2)** also considers the planning balance should the Proposed Development be considered under Section 105, with the relevant NPS as an important and relevant consideration, rather than requiring the Proposed Development to be determined in accordance with it as a matter of law.

2.2.4 This Statement of Need does not seek to set out the policy basis for the determination of the application in any detail (this is set out in the **Planning Statement (Document Ref. 7.2)** but summarises policy as the starting point for establishing need for the Proposed Development, whether the Proposed Development is to be determined under Section 104 or Section 105 of the Planning Act 2008.

2.2.5 This Statement of Need therefore describes how and why the Project will deliver benefits which are consistent with those deriving from the development of renewable energy infrastructure as set out in government policy, and specifically how the Proposed Development will play an important role in enabling an energy system that meets:

- The UK's commitment to reduce carbon emissions
- The Government's objectives to create a secure, reliable and affordable energy supply for consumers

2.3 The need to reduce carbon emissions globally

2.3.1 The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties, including the UK government, at the UN Climate Change Conference (COP21) in Paris, France, on 12th December 2015. It entered into force on 4th November 2016.

2.3.2 The overarching goal of the Paris Agreement is to hold *"the increase in the global average temperature to well below 2°C above pre-industrial levels"* and pursue efforts *"to limit the temperature increase to 1.5°C above pre-industrial levels"* [Ref. 3, Article 2].

2.3.3 Nationally Determined Contributions (NDCs) are at the heart of the Paris Agreement and the achievement of its long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. Article 4, Paragraph 2 of the Paris Agreement requires each Party to prepare, communicate, and maintain successive NDCs that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

2.3.4 In October 2018, following the adoption by the UN Framework Convention on Climate Change of the Paris Agreement, the Intergovernmental Panel on Climate Change (IPCC), which is the United Nations body for assessing the science related to climate change, published a Special Report on the impacts of global warming of 1.5°C above pre-industrial levels.

2.3.5 This report concluded that human-induced warming had already reached approximately 1°C above pre-industrial levels, and that without a significant and rapid decline in carbon emission s across all sectors, global warming would not be likely to be contained. Therefore, more urgent international actions to decarbonise would be required.

2.3.6 Fighting climate change is a global endeavour, and commitments from countries which are party to the Paris Agreement to reduce national emissions and adapt to the impacts of climate change are critical to the achievement of its long-term goals.

2.3.7 Parties pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions. But it follows that all measures which reduce carbon emissions, including those which are domestic to one country and those which cross international borders, go towards fighting climate change.

2.3.8 The IPCC Working Group III (IPCC WG3) published its Summary of Climate Change as part of the IPCC's Sixth Assessment Report in April 2022 [Ref. 4, p44]. The IPCC WG3 report notes that although the rate of growth of average global annual greenhouse gas (GHG) emissions was lower between 2010 and 2019 than in the previous decade, average global annual GHG emissions during the last decade were higher than in any previous decade on record.

2.3.9 The IPCC WG3's global GHG emissions for four modelled scenarios are included in Figure 1. The red band shows global annual GHG emissions considering global decarbonisation policies which at the time of writing the report had been implemented. Implemented policies are likely to slow the historical increase in annual emissions but are not yet sufficient to reduce them. That is to say, policies which have already been implemented mean that global GHG emissions will continue at their current level through to 2050.

2.3.10 The purple, green, and blue bands show the IPCC's conclusions on different decarbonisation pathways, which must be followed to meet three scenarios of global temperature increases.

2.3.11 The purple band shows the decarbonisation path achieved by NDCs t o 2030 followed by the decarbonisation path required to limit temperature increase to 2°C above pre-industrial levels with a probability of at least 67%. The red band is higher than the purple band, which implies that policies implemented to date are not yet sufficient to meet 2030 NDC commitments.

2.3.12 The green band shows the decarbonisation path which will achieve the same outcome as the purple path, by increasing actions in the 2020s and overshooting current NDCs. By urgently increasing decarbonisation actions now, future year-on-year carbon reductions to meet the same outcome can be lower and therefore are likely to be more achievable.

2.3.13 The cumulative warming effect of carbon means that not delivering against plans set out for the 2020s will lead to a greater scale and urgency to future plans and their delivery in order to meet the temperature increase limit set by the Paris Agreement. Delaying the implementation of measures to deliver or enable decarbonisation increases the risk of losing the fight against climate change, whilst in the meantime ongoing climate change events and impacts are unlikely to slow or decrease, putting lives and livelihoods at risk.

2.3.14 The blue band shows the decarbonisation path which will meet the commitments of the Paris Agreement with a probability of 50%.

2.3.15 **Figure 1** shows that:

- Global climate change commitments are not yet sufficient to meet nor sustain a (likely) successful track towards containing global temperature rise below 1.5°C
- Policies implemented to date fall short even of those commitments
- The delivery of measures will be required beyond 2030 to ensure that the 2050 target is met

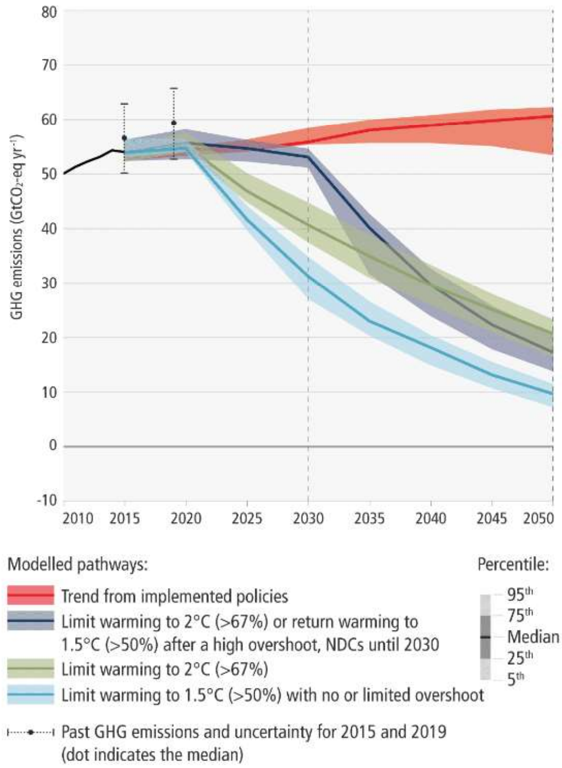

Figure 1. Representation of global GHG emissions of modelled pathways [Ref. 4, Figure SPM.4]

2.3.16 Within the context of a global climate crisis, it is paramount that the capacity of any measure which can reduce carbon emissions should be maximised to ensure that the emissions reduction it brings forwards will be as large as it can be, without being so large as to risk delivery of the Project in absolute terms, or within the timeframes required for measures to come online.

2.3.17 The IPCC WG3 report findings also imply that mitigation after 2030 can no longer establish a pathway which will likely not exceed 1.5°C global temperature increase vs. 1990, during the 21st Century.

2.3.18 The compelling need for global action to decarbonise continued to be reinforced through the IPCC's 20th March 2023 publication of its 2023 assessment of global climate change.? The report concludes that the world is likely to pass a dangerous temperature threshold within the next 10 years, pushing the planet past the point of catastrophic warming - unless nations drastically transform their economies and immediately transition away from fossil fuels [Ref. 5].

2.3.19 The Synthesis Report of the IPCC's Seventh Assessment Report will be produced after the completion of the Working Group reports and released by late 2029.

2.3.20 In a June 2024 news report which accompanied the publication of its Global Annual to Decadal Climate Update (2024 - 2028) report, the World Meteorological Organisation (WMO) stated that *“There is a 47% likelihood that the global temperature averaged over the entire five-year 2024-2028 period will exceed 1.5°C above the pre-industrial era”* [Ref. 6]. This implies that sufficient progress on fighting climate change has not yet been made and more needs to be done in both mitigation and adaption.

2.3.21 The 28th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) was held in Dubai in December 2023. At the closing statement, the UN Climate Change Executive Secretary celebrated strides made at COP28, including agreement among the parties, to *“tripling renewables and doubling energy efficiency”* as well as signalling *“the beginning of the end”* of the fossil fuel era.

2.3.22 However, on a global basis, COP28 concluded the requirement for action to abolish carbon emissions is more urgent now than ever it has been. The same is true for the UK [Ref. 7], and in July 2024, the Secretary of State for Energy Security and Net Zero met with past and future COP Presidents to discuss the need for greater urgency in tackling the climate crisis while underlining *“the UK’s determination to act as a global leader and reliable partner on climate action”* and *“the importance of the UK’s renewed domestic leadership in encouraging ambitious action abroad. Climate and clean energy are at the heart of the new government’s agenda. The UK is taking immediate action to unlock investment in onshore wind,* [and] *begin a solar revolution”* [Ref. 8].

3 UK ENERGY POLICY

3.1 Policy Introduction

3.1.1 The National Policy Statements (NPSs) set out the policy framework for large-scale energy infrastructure schemes that are nationally significant. This section of the Statement of Need summarises the policy position for the purpose of establishing the need case of the Proposed Development, rather than providing any analysis against policy (see the **Planning Statement (Document Ref. 7.2)** for further details).

3.1.2 The Overarching NPS for Energy, EN-1, states that the government's objectives for the UK's energy system are *"to ensure our supply of energy always remains secure, reliable, affordable, and consistent with meeting our target to cut GHG emissions to net zero by 2050, including through delivery of our carbon budgets and Nationally Determined Contribution. This will require a step change in the decarbonisation of our energy system"* [Ref. 1, Para 2.3.3].

3.1.3 This Statement provides evidence that the Proposed Development will deliver benefits which are consistent with the government's objectives as described in NPS EN-1.

3.2 The National Policy Statements

3.2.1 The **Planning Statement (Document Ref. 7.2)** provides an analysis of the National Policy Statements and their relevance and applicability to the Proposed Development. The critical points arising from that analysis as relevant to the need for the scheme are as follows.

3.2.2 NPS EN-1 describes that government's objectives for the energy system are:

"To ensure our supply of energy always remains secure, reliable, affordable, and consistent with meeting our target to cut GHG emissions to net zero by 2050, including through delivery of our carbon budgets and Nationally Determined Contribution."

"Meeting these objectives necessitates a significant amount of new energy infrastructure" [Ref. 1, Para 2.3.3 & 2.3.4].

3.2.3 Although *"it is not the role of the planning system to deliver specific amounts or limit any form of infrastructure"* [Ref. 1, Para 3.2.3], government expects that the UK will be powered mainly by wind and solar in 2050, therefore significant capacities of these low-carbon generation technologies will need to come forward to meet that expectation [Ref. 1, Para 3.3.20].

3.2.4 An increase in new flexible assets is also needed to support the delivery of a low carbon and reliable electricity system and to reduce costs in support of an affordable electricity supply [Ref. 1, Para 3.3.5].

3.2.5 Even with major improvements in overall energy efficiency and increased flexibility in the energy system, demand for electricity is likely to increase significantly over the coming years and could more than double by 2050 [Ref. 1, Para 3.3.3].

3.2.6 The government considers that *"It is prudent to plan on a conservative basis to ensure that there is sufficient supply of energy to meet demand across a wide range of future scenarios"* [Ref. 1, Para 3.4.29], including, for example, where the future use of new technologies is limited, or *"to ensure that there is sufficient electricity to always meet demand; with a margin to accommodate unexpectedly high demand and to mitigate risks such as unexpected plant closures and extreme weather events"* [Ref. 1, Para 3.3.1].

3.2.7 Government has therefore concluded that there is a Critical National Priority for low-carbon infrastructure to come forwards urgently to achieve the UK's energy objectives of delivering a low-carbon, secure, and affordable energy system [Ref. 1, Para 4.2.4].

3.2.8 The Proposed Development is within the definition of Critical National Priority Infrastructure set out in the National Policy Statements, and therefore:

"Subject to any legal requirements, the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy. Government strongly supports the delivery of CNP Infrastructure and it should be progressed as quickly as possible" [Ref. 1, Para 3.3.63].

3.2.9 Although not within the Proposed Development to be consented within the UK, the Project includes significant solar generation and electricity storage capacity, both technologies which are identified in NPS EN-3 as critical for the UK to achieve its energy objectives.

3.2.10 The Proposed Development is critical infrastructure which is required to deliver the Project and therefore deliver the benefits associated with it. It can therefore be considered that if the Proposed Development is not consented, the benefits arising from the Project will not materialise. Therefore the benefits deriving from the Project are considered in this Statement to be benefits deriving also from the Proposed Development.

3.2.11 The evidence presented in this Statement underpins the Applicant's case that there is a significant need for the Project, and therefore there is a significant need for the Proposed Development because of the benefits it will deliver if consented.

3.3 Change in government

3.3.1 The UK's general election in July 2024 saw a change of government. However, the UK's 2030 NDC remains unchanged at 68 per cent reduction in territorial emissions by 2030 on 1990 levels. The Sixth Carbon Budget (2033-2037) also remains unchanged, requiring the UK to reduce GHG emissions by 78 per cent by 2035 compared to 1990 levels.

3.3.2 In October 2024, the Climate Change Committee provided advice to the government for the UK's Nationally Determined Contribution (NDC) commitment to reduce greenhouse gas emissions to increase to 81% from 1990 to 2035. The Applicant notes, however, that the newly recommended 81% reduction is consistent with the ambition legislated in the Sixth Carbon Budget, but has been updated to include International Aviation and Shipping emissions and for a change in accounting methodology [Ref. 9].

3.3.3 The incoming government made major commitments to the delivery of clean energy in its election manifesto, including to achieve 'Clean Power by 2030'. The government's commitments include [Ref. 10]:

- Double onshore wind, triple solar power, and quadruple offshore wind by 2030

- Invest in carbon capture and storage, hydrogen, and marine energy
- Take decisions on existing and new nuclear power
- Embrace the future of energy production and storage
- Through a new publicly-owned company, Great British Energy, partner with energy companies, local authorities, and co-operatives to install thousands of clean power projects, through a combination of onshore wind, solar, and hydropower projects

3.3.4 While further detail on how the government's manifesto pledges will be delivered has not yet been confirmed, it is important to note that:

- The National Policy Statements (NPSs) continue to set out the policy framework for large-scale energy infrastructure schemes
- The government's strategy to deliver societal decarbonisation through decarbonisation of the electricity sector and electrification of other sectors is consistent with the previous government's strategy
- The government's decarbonisation and energy security strategy pledges are more ambitious than those of the previous government at the time of the general election
- The delivery of large capacities of low-carbon generation, including large-scale solar generation, is a critical part of the government's plans
- Delivery of Clean Power by 2030, if achieved, must be followed by further measures to ensure that energy stays green beyond 2030. This is also true if Clean Power by 2030 is not achieved

3.3.5 In March 2020, the Energy System Catapult's Innovating to Net Zero report [Ref. 11] observed that:

"Net Zero narrows the set of viable pathways for the future energy system. Where an 80% target allowed considerable variation in relative effort across the economy, with some fossil fuels still permissible in most sectors, Net Zero leaves little slack" [Ref. 11, p5].

3.3.6 It therefore follows that the government's proposed approach to achieve net zero, shares many similarities with the approach taken by previous governments and indeed there is nothing inconsistent between the government's approach and the approach taken by previous governments which would mean a move away from existing policies in support of renewable electricity supplies.

3.3.7 That said, one key aspect of difference between the current government and the previous government's strategies, is that the current government considers the urgency of the need to implement measures which deliver decarbonisation to be greater than that ascribed to it by previous governments.

3.3.8 The government's support for low-carbon infrastructure going forwards is therefore highly likely to be no lower than the support set out in existing publications and strategies and if anything may be more supportive, as evidenced by the approval of four large-scale solar Development Consent Orders in the first months of the government's term in office, the establishment of Mission Zero, and the establishment of Great British Energy.

3.3.9 The UK's targets and NDCs have not changed under a new government, and the need for new clean power does not stop at 2030. The continued delivery of low-carbon generation facilities beyond 2030 is necessary to meet future electricity demand growth and achieve essential wider societal carbon savings. It is also important to continue to bring forward schemes in the event that Clean Power by 2030 is not achieved.

3.3.10 In August 2024, government requested advice on decarbonising the power sector by 2030 from the (now named) National Energy System Operator (NESO). NESO published their advice in November 2024, and it is summarised in **Section 4.2** of this Statement.

4 ENABLING REDUCTIONS IN THE UK CARBON EMISSIONS

4.1 Climate Change Committee Progress Report to Parliament, 2024

4.1.1 The Climate Change Committee (CCC) published the 2024 edition of their annual Progress Report to Parliament in July 2024. The report leads with the Committee's view that *"the new government will have to act fast to hit the country's* [climate] *commitments"* [Ref. 12(2024), p8].

4.1.2 The Committee summarised that *"the cost of key low-carbon technologies is falling, creating an opportunity for the UK to boost investment, reclaim global climate leadership and enhance energy security by accelerating take-up. British-based renewable energy is the cheapest and fastest way to reduce vulnerability to volatile global fossil fuel markets. The faster we get off fossil fuels, the more secure we become"* [Ref. 12(2024), p8].

4.1.3 However, the Committee assessed that *"only a third of the emissions reductions required to achieve the 2030 target are currently covered by credible plans. Action is needed across all sectors of the economy, with low-carbon technologies becoming the norm,"* and that rapid reductions in the use of oil and gas must also be secured [Ref. 12(2024), p8].

4.1.4 The Committee's assessment also implies that plans to achieve emissions reductions beyond 2030 are not yet credible and therefore that schemes which come forwards which will help deliver those reductions in that timeframe are also needed.

4.1.5 To deliver this, the Committee recommend that:

- Annual offshore wind installations must increase by at least three times, onshore wind installations will need to double and solar installations must increase by five times
- Approximately 10% of existing homes in the UK will need to be heated by a heat pump, compared to only approximately 1% today
- The market share of new electric cars needs to increase from 16.5% today to nearly 100%

4.1.6 These recommendations are consistent with a continuing move away from the use of fossil fuels and towards an energy system with electricity at its centre, either directly or through the use of hydrogen, produced at least in part, by the electrolysis of water.

4.1.7 The CCC report that *"indicators for low-carbon technology roll-out are off track, with rates needing to significantly ramp up"* to achieve 2030 targets [Ref. 12(2024), p9], including on engineered removals of CO2 from the atmosphere. While technologies with substantial lead-times continue to be progressed, the delivery of essential nearer-term carbon emission reductions will need to come from an increase in renewable electricity generation capacity.

4.1.8 Relevant conclusions arising from the report are:

- Climate change is a global problem requiring a global solution
- The UK seeks an international leadership position in the fight against climate change
- The UK's domestic policies are not yet sufficiently robust for the UK to deliver to its own commitments

4.1.9 The Project offers an international solution to bringing forwards decarbonisation, energy security, and affordability benefits also ascribed to nationally significant infrastructure. Those Project benefits will not be delivered unless the Proposed Development is delivered. Therefore, the Proposed Development is needed.

4.2 Advice on decarbonising the power sector by 2030

4.2.1 In November 2024, following a request from government, NESO provided their input into the development of the government's plan for Clean Power by 2030 by publishing their Clean Power 2030 report [Ref. 13].

4.2.2 Clean power supports decarbonisation by offering consumers electricity with no carbon emissions for their current demand and also for the future electrification of heating and transportation. This is needed to further displace imports of gas and oil, reducing overall reliance on imported energy in the British energy system and increasing protection for GB consumers from volatile international energy markets. [Ref. 13, p80].

4.2.3 NESO state that Clean Power by 2030 is the foundation for wider electrification and for achieving net zero [Ref. 13, p68]. Clean power is needed by 2030 and in preparation for the 2030s, to *"ensure the* [electricity] *system is able to keep pace with accelerated electrification through the 2030s, which is expected to add approximately 19 TWh per year to demand"* [Ref. 13, p67].

4.2.4 NESO state that: *"With a short and shrinking window of time, pace must be the primary goal"* [Ref. 13, p6], that *"There is no path to clean power without mass deployment of offshore wind, together with onshore wind and solar," and that "Accelerating build rates now for renewables is crucial to enabling the continued growth of demand due to electrification"* [Ref. 13, p68].

4.2.5 NESO's pathways *"see a doubling of onshore wind capacity from 14 GW in 2023 to 27 GW by 2030 and a trebling of solar from 15 GW to 47 GW by 2030"* [Ref. 13, p16]. Further*, "Flexibility is vital in a system with more variable renewables."* [Ref. 13, p7] and NESO pathways include *"an increase in grid connected battery storage from 5 GW to over 22 GW"* [Ref. 13, p8].

4.2.6 NESO's analysis demonstrates that to achieve Clean Power by 2030, *"offshore wind, onshore wind, solar, batteries* [and other key supply technologies] *will all need to deploy more on average each year to 2030 than they have ever done in a single year before. This will inevitably stretch supply chains and require accelerated decision making in planning, permitting and awarding of contracts"* [Ref. 13, p9].

4.2.7 NESO also describe that ringfenced overseas renewables projects for dedicated export to Great Britain (such as is enabled by the Proposed Development) could support the UK in its delivery of a clean power system. NESO's advice does not assess the deliverability of such schemes but notes that *"it will be for government to decide whether to support these projects and the terms for doing so"* [Ref. 13, p30].

4.2.8 Therefore, and in alignment with government's view [Ref. 1, Para 3.3.10], NESO conclude that *"to manage delivery risk, there is a high value in pursuing multiple options where they exist and encouraging competition between, not just within, different technologies."* [Ref. 13, p7]. NESO therefore recommend aiming high on the deployment of critical technologies in any pathway to Clean Power by 2030 to reduce the risk of under delivery as a whole and also to reduce reliance on any single project [Ref. 13, p49].

4.2.9 NESO's Clean Power 2030 report also describes the significant investment across three categories of network development required for delivering clean power [Ref. 13, p34]:

- Strengthening the transmission network to enable the efficient transfer of clean power from generation sites to areas of demand
- Additional infrastructure which is necessary to meet the requirements for connection of individual power generators and demand
- Other projects also required to ensure a safe, secure, and resilient network

4.2.10 NESO identify that pinch points in the network will, without development works, lead to clean power in Scotland, home to a significant proportion of the UK's future offshore wind generation capacity, being constrained [Ref. 13, p52]. However, *"speeding up the delivery of strategic transmission is both critical and challenging"* [Ref. 13, p34].

4.2.11 **Section 0** of this Statement describes that the project is anticipated to deliver a high utilisation of its proposed grid connection, and **Section 7.7** describes the benefits associated with the location of the Proposed Development in relation to the use of existing infrastructure and the likelihood of the flow of electrical energy onto the NETS from the Proposed Development being largely un-curtailed.

4.2.12 The benefit of delivering a high capacity factor through a largely un-curtailed connection is that a large quantity of energy can be provided for consumption through a single point of connection, relieving pressure on other network development requirements to enable the same annual quantity of energy for consumption.

4.2.13 A key enabler of achieving Clean Power by 2030, is a *"connections queue … formed of ready-to-connect projects that align with the Government's plan for clean power by 2030"* [Ref. 13, p10]. Such a queue would help NESO speed up the *"critical and challenging"* delivery of essential strategic transmission infrastructure needed to achieve Clean Power by 2030 [Ref. 13, p34].

4.2.14 NESO observe that:

"The connections queue currently comprises a greater volume of projects than required for 2030 across our pathways. However: a) not all of those projects may be 'ready' or committed to progressing; and b) there may be projects with connection dates after 2030 that could usefully contribute to the 2030 system, for example with lower delivery barriers or lower costs" [Ref. 13, p61].

4.3 National Energy System Operator: Future Energy Scenarios

4.3.1 On 1st October 2024, National Grid Electricity System Operator (NGESO) became the National Energy System Operator (NESO). This Statement references reports and data published by that organisation both before and after their change to NESO. For simplicity this Statement refers to the organisation as NESO throughout.

4.3.2 The annual National Energy System Operator (NESO) Future Energy Scenarios (FES) documents provide important and relevant information on pathways to deliver net zero for the UK by 2050. They are annual publications which explore strategic, credible choices to propel GB on the route to decarbonisation.

4.3.3 The 2024 FES includes pathways which outline a narrower range of outcomes than the scenarios included in previous FES publications, to help *"drive forward Great Britain's strategic investment needs and to support the rapid and fundamental change that is required,"* [Ref. 14(2024), p6].

4.3.4 Three of the 2024 FES pathways meet net zero in 2050. A counterfactual that does not meet net zero is presented alongside the pathways that do.

4.3.5 NESO recommend that direct comparisons should not be made between previous year's scenarios and the 2024 pathways due to the change in framework. In particular:

- NESO have included economic modelling where previously their scenarios were cost agnostic. The FES therefore now assesses all three national policy aims of decarbonisation, security of supply, and affordability
- Efficiency of location and network infrastructure is also considered through the impact of network constraints in the analysis

4.3.6 The net zero commitment underpins the urgency for new low carbon generation infrastructure to be built and commissioned, and government support for such developments is critical.

4.3.7 The key observation is that in all lower-carbon futures, the electricity sector will not operate in isolation from other energy sectors. Rapid decarbonisation is required across all areas of demand - including the residential, transport, industrial, and commercial sectors. Deep electrification of all those areas is required to meet net zero. Until widespread electrification is achieved, the need for urgent electrification will increase year-on-year.

4.3.8 The 2023 FES includes an Energy Background Document in which it is stated that:

"A range of technologies with different characteristics can, in combination, help deliver secure, affordable low carbon electricity supplies and harness the potential of domestic renewable resources. More electricity from wind and solar is vital to help UK meet its target for net zero by 2050" [Ref. 14(2023), Energy Background Document, p15].

4.3.9 Consumer engagement in demand side flexibility and demand reduction measures across the pathways is a key component of what makes the pathways differ from each other. All net zero pathways follow government's Zero Emissions Vehicle mandate for car sales while different take-up rates for hydrogen use in home heating drives differences between the scenarios.

4.3.10 The pathways analysis was completed prior to 2024's General Election, but the new government's ambitions to deliver Clean Power by 2030 are at least as ambitious as the previous government's ambitions over the next important years. The 2024 FES therefore remains relevant and useful to support the need for the Proposed Development.

4.4 Clean electricity supplies must increase to deliver and sustain clean power

4.4.1 **Figure 2** shows how NESO's forecasts for electricity demand in Great Britain developed from 2019 (prior to the UK's 2019 commitment to net zero), through 2023 to 2024. Each annual forecast is represented as a shaded area ranging from the lowest forecast demand scenario to the highest scenario per delivery year, for those scenarios which met the 2050 climate targets of the time.

4.4.2 Current forecasts for future GB electricity demand have increased significantly. Increased electrification of transport, heat, and industrial demand is essential for the achievement of net zero and is a key driver for the increase in future electricity demand.

4.4.3 In 2023, 285TWh of consumer demand was met by 166TWh of low-carbon generation and 119TWh of carbon intensive generation. Consumer demand across the three net zero FES pathways in 2030 averages 330TWh. Therefore, low-carbon generation will need to increase by approximately 164TWh between 2024 and 2029 to deliver Clean Power by 2030.

4.4.4 Annual consumer demand across the three net zero FES pathways in 2040 averages 530TWh. Therefore, annual low-carbon generation will need to increase by approximately a further 200TWh between 2030 and 2039 to keep power clean through the 2030s.

4.4.5 In conclusion, although the government's current focus is on the delivery of a net zero power system by 2030, the drive to deliver full societal decarbonisation will require effort of a similar magnitude in the next two decades to delivery wider decarbonisation while keeping the electricity system clean.

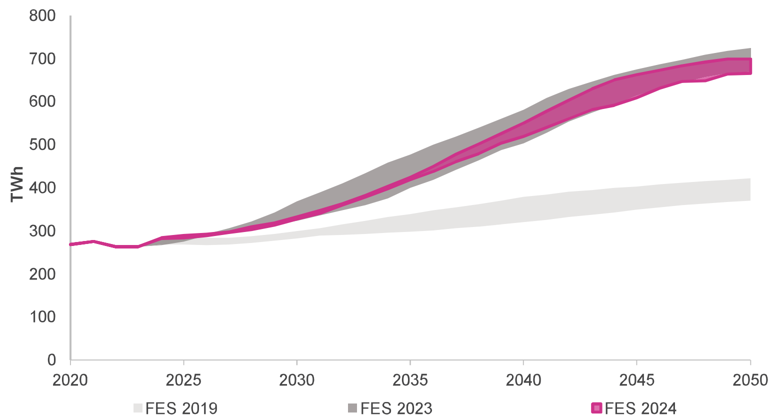

Figure 2. Evolution of UK electricity demand projections (2019, 2023 & 2024)
[Ref. 14, Author Analysis]

4.5 UK electricity system decarbonisation

4.5.1 **Figure 3** shows historical electricity generation in the UK from 1996 to 2022 by fuel source, measured in terawatt hours (TWh, 1 TWh = 1,000,000 MWh), and the resulting average grid carbon intensity, measured in gCO2(e)/kWh.

4.5.2 **Figure 3** shows that Coal + Oil generation reduced from approximately a one-half share of UK generation in 1996 to nearly zero by 2022. Conversely, low-carbon generation, including renewable wind and solar, increased from near zero in 1996 to over 40% of UK generation in 2023.

4.5.3 NESO's FES pathways provide projections for how that demand may be met. **Figure 3** also shows projected electricity generation in the UK to 2050 by fuel source, measured in terawatt hours under NESO's 'Holistic Transformation' pathway, and the resulting average grid carbon intensity, measured in gCO2(e)/kWh.

4.5.4 Low-carbon generation sources will provide the much-needed electricity required to reduce grid carbon intensity from current levels to zero or lower in 2035, aligned with previous government decarbonisation targets. To achieve the government's mission to deliver Clean Power by 2030, the rollout of low-carbon and negative carbon emissions generation would have to be faster than in NESO's current net zero pathways.

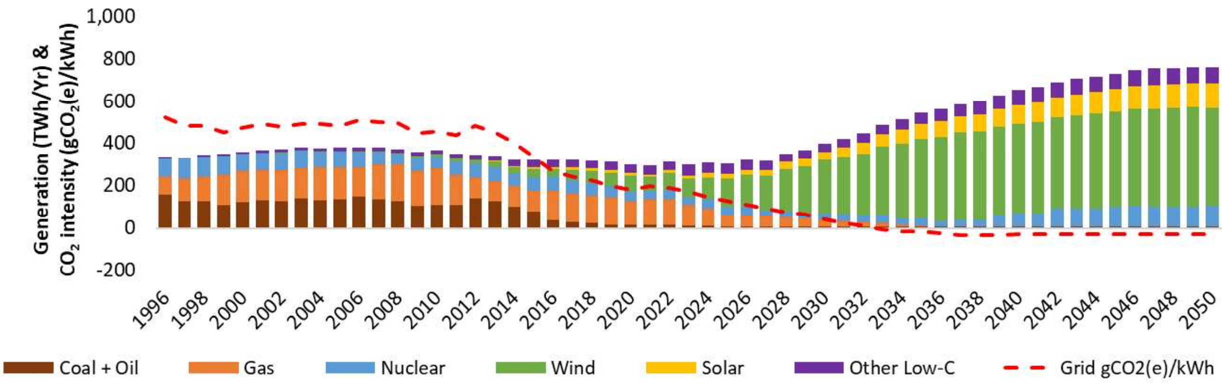

Figure 3. Historical & Future Electricity generation (TWh/Yr) and carbon intensity (gCO2(e)/kWh)
[Ref. 15, Tables 5.6 & 5.14, Ref. 14(2024), Tables ES.08-11 & ES1 – 'Holistic Transformation', Author Analysis]

4.5.5 Renewables have taken the UK a long way and will continue to drive decarbonisation. However, the capacity of renewable generation required to meet forward projections of supply in net zero pathways is unprecedented. The Project will bring forward renewable generation capacity which is additional to projected UK generation buildouts. Market mechanisms mean that the electricity generated by the Project will displace more expensive carbon emitting assets from the grid, and UK carbon emissions will reduce accordingly.

4.5.6 In the scenario that the Project delivers into an electricity system which is already operating at or near to zero carbon intensity, the Project will provide additional zero-carbon electricity to the UK's energy system to meet the necessary increase in the electricity demand that is associated with the decarbonisation of sectors which have not traditionally used electricity.

4.5.7 Decarbonisation of these sectors will be delivered either through their direct electrification, or through the production of hydrogen which will act as a new and intermediary energy vector to reduce reliance on carbon-emitting fossil fuels.

4.5.8 **Figure 4** shows, for the same 'Holistic Transformation' pathway, the significant increase in installed capacity of each technology required to meet the output projections shown in **Figure 3**.

4.5.9 **Figure 4** shows that the UK needs offshore wind, onshore wind, solar, nuclear, and abated gas generation, to meet a pathway to net zero by 2050.

4.5.10 The Proposed Development is a critical part of a project which would deliver onto the UK grid, approximately 15% of the additional low carbon electricity needed to meet Clean Power by 2030, or approximately 12% of the additional low carbon electricity needed to keep electricity clean through the 2030s.

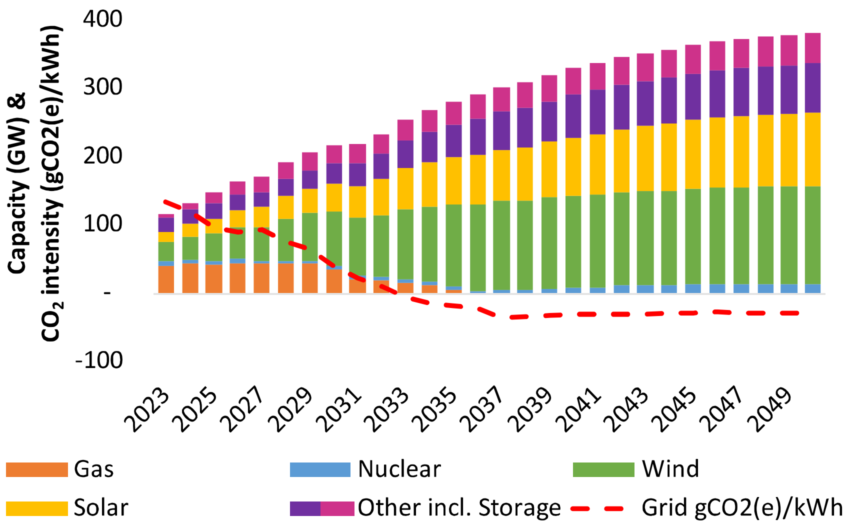

Figure 4. Projected electricity generation capacity (GW) and carbon intensity (gCO2(e)/kWh)

[Ref. 14(2024), Tables ES.08-11 & ES1 – 'Holistic Transformation', Author Analysis]

4.5.11 The Proposed Development would enable this significant benefit to be delivered through a single grid connection, bringing benefits in terms of cost, and infrastructure efficiency.

4.6 Powering Up Britain

4.6.1 The former government's Powering Up Britain Strategy, Powering Up Britain: Energy Security Plan and Powering Up Britain: Net Zero Growth Plan, set out how the UK will achieve energy security, promote green growth and meet its net zero targets, and therefore provides important evidence which demonstrates the need for the Proposed Development.

4.6.2 Powering Up Britain was published in March 2023 to present the most up to date information on the then government's energy strategy, *explaining "how the Government will enhance our country's energy security, seize the economic opportunities of the transition* [to renewables]*, and deliver on our net zero commitments"* [Ref. 16(1), p6], and observes that *"The* [Mission Zero] *Review was unequivocal in its assessment that the plan set out in the Net Zero Strategy was* *the right one, whilst providing recommendations to strengthen delivery"* [Ref. 16(1), p16].

4.6.3 Powering Up Britain concludes that *"We need investment at scale … to rapidly rollout existing technologies … at pace to meet our ambitions for decarbonising power and* [lower] *wholesale UK electricity prices"* [Ref. 16(1), p9] and observes that *"a significant proportion of technologies we will need for 2050 are currently at the demonstration or prototype phase*" [Ref. 16(1), p9]. This implies that while we should continue to strive for innovation, waiting for novel technologies to deliver comes with risk because some technologies may not deliver at the pace and scale required of them. Therefore, the government's strategy to deliver a rapid rollout of existing technologies, while continuing to invest in new technologies is of critical importance in the fight against climate change.

4.6.4 Powering Up Britain states that the government is:

"Actively exploring the potential for international projects to provide clean, affordable and secure power. For example … the Xlinks project … The Government is considering - without commitment - the viability and merits of [the Project] *to understand if it could contribute to the UK's energy security"* [Ref. 16(4), p35].

4.6.5 In November 2024, Ofgem approved two Offshore Hybrid Assets which can directly feed energy generated by internationally located offshore wind farms into both the UKs and European electricity grids Ref. 38(8).

4.6.6 This Statement of Need does not seek to justify or promote the exclusion of any other generation technologies from the UK's future generation mix, but provides a factual 'state of play' of development to date, and risks associated with the future development plans, of all relevant generation technologies in the UK.

4.6.7 However, a reference specifically to this Project in a government energy strategy, and the approval of other projects which seek to connect internationally located generation assets to the UK's electricity grid, supports the Applicant's case that the Proposed Development, which is a critical part of the Project, does have the potential to play an important role in enabling an energy system that meets the UK's commitment to reduce carbon emissions, and the Government's objectives to create a secure, reliable, and affordable energy supply for consumers. The purpose of this Statement is, in part, to demonstrate that the Proposed Development can play this role in practice.

4.7 Although UK RES pipelines are healthy, the scale and timing of delivery is not yet certain

4.7.1 Through the establishment of Great British Energy and Mission Control for Clean Power by 2030, the current government has already set in place organisations to speed the transition towards UK energy security and net zero.

4.7.2 The pipeline capacity of potential UK low-carbon generation connections appears healthy. However, the capacity of consented projects is lower, and the capacity of contracted projects is even lower still. The delivery of future capacity is not certain and cannot be assumed until it is close to delivery. Capacity attrition occurs throughout the project development lifecycle.

4.7.3 **Table 1** shows the quantum of capacity in development pipelines at various stages, for each of the major established low carbon generation technologies:

- Connection offered: sourced from grid connection registers, this column shows the total capacity of projects which have applied for and been accepted to connect to the electricity grid
- In flight: sourced from the Renewable Energy Planning Database, this column shows the total capacity of projects which have submitted planning applications but those applications have not yet concluded
- Concluded, not consented: sourced from the Renewable Energy Planning Database, this column shows the total capacity of projects which have finished their planning journey and are not going ahead. Reasons could be that planning was not granted, that the project was abandoned, or the project's planning application was withdrawn
- Consented, not operational: sourced from the Renewable Energy Planning Database, this column shows the total capacity of projects which achieved consent, but are not yet operational
- Contracted (CfD), not Operational: sourced from the CfD Register, this column, which comprises part of the Consented, not operational column, shows the total capacity of projects which have secured CfDs but are not yet operational
- Operational (from planning): sourced from the REPD, this column shows the total capacity of projects which have made it through development and all the way to operation. This capacity includes projects which have CfDs, other (historical) forms of subsidy or are unsubsidised. This capacity does not include projects which did not need to secure planning permission, such as rooftop solar, nor existing nuclear generating capacity
- Operational (other): Rooftop and other small scale solar, and existing nuclear generating capacity

4.7.4 The Connections Action Plan [Ref. 17], also discussed in **Section 7.1** of this Statement, provides evidence that grid connections are scarce, providing a context for the recent rush for renewable developers to get into the connections queue, and the high capacities of projects listed on connections registers but not yet submitted to planning.

4.7.5 The Connections queue is currently under reform, however, it currently operates on a 'first come, first served' basis. It is intended that projects will maintain their positions in the connections queue by proceeding through major development gates, such as securing land, achieving planning consent, or achieving a financial commitment milestone. Projects which do not achieve these gates may move back in the connections queue, or may be removed from the queue altogether.

4.7.6 In February 2023 NESO shared their analysis that *"only 30-40% of projects* [schemes] *in the* [connections] *queue make it to fruition"* [Ref. 18], suggesting that connection registers may list projects which are not likely ever to connect and operate.

4.7.7 Projects which have secured a grid connection offer, secured options over land and developed proposals to deploy a well-defined technological solution, then proceed to planning.

4.7.8 The Renewable Energy Planning Database (REPD, [Ref. 19]) shows that for planning applications which have been made and concluded (Concluded, not consented plus Consented, not operational plus Operational (from planning), totalling 133.2GW), 28% (37.6GW) is no longer going ahead.

4.7.9 Reasons for capacity to not be consented include: planning has been refused, projects have been withdrawn prior to the planning process concluding, or abandoned after consent had been secured.

4.7.10 Projects which are successful in their planning applications next proceed to a Financial Investment Decision. Although it is not a requirement per se, many large-scale renewable energy projects seek to secure future revenues to the greatest extent possible before committing to construction. The CfD scheme is the government's main mechanism for supporting low carbon electricity generation. Of a total of 57.3GW of Consented, not Operational projects, only 19.2GW (one third) have so far secured a CfD.

4.7.11 Securing a CfD is a competitive process, therefore it is not expected that all projects which apply for a CfD are successful. Securing a CfD also does not guarantee delivery. The CfD scheme lists 33.5GW of capacity awards.

4.7.12 Capacity which is for future delivery currently totals 20.4GW, 1.5GW lower than the capacity stated at CfD award, an attrition rate of 7%.

4.7.13 Projects totalling 9.1GW are already operational, 0.2GW lower than the capacity stated at CfD award, an attrition rate of 2%.

4.7.14 CfDs for a further 2.3GW of capacity have been terminated because projects have been abandoned following contract award.

4.7.15 In summary, only 78% of CfD capacity which is not still in development has delivered, demonstrating that consented capacity which has not yet become operational is still not guaranteed to deliver.

4.7.16 In conclusion, capacity attrition occurs throughout the project development pipeline. Although lists and registers provide important evidence towards current and future generation capacities, the listing of a project on any grid connection register, a planning database, or a commercial contract register does not guarantee that the scheme will come forwards.

4.7.17 Due to historical levels of attrition in energy projects, pipelines need to be very much larger than the capacity projected to be required to meet government's decarbonisation targets.

4.7.18 Timing is also important, because project development is a multi-year process with constraints, or bottlenecks at multiple points. A significant portion of the capacity listed in **Table 1** which does make it through to operation will not deliver before 2030.

4.7.19 For example, although it was announced in January 2024 that the plan to start commercial operations at Hinkley Point C, the UK's only new nuclear generating station currently under construction, has been delayed to between 2029 and 2031 [Ref. 23], the government remain committed to *"get Hinkley Point C over the line"* [Ref. 10, p52]. The long lead time associated with nuclear development means that no other new nuclear is likely to come online before 2035.

4.7.20 The need for low-carbon generation is significant and urgent and pipelines of consented and contracted projects are not currently of a sufficient scale to meet that need.

Table 1. Pipeline analysis for mature low carbon generation technologies [Ref. 19, Ref. 20, Ref. 21, Ref. 22]

GW	Connection offered	Planning Consent			Contracted (CfD), not Operational	Operational (from planning)	Operational (other)
		In flight	Concluded, not Consented	Consented, not Operational			
Onshore Wind	30.6	8.9	22.7	9.6	2.1	14.1	
Offshore Wind	111.9	10.4	3.8	22.4	10.1	14.7	
Solar	201.7	10.1	8.4	18.6	3.7	9.4	8.0[1]
New Nuclear	15.6	0.0	2.7	6.7	3.3	0.0	6.0[2]

[1] Estimate of current operational small-scale and rooftop solar which was not required to secure planning consent
[2] Capacity of existing operational nuclear stations in the UK

4.7.21 The Proposed Development is critical infrastructure which is required to deliver the Project and therefore deliver the benefits associated with it. This evidence supports the Applicant's case that there is a significant need for the Project, and therefore there is a significant need for the Proposed Development.

4.8 The delivery of large-scale CCUS and hydrogen is not yet proven

4.8.1 National Grid's FES shows that 29.4GW of unabated CCGT (Combined Cycle Gas Turbine) and 6.5GW of other gas fired generation capacity was operational in 2023, contributing approximately 25% of the GB total generation output [Ref. 14(2024), Table ES1].

4.8.2 Progressing towards a zero-carbon electricity system requires the decarbonisation of these assets, or the replacement of their generation capacity with alternative low-carbon sources.

4.8.3 Capturing carbon emissions and storing them away from the atmosphere would decarbonise the assets and is dependent upon the deployment at scale of Carbon Capture Usage and Storage (CCUS).

4.8.4 CCUS has a key role in the UK's Net Zero Strategy. It is a prominent feature of the National Infrastructure Strategy (2020), Energy White Paper (2020) and Industrial Decarbonisation Strategy (2021). Powering Up Britain aimed to deliver four operational CCUS clusters to capture and store 20-30 million tonnes of carbon dioxide (MtCO2) by 2030 [Ref. 16(1), p21].

4.8.5 FES 2024 net zero pathways include gas schemes with carbon capture operating from 2033 at the earliest and between 18.8 and 34.7GW of dispatchable low-carbon generation in operation in 2040.

4.8.6 Deploying CCUS more quickly than the FES 2024 pathways is necessary for CCGT to make a significant contribution to the government's ambition to deliver 'Clean Power by 2030'.

4.8.7 Previous governments have recognised that *"the technology has not been delivered at scale and significant risks remain"* [Ref. 24, p53] but recent progress has been made in developing and consenting projects as well as developing a commercial framework to support the technology.

4.8.8 The government's current CCUS Deployment Pathway seeks to secure an option to deploy CCUS at scale during the 2030s, subject to costs coming down sufficiently.

4.8.9 However, the CCC note in their 2024 Progress Report to Parliament, that *"progress on developing engineered removals is behind schedule and achieving the Government's ambition to remove at least 5 MtCO2 per year by 2030 is increasingly challenging"* [Ref. 12(2024), p81].

4.8.10 In October 2024, government confirmed funding to launch the UK's first carbon capture sites, with an aim to make the UK *"among the first to deploy this game-changing technology at scale in Teesside and Merseyside"* [Ref. 25].

4.8.11 To date, applications for development consent orders for CCUS-related projects which have come to the Planning Inspectorate include:

- Seven applications to install CCUS equipment on existing or new power generation facilities. Three (one of which also includes infrastructure to facilitate the transportation of CO_2 to a suitable storage repository) have been granted, one is at Decision stage and one is in Examination. Applicants are currently aiming for submission in late 2025 for two projects
- Six applications to install pipelines to transport CO_2 from where it will be produced to a suitable storage repository. Two have been granted. The examination of one project has concluded but is not yet decided. Applicants are currently aiming for submission in 2026 on the other three projects

4.8.12 Progress has been made on project definition, design, and consenting in recent years. The Energy Act 2023 provides a licensing framework for CO_2 transport and storage, and business models to secure future revenues are in development. These will be a critical input to future Final Investment Decisions for the technology.

4.8.13 CCUS, when it is delivered, will provide the opportunity to abate a significant proportion of the UK's operational CCGT fleet and other industrial carbon emissions. However, an extension of the UK's CCUS or hydrogen pipelines will be required to take emissions out of the many CCGT facilities which are not near to an existing or proposed cluster.

4.8.14 A prudent approach to future energy supply would suggest that the full decarbonisation of the existing UK CCGT fleet prior to 2030 should not be assumed.

4.8.15 Therefore, other low-carbon supplies may be required to make up for facilities which have by 2030 not yet been abated to secure the government's aims to deliver 'Clean Power by 2030' and maintain the cleanliness of the electricity system thereafter.

4.8.16 Decarbonisation of the fuel used to generate electricity in the CCGT fleet can also be achieved by burning hydrogen.

4.8.17 Hydrogen is being pursued as a potential new measure to help the UK move towards net zero. Hydrogen has the potential to be used as a low-carbon substitute for natural gas in electricity generation, in homes, in industry, and for uses which are difficult for electricity to reach. It also has potential to be used as a substitute transport fuel, as a means of storing energy over long periods of time and of powering flexible electricity generation assets with zero carbon emissions.

4.8.18 NESO's FES 2024 estimates that between 110 and 186TWh of electrical energy will be required annually in the UK by 2050 to produce hydrogen through electrolysis to meet its many potential end-uses [Ref. 14(2024), Table ES.K]. The wide range of future demand estimates is due to different net zero compatible scenarios producing hydrogen in different ways. One commonality between the pathways, is that the production of hydrogen itself must have zero carbon emissions for the hydrogen to be a low-carbon fuel.

4.8.19 The three known ways of producing low-carbon hydrogen are:

- 'Blue' hydrogen: relies on functional CCUS operating at GW-scale to remove the carbon emissions associated with its production from methane cracking
- 'Pink' hydrogen: relies on abundant electricity from new nuclear facilities (which emit no carbon emissions) to electrolyse water
- 'Green' hydrogen relies on abundant renewable electricity to achieve the same effect

4.8.20 That is to say that the production of low-carbon hydrogen must be coupled with a low-carbon technology. The delivery risks associated with producing 'green' hydrogen are significantly lower than the risks associated with producing either 'blue' or 'pink' hydrogen because large-scale renewable generation is proven in delivery and is in operation globally. CCUS is not yet common at an industrial scale, and no new nuclear will be delivered in the UK before 2029.

4.8.21 The Energy System Catapult foresee the need for *"a new low carbon hydrogen economy … delivering up to 300TWh per annum, roughly equivalent to electricity generation today"* and concluding that *"electricity generation itself may have to double, or even treble if most hydrogen is to be produced by electrolysis"* [Ref. 11, pp6&36].

4.8.22 The production of 'green' hydrogen will cause an increase in the demand placed on UK electricity generation, and therefore requires an increase in low-carbon electricity supply.

"Producing hydrogen via electrolysis can create additional demand when needed to avoid curtailing wind and solar generation and this hydrogen can then be used to generate power at times of peak demand or low renewable output" [Ref. 14(2023), Energy Background Document, p15].

4.8.23 The government plans to allocate £500 million to support the manufacturing of green hydrogen [Ref. 10, p27].

4.8.24 The Energy Act 2023 lays the foundations for a future which includes hydrogen technology by creating provisions for business modes for hydrogen production, transport, and storage. Business models to secure future revenues are in development. These will be a critical input to future Final Investment Decisions for the technology.

4.8.25 If consented, the Proposed Development will allow the transmission of a large quantity of low-carbon electricity onto the UK's grid. The Proposed Development will therefore complement UK generation in supporting any growth in the use of hydrogen to decarbonise hard to reach sectors, deliver additional flexible generation capacity, and support the UK's ability to store renewable energy over a longer term, from when it is generated until it is needed.

4.9 Lower carbon emissions

4.9.1 Government expects wind and solar to deliver the bulk of the UK's electricity system decarbonisation. The Project is for a combination of wind, solar and storage capacity with the Proposed Development bringing the outputs of that generation into the UK. This analysis demonstrates that the Project would, when operational, displace existing carbon-emitting power stations from the grid. This will result in less carbon being emitted into the atmosphere than would be the case if the Project was not operational. The Project would, if consented, play an important role in enabling an energy system that meets the UK's commitment to reduce carbon emissions.

4.9.2 **Figure 5** to **Figure 8** show the makeup of UK electricity sources to meet demand on individual days in 2024. In each figure, the x-axis shows the time of day at hourly granularity and the y-axis shows a half hourly average level of power either demanded or supplied through the day.

4.9.3 These days have been selected not because they are special, but because they represent different but common types of day, showing a range of examples of demand, wind, solar generation, or electricity imports. The charts have been derived exclusively from publicly available market data [Ref. 17, Ref. 18].

4.9.4 Starting at 23:00 (the beginning of the UK's 'electricity day'), UK electricity demand follows a pattern of reducing into the early hours of the morning before rising again ahead of the start of the working day. Fluctuations through the middle of the working day are common and can vary from day to day, but demand remains high during working hours before then peaking as the working day ends. Demand then reduces towards the end of the working day and into the evening.

4.9.5 The top of each multi-coloured area represents total UK demand, being all end use consumption plus energy exported to other countries through one of (at the time of submission) nine sub-sea interconnectors, plus any energy being stored for later use by Pumped Storage facilities, batteries, or other storage facilities.

4.9.6 Each coloured area shows the quantum of electricity generated by each technology type through the day, and the technology types are broadly stacked in order of increasing marginal cost of generation. This order is directionally consistent with increasing marginal carbon emissions.

4.9.7 NESO's Carbon Intensity Forecast Methodology [Ref. 28] has been used to estimate a daily carbon emission from UK-located generation facilities for each day. Because the UK no longer operates any coal fired power stations, emissions from any coal generation have been estimated as though the generation was from CCGTs (which will now likely generate in place of coal), so as not to overstate the contribution the Project would make to enabling UK carbon emission reductions.

4.9.8 The actual profile of energy delivered through the Proposed Development on any specific day will be dependent on a number of factors. The Project's anticipated potential capacity factor is 75% (i.e. throughout the year, on average, 2.7GW each hour, rather than the maximum 3.6GW). The blue line on each chart shows how the annual average generation (2.7GW) through the Proposed Development from the Project to the UK's electricity system, , could change the mix of generation sources which contribute to meeting UK demand.

4.9.9 The Project would, when operational, remove the need for generation 'above' the blue line on each chart, that proportion of demand would instead be met by generation from the Project.

4.9.10 Such displaced generation in today's market comprises assets with a high marginal cost, and/or carbon emitting assets. The Project would therefore enable a reduction in carbon emissions from UK-generated electricity while still ensuring that UK demand could be met.

4.9.11 The Project would also enable an improvement in the affordability of energy supplies for UK consumers by enabling a reduction in the marginal cost of electricity by displacing more expensive assets.

9th January 2024

4.9.12 On 9th January, UK wind met approximately one third of the of day's high demand (1TWh over the day). Both UK solar generation and imports to the UK were very low. Significant CCGT generation was required to meet demand, and coal also ran. UK generators emitted an estimated 203,400 tonnes of CO_2.

4.9.13 **Figure 5** shows that energy transmitted onto the UK grid through the Proposed Development would displace CCGT generation from the grid in every half hour of the day, reducing the amount of CO_2 emitted by UK generators to an estimated 177,900 tonnes, or by 13%.

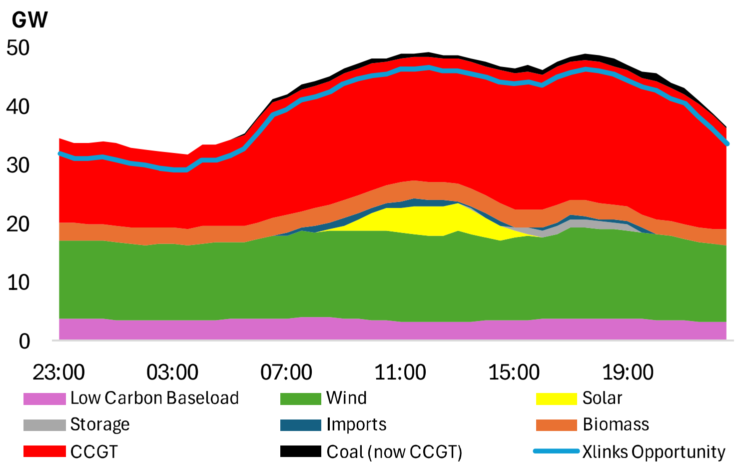

Figure 5. UK Generation mix, 9th January 2024
[Ref. 26, Ref. 27, Author Analysis]

24th February 2024

4.9.14 On 24th February, UK wind met approximately 5% of the day's 0.8TWh of demand. UK solar generation and imports to the UK were more sizeable than they were on 9th January but CCGT generation was still required to meet demand. A small amount of coal also ran. UK generators emitted an estimated 141,800 tonnes of CO_2.

4.9.15 **Figure 6** shows that energy transmitted onto the UK grid through the Proposed Development would displace CCGT generation from the grid in every half hour of the day, reducing the amount of CO_2 emitted by UK generators to an estimated 116,300 tonnes, or by 18%.

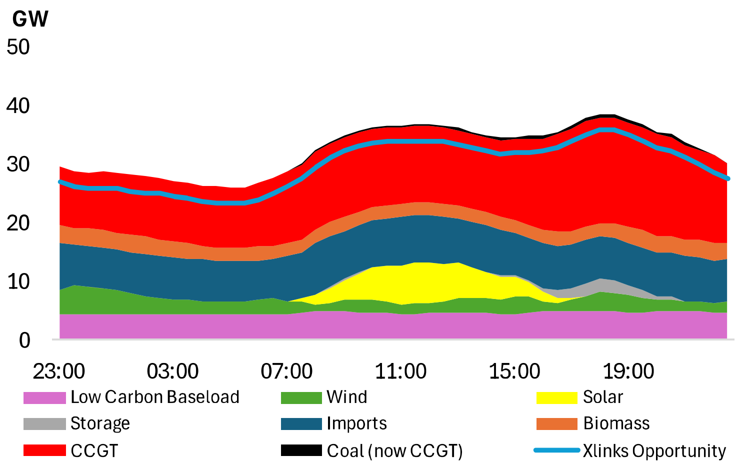

Figure 6. UK Generation mix, 24th February 2024
[Ref. 26, Ref. 27, Author Analysis

5th June 2024

4.9.16 On 5th June, UK wind met nearly 40% of the day's 0.7TWh of demand. UK solar generation was significant at over 80GWh. Imports to the UK contributed to 19% of demand. CCGT generation was low but still required to meet demand, especially in the evening. UK generators emitted 36,700 tonnes of CO2.

4.9.17 **Figure 7** shows that energy transmitted onto the UK grid through the Proposed Development would displace CCGT and biomass generation from the grid in every half hour of the day. If energy from biomass was cheaper than energy imported to the UK, imports may have been displaced by the Project instead of Biomass.

4.9.18 Displacing imports would result in the amount of CO2 emitted by UK generators on the day reducing to 13,200 tonnes, or by 64%. If it was Biomass that was displaced, the amount of CO2 emitted by UK generators on the day would reduce to 12,600 tonnes, or by 66%.

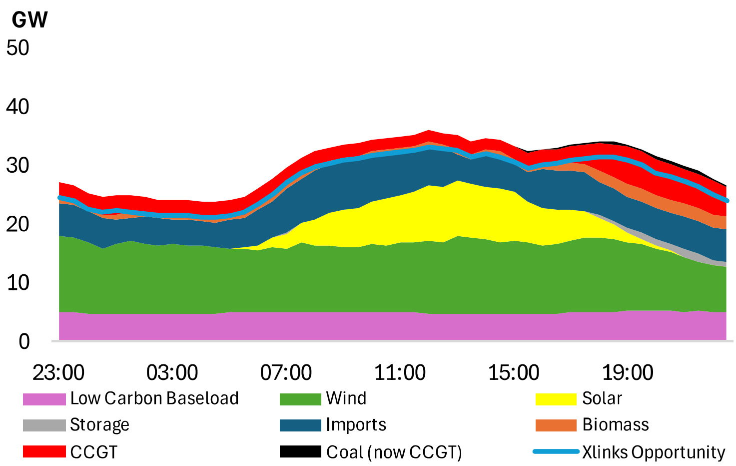

Figure 7. UK Generation mix, 5th June 2024
[Ref. 26, Ref. 27, Author Analysis]

7th August 2024

4.9.19 On 7th August, UK wind met nearly 40% of the day's 0.7TWh of demand. UK solar generation was significant at nearly 45GWh and imports to the UK contributed to 19% of demand. CCGT generation was still required to meet demand. UK generators emitted 39,300 tonnes of CO2.

4.9.20 **Figure 8** shows that energy transmitted onto the UK grid through the Proposed Development would displace CCGT generation from the grid in every half hour of the day. Biomass generation would also be displaced, although it is possible that if energy from biomass was cheaper than energy imported to the UK, imports may instead have been displaced by the Project.

4.9.21 Displacing Biomass would reduce the amount of CO2 emitted by UK generators that day to 14,100 tonnes, or by 64%. Displacing imports would reduce the amount of CO2 emitted by UK generators that day to 14,300 tonnes (still 64%).

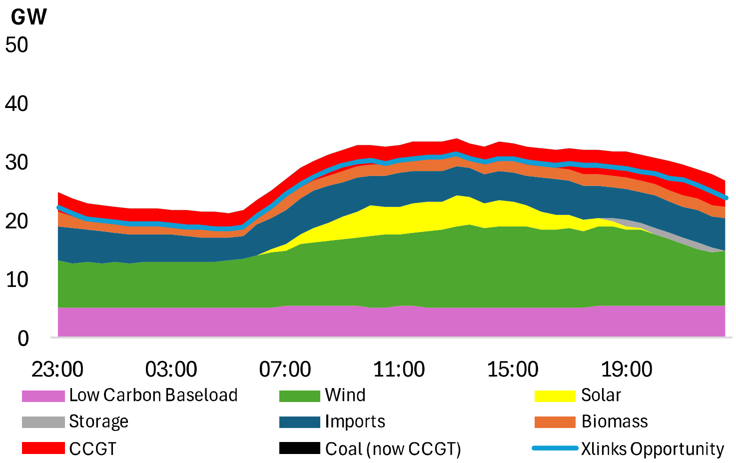

Figure 8. UK Generation mix, 7th August 2024
[Ref. 26, Ref. 27, Author Analysis]

4.10 The Proposed Development will enable a reduction in UK electricity generation emissions

4.10.1 The preceding analysis demonstrates how the Proposed Development enables an energy system that meets the UK's commitment to reduce carbon emissions for as long as carbon-emitting generation remains in operation.

4.10.2 Emissions pricing ensures that carbon-emitting assets are more expensive to dispatch than renewable assets. Therefore, renewable assets will displace carbon intensive assets, providing both a reduction in carbon emissions from UK generation, and a cost benefit to consumers (See **Chapter 7** of this Statement).

4.10.3 Imported electricity therefore reduces the average carbon intensity of electricity generation in the UK, because if that imported electricity was not provided, dispatchable UK-based thermal generators would need to generate more to meet demand. Such generators currently almost exclusively use carbon-emitting source fuels.

4.10.4 Two key characteristics of the Project, are firstly, that the energy it generates is exclusively from low-carbon supplies, and secondly, the battery energy can be dispatched, if required, to meet a market need. Therefore, the electricity generated by the Project will have the capability to displace UK-based carbon emitting generators from the grid through the provision of dispatchable low-carbon generation. The Project will therefore deliver a genuine international reduction in carbon emissions.

4.11 The flexibility proposed further enables UK electricity system carbon reductions

4.11.1 **Figure 5** to **Figure 8** illustrate how the Proposed Development would enable a reduction in carbon emissions from UK generation. The analysis is conservative for the Proposed Development because of the inclusion of a BESS in the Project plans. The BESS enables flexibility in the supply of low-carbon energy transmitted through the Proposed Development, meaning that to some extent, the Proposed Development can be operated in a way which maximises the carbon reductions it enables.

4.11.2 For example, if at one point in a day, dispatches from the Proposed Development into the UK's energy system would displace other low-carbon power from that system, market mechanisms already established in the UK market may incentivise a self-curtailment of the energy which otherwise would have been transmitted through the Proposed Development, or from other low-carbon assets.

4.11.3 Therefore, by storing, rather than dispatching, energy at that time, the Project would be able to dispatch more energy at other times when UK generation carbon emissions were higher and so enhance its enablement of a lower carbon emissions UK energy system.

4.12 A zero-carbon electricity system enables non-electricity carbon emission reductions

4.12.1 The electricity system of a net zero consistent future is not expected to look like the electricity system of 2024. Low-carbon and renewable generation asset capacities will increase, as will their output. Interconnection with other markets is also expected to increase, but so is consumer demand.

4.12.2 The government recognises the need for flexible assets to be brought online to support the move to a net zero energy system. Flexible assets will be able to store abundant low-carbon energy and release it later when it is needed. Sufficient storage capacity is needed to enable this benefit, however what is also required, is sufficient low-carbon generation capacity to create an abundance of low-carbon energy at times which can then be stored. Otherwise, where would the low-carbon energy come from, for flexible assets to store?

4.12.3 The electricity system of a net-zero consistent future therefore is expected to:

- Generate, at times, more low-carbon energy than is needed in that moment
- Store that energy for varying periods of time through a variety of storage mediums
- Dispatch (or use) that stored energy to meet demand when low-carbon supplies are insufficient

4.12.4 The inclusion of BESS as part of the Project scope means that the Project will be able to carry out all three of these functions, through the Proposed Development.

4.12.5 Until low-carbon flexible assets are developed to a sufficient capacity, and their ‘fuel’, low-carbon electricity, is also generated in abundance so it can be stored, then technologies which currently provide flexibility to the system must be kept in service, to provide that flexibility. Assets which currently provide the bulk of the UK’s flex are carbon-intensive CCGTs.

4.12.6 As demand increases through the electrification of other sectors, the need for flexible assets will increase. The need for the continued development of low-carbon generation assets to enable those flexible assets to reduce UK carbon emissions will also increase. This underpins the need for the Proposed Development: to bring significant quantities of low-carbon power to the UK to enable the UK to reduce its carbon emissions, by helping to take carbon emitting generation off the UK’s energy system, and by helping to keep carbon-emitting generation off the UK’s energy system for good.

4.12.7 The Proposed Development will also continue to enable a reduction in the UK’s carbon emissions even when the electricity system has been fully decarbonised. By growing the UK’s low-carbon generation capacity, more low-carbon electricity will be available to use in the decarbonisation of other sectors, for example, transport, home heating, and industry. Without sufficient supplies of low-carbon electricity, the decarbonisation of these sectors would be slower than if low-carbon electricity supplies were plentiful, or may not happen at all.

4.12.8 Decarbonisation of the UK’s electricity system is the enabler of achieving wider societal decarbonisation. Each additional low-carbon generation facility which comes forward will provide more electricity which can be used to power vehicles, heat homes or power industrial processes. Therefore, there is a carbon reduction benefit attributable to all low-carbon generation developments until all carbon emissions from all sectors have been eliminated.

4.12.9 This Statement does not attempt to quantify such benefits for the Proposed Development, but refers instead to **Volume 4, Chapter 1: Climate Change of the ES (Document Ref. 6.4.1)** which follows an established methodology for a conservative and quantified assessment of the lifetime carbon benefits enabled by the Proposed Development, arising from its critical role in enabling the transmission of low-carbon energy from the Project into the UK’s energy system.

4.13 Conclusions on enabling carbon emission reductions

4.13.1 This Statement explains how the UK’s future energy system must evolve to become net zero, through the deployment of low-carbon and flexible assets. This Statement therefore demonstrates why the Proposed Development is needed to enable an energy system which meets the UK’s commitments to reduce carbon emissions, and which meets the Government’s objectives to create a secure, reliable, and affordable energy supply for consumers.

4.13.2 In summary:

- Low-carbon generation is needed to remove carbon emitting assets from the UK’s electricity system. A large quantity of low-carbon power must be generated from new assets before electricity system emissions are reduced to zero

- Abundant low-carbon generation at times is necessary to create opportunities for flexible assets to store low-carbon power
- Flexible assets, full of stored low-carbon power, are necessary to displace carbon emitting flexible assets from the energy system at times when low-carbon supplies cannot displace those assets themselves
- A low-carbon energy supply for consumers which is also secure, reliable, and affordable, requires low-carbon flexibility
- A secure, reliable, and affordable low-carbon energy supply is required to move other energy intensive sectors off carbon-emitting fuels and onto low-carbon supplies, thereby delivering wider decarbonisation throughout the UK. Decarbonising other sectors will require a similar quantity of low-carbon generation to be developed in the 2030s, as is required in the 2020s

4.13.3 Delivering an insufficient quantum of low-carbon generation risks not achieving the UK's commitment to reduce carbon emissions, and also places at risk the achievement of the Government's objectives to create a secure, reliable, and affordable energy supply for consumers.

4.13.4 The Proposed Development, by enabling the transmission of low-carbon energy from the Project into the UK's energy system, enables an energy system that meets the UK's commitment to reduce carbon emissions.

5 CREATING A SECURE AND RELIABLE ENERGY SUPPLY

5.1 British Energy Security Strategy, 2022

5.1.1 The Strategy describes that the *“record rise in global energy prices* [in 2021 and 2022] *has led to an unavoidable increase in the cost of living in the UK”* [Ref. 29, p5] and sets out that:

“The long-term solution is to address our underlying vulnerability to international oil and gas prices by reducing our dependence on imported oil and gas” [Ref. 29, p5].

5.1.2 And therefore that:

“The growing proportion of our electricity coming from renewables reduces our exposure to volatile fossil fuel markets” [Ref. 29, p6].

5.1.3 Although the Strategy calls for *“A power supply that’s made in Britain, for Britain”* [Ref. 29, p3] it also explains that *“We are actively exploring the potential for international projects to provide clean, affordable and secure power, for example by expanding the Contracts for Difference scheme”* [Ref. 29, p19], to support the strategic aim of achieving a fully decarbonised electricity system by 2035, subject to security of supply [Ref. 29, p6].

5.1.4 In November 2024, Ofgem approved two Offshore Hybrid Assets which can directly feed energy generated by internationally located offshore wind farms into both the UKs and European electricity grids [Ref. 38(8)].

5.1.5 The British Energy Security Strategy therefore recognises the potential security of supply benefits to the UK of internationally located generation facilities, including those which, like those associated with the Proposed Development, are dedicated supplies to the UK.

5.1.6 NPS EN-1 describes that *“Interconnection across national borders has an essential role in delivering a secure, low carbon electricity system at low cost”* [Ref. 1, Para 3.3.32], and that *“Interconnection provides access to a diverse pool of generation, enabling the import of cheaper electricity, while also providing a route for electricity export”* [Ref. 1, Para 3.3.34].

5.1.7 The Proposed Development would enable dedicated low-carbon supplies from Morocco to the UK energy system, increasing the diversity of UK energy supplies, but would not provide a route for electricity export to the Moroccan electricity system.

5.1.8 The Proposed Development is a critical element of an international project to bring clean, affordable, and secure power to the UK. Therefore, the Proposed Development would play an important role in enabling an energy system that meets the Government’s objectives to create a secure, reliable, and affordable energy supply for consumers.

5.2 The UK is a net energy importer

5.2.1 The UK has been a net energy importer for many years. Before oil and gas was discovered in UK Territorial Waters and commercialised in the 1980s, the UK consistently imported up to 50% of its total energy supply [Ref. 15, Chapter 1, Chart 1.4].

5.2.2 Following the commercialisation of UK North Sea gas, the UK remained a net energy exporter for nearly three decades. In 2004, however, the UK returned to a position of net imports, and net imports have been growing as a proportion of consumption since that time, as shown in **Figure 9**. Imports are rising predominantly because domestic hydrocarbon production is falling more quickly than domestic hydrocarbon consumption.

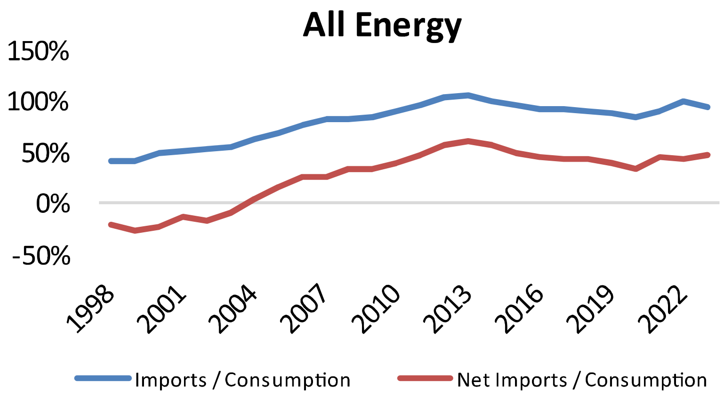

Figure 9. The UK has been a net energy importer since 2004 and energy imports are growing
[Ref. 15, Chapter 1.1, Author analysis]

5.2.3 Given the historical context, it should not be an unusual or alarming state for the UK to remain being a net energy importer subject to the nature and geography of energy imports for energy security and cost management purposes.

5.2.4 **Figure 10** shows the sources of UK energy imports in 2023. The data shows that over 75% of UK's energy imports came from Norway (oil and gas), the USA (oil and gas), the European Union (oil through European cargo hubs), and Africa (predominantly oil from Libya and Nigeria).

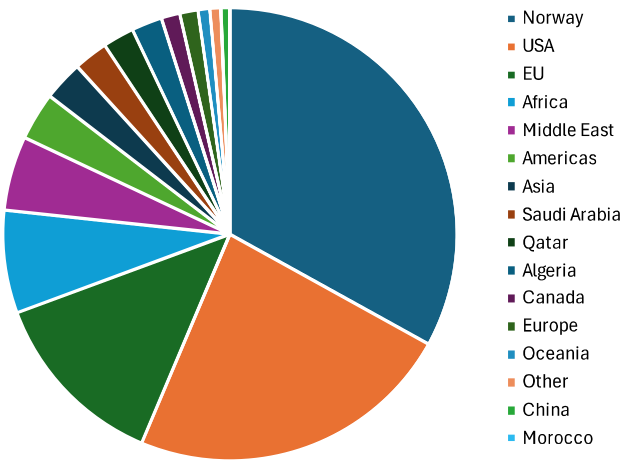

Figure 10. UK gross energy imports by country, 2023
[Ref. 15, Chapters 2.7, 2.8, 3.7, 3.8, 4.5. Also, Ref. 27 and Author analysis]

5.2.5 The UK actively participates in international energy trade, and imports are secured from a wide range of geographies and countries. By expanding the geographical sources of energy imports to the UK, the UK reduces its exposure to individual geopolitical shocks and therefore increases the security of its supplies.

5.2.6 Over one third of the UK's energy imports are delivered to the UK through sub-sea pipelines from North Sea and Norwegian Sea oil and gas fields and from continental Europe. In 2023, more energy was imported to the UK through sub-sea hydrocarbon pipelines, than was consumed in the whole GB electricity system in the same year.

5.2.7 **Figure 10** shows that in 2023 the UK reported no energy imports from Morocco.

5.2.8 The UK's first continental electricity system interconnector (IFA) was commissioned in 1986, and so linked the UK's electricity network with the French network. **Figure 11** shows that since 1998 the UK has been a net electricity importer, with the exception of a geo-politically influenced 2022.

5.2.9 Cross-border electricity flows occur through interconnectors which join together separate functioning electricity markets. Interconnectors flow energy from lower priced markets to higher priced markets. Interconnectors can therefore change their direction of flow to meet changing supply/demand balances. Further, the price of the electricity delivered to the receiving end of an interconnector will change according to market movements and may be highly volatile.

5.2.10 The Proposed Development will, if consented, enable the Project to deliver a one-directional flow of low-carbon electricity into the UK's electricity system. The Project has been designed such that electricity generated in the UK will not be able to flow back to the Moroccan electricity system.

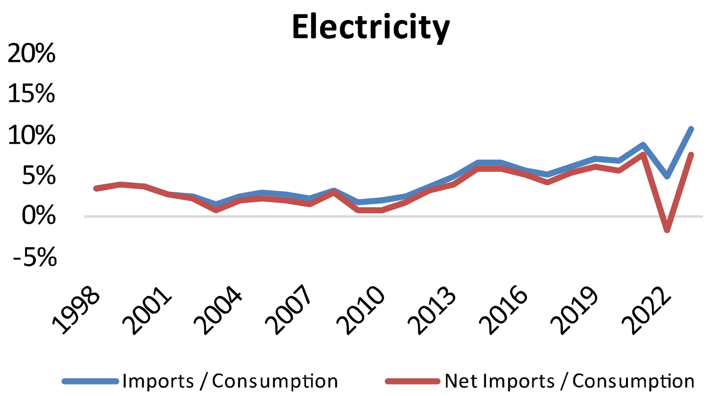

Figure 11. The UK has been a net electricity importer since 1998 and electricity imports are growing

[Ref. 15, Chapter 1.1, Author analysis]

5.2.11 The Applicant's proposal to secure a bankable revenue stream for the Project, for example through its preferred use of the government's CfD scheme also means that the energy delivered to the UK's electricity system via the Proposed Development will, for the life of such a contract, not be affected by market movements, because it would be subject to the pricing terms of the revenue agreement. Many bankable revenues streams remove market volatility for generators and consumers, **Section 6.4** of this Statement provides further detail.

5.2.12 In this regard, the energy generated by the Project and imported to the UK through the Proposed Development are fundamentally different to any of the UK's current imported energy. The Project will therefore increase the UK's energy security and help shield UK consumers from volatile international energy markets.

5.2.13 A key aim of the Project is to provide low-carbon energy to the UK to support its decarbonisation aims. By achieving those aims, the UK will have significantly reduced its annual imports of hydrocarbon fuels such as oil and gas. The quantum of energy imported to the UK through the Proposed Development presents an increase of just 3% of net UK energy imports, or just 1.5% of gross UK imports. The green line (Xlinks + Imports) **Figure 12** is very close to (and is almost superimposed upon) the blue imports line as was shown in **Figure 9**.

5.2.14 However, such a short-term increase will erode into insignificance in the longer term, as hydrocarbon imports fall due to the increasing use of electricity in what are currently hydrocarbon-heavy energy use sectors.

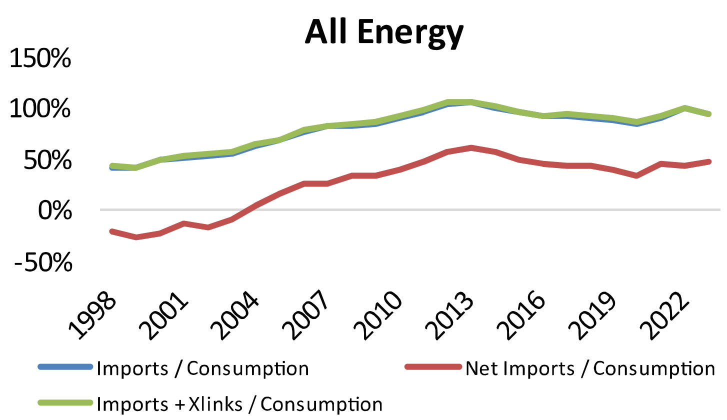

Figure 12. The Project does not materially change the balance of UK energy imports

[Ref. 15, Chapter 1.1, Author analysis]

5.2.15 Net electricity imports into the UK over the period 2018 – 2023, excluding the anomalous 2022, have averaged 21TWh per year. Indications are that the Project expects that through the course of a year, energy exported from the international generation assets will be equivalent to approximately 18 hours of full export a day (i.e. an annual load factor of approximately 75%), to be able to transmit its full 3.6GW of electrical power onto the UK NETS for an average of 18 hours each day, or a total of 24TWh per year. The Project would, if commissioned 'today', materially shift the balance of cross-border electricity flows into the UK.

5.2.16 However, as the UK weens itself off fossil fuels and onto low-carbon electricity and other low-carbon sources of energy, fossil fuels imports will reduce, and UK indigenous low-carbon electricity production will increase and/or the UK will import more low-carbon electricity to meet its needs.

5.2.17 The Proposed Development, which is a critical element of the Project, therefore presents a pioneering opportunity to secure geographically diverse and exclusively low-carbon electricity supplies for the UK in recognition of the future need for all energy supplies to be low-carbon and secure. The Proposed Development will also provide an opportunity for the Project to deliver the energy it generates to the UK at a contracted price which will deliver price certainty and value for consumers, as well as deliver a shield against volatile international energy markets.

5.2.18 In conclusion:

- Importing energy from Morocco adds further diversity to the UK's global energy sources because the UK does not currently import energy from Morocco
- Importing energy from Morocco does not significantly increase gross or net UK energy imports
- The increase in UK gross and net electricity imports arising from electricity imports from Morocco represents a pioneering opportunity to secure geographically diverse and exclusively low-carbon electricity supplies for the UK, while providing value for money for consumers
- The Project presents a fundamentally different nature of energy import to those currently used. The energy supply is dedicated, uniquely low-carbon, one-directional (only into the UK) and will be subject to commercial terms which will help provide consumer protection against high and/or volatile electricity prices

5.3 The Proposed Development will increase the diversity of the UK's electricity supplies

5.3.1 NPS EN-1 states that *"Given the changing nature of the energy landscape, we need a diverse mix of electricity infrastructure to come forward, so that we can deliver a secure, reliable, affordable, and net zero consistent system during the transition to 2050 for a wide range of demand, decarbonisation, and technology scenarios"* [Ref. 1, Para 3.3.19].

5.3.2 This section demonstrates how, in support of the need described in NPS EN-1 [Ref. 1, Para 3.3.22], the Proposed Development could enable electricity supplies to the UK's energy system which would complement UK wind and solar supplies by supplying electricity when, in the UK, the wind is not blowing, or the sun is not shining.

5.3.3 At **Section 0** of this Statement government data was used to demonstrate that based on current international energy flows, the Project would not materially increase the UK's reliance on international energy sources, but would provide additional diversity to the UK's current international sources of electricity.

5.3.4 The Proposed Development, by connecting the Project to the UK's energy system, enables the critical opportunity for the UK to diversify its supplies of energy from international sources, broadening both the nature of supplies (electricity, while most imports are currently hydrocarbons) and political and geographic spread, in that the UK is not currently an importer of any energy commodities from Morocco.

5.3.5 This section provides an analysis of how the UK electricity system would benefit from renewable energy generated by the Project components in Morocco, and transmitted to it through the Proposed Development. The generation profile of the Project components in Morocco complement the profile of renewable energy indigenously generated from UK assets.

5.3.6 Data [Ref. 33] allows a broad comparison to be made between onshore wind and solar power located in the UK (a central location was selected) and Morocco (Guelmim Oued Noun region).

5.3.7 On selection of a renewable generation technology, an installed capacity, an equipment type (e.g. onshore wind turbine make / model), and an orientation (e.g. of the solar panels), the data source returns a series of power outputs over the years selected, which can be analysed further.

5.3.8 By selecting the same installed capacity, equipment type, and orientation in the UK and in Morocco, and comparing the data produced, it is possible to make these relevant comparisons.

5.3.9 The only key difference is that the estimated 15% HVDC transmission losses between Morocco and the UK are taken into account such that the comparisons can be assumed to be made 'at the connection point' of the Proposed Development and any UK-based 'comparison' development, rather than at the point of generation.

Solar Generation

5.3.10 **Figure 13** shows (red line) that daily average solar generation in Guelmim Oued Noun is stronger all year around than daily average solar generation in the UK (blue line), on a 'per MW installed' capacity metric. This is driven by more consistent weather patterns in Morocco than in the UK, especially in winter months, as well as higher solar irradiation generally in Morocco due to its position closer to the equator than the UK.

5.3.11 The solar component of the Project's Moroccan generation assets provides a nearly consistent daily amount of energy, falling by only 18% from summer to winter, while generation from UK-located solar schemes tails off more, at approximately 63%, between summer and winter.

5.3.12 Moroccan solar transmitted into the UK's energy system will therefore play significant role in winter electricity supply.

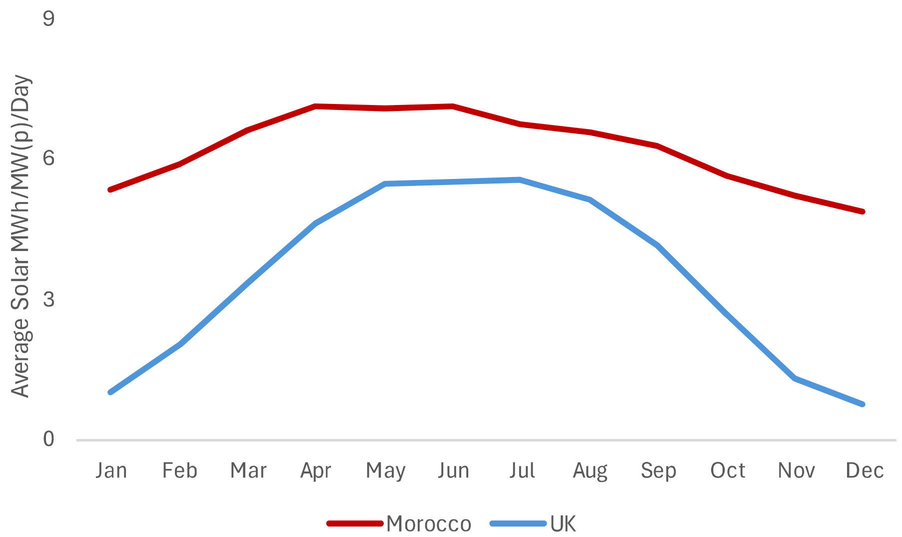

Figure 13. Month average daily solar generation, UK & Morocco (Adjusted for cable losses of 15%)
[Ref. 33, Author Analysis]

5.3.13 **Figure 14** analyses summer solar generation (yellow scatter series, left hand graph) and winter solar generation (orange scatter series, right hand graph).

5.3.14 Each data point on each graph represents a unique day in the 44-year data set analysed. The solar generation output modelled from the UK location is plotted on the x-axis, and the solar generation output modelled from the Moroccan location is plotted on the y-axis.

5.3.15 The locus of data points in the left hand (summer) chart, shows that daily UK summer solar generation is distributed relatively evenly across the entire range of possible outputs. Whereas daily Moroccan summer solar generation clusters near to or above 6 MWh/MW(p)/Day as evidenced by the density of yellow data points lying above that mark on the left hand chart. Morocco daily output is more consistent in summers than UK daily output.

5.3.16 Similarly, the scarcity of yellow data points lying below the 3 MWh/MW(p)/Day line on the yellow chart, suggests that summer days with low solar generation from Morocco are scarce.

5.3.17 The right hand (orange) chart tells a slightly different story, in that low-solar generation days in the UK in winter months are likely. This is shown by the weight of orange data points to the left-hand side of the graph. While orange data points cover the full range of the y-axis on the right-hand chart, showing that some Moroccan winter days can have low solar yield, it is clear by eye that the densest area of orange data points lies when solar output days are low in the UK (left hand side of the x-axis) but high in Morocco (high up on the y-axis).

5.3.18 If irradiation in Morocco was correlated with irradiation in the UK, the locus of data points would form a line, but they do not. Therefore, the data shows that days in either summer or winter with low solar output in the UK are not likely to be days with low solar output in Morocco, and more generally, daily solar generation output in the UK is uncorrelated with daily solar generation output in Morocco.

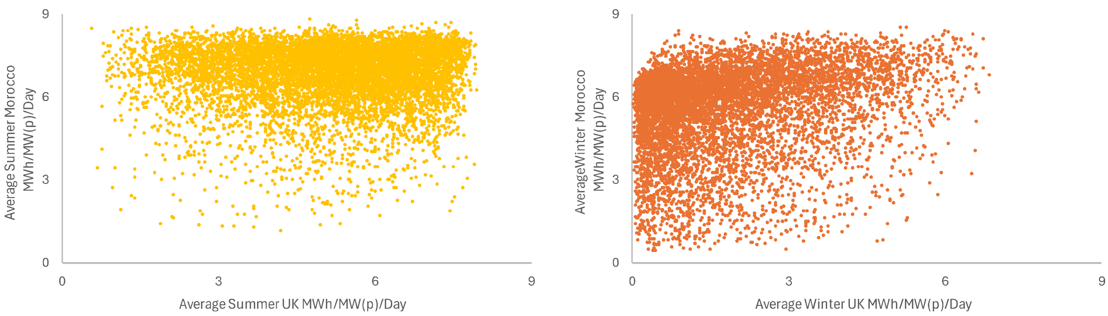

Figure 14. Total daily solar energy intensity (MWh/Day/MW(p), UK & Morocco (Adjusted for cable losses of 15%)
[Ref. 33, Author Analysis]

5.3.19 Therefore, Moroccan solar generation adds to the reliability of UK solar generation, and the its addition of Moroccan solar generation into the UK's supply mix enables an energy system that meets the government's objectives to crease a secure and reliable energy supply for consumers.

Onshore wind generation

5.3.20 An assessment of the loci of data points in **Figure 15** (which cover almost the entire possible area in both graphs) draws the conclusion that daily onshore wind generation output in Guelmim Oued Noun is not correlated with daily onshore wind generation in the UK. The Project's wind generation profile therefore complements that of wind in the UK. Similar to solar analysis, Moroccan onshore wind generation adds to the reliability of UK onshore wind generation, and the addition of Moroccan onshore wind generation into the UK's supply mix enables an energy system that meets the government's objectives to crease a secure and reliable energy supply for consumers.

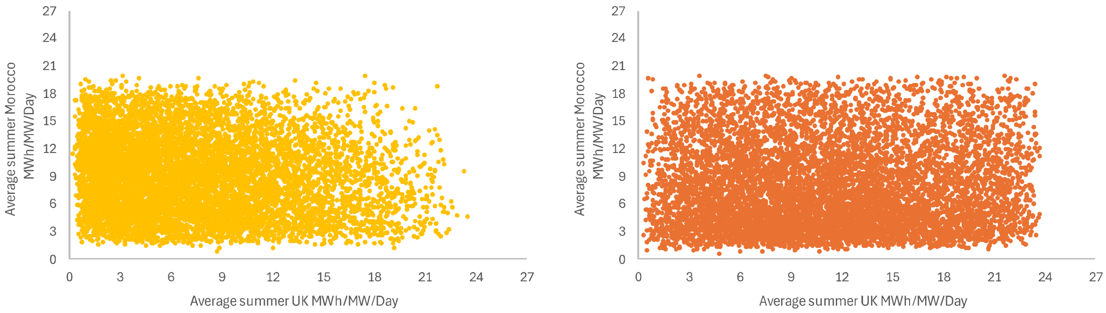

Figure 15. Total daily wind generation, UK & Morocco (Adjusted for cable losses of 15%)
[Ref. 33, Author Analysis]

5.3.21 **Figure 16** helps identify further characteristics and benefits arising from the inclusion of Moroccan wind in the Project. At the month-average level, UK and Moroccan onshore wind resource is comparable on a month-average MWh/MW/Day basis.

5.3.22 UK onshore wind is higher in winters (October – March) than it is in summers (April – September), while Moroccan onshore wind resource is less variable from month-to-month.

5.3.23 Therefore, the reliability of energy supplies from onshore wind located in the UK and onshore wind located in Morocco is higher than the reliability of onshore wind from each location individually.

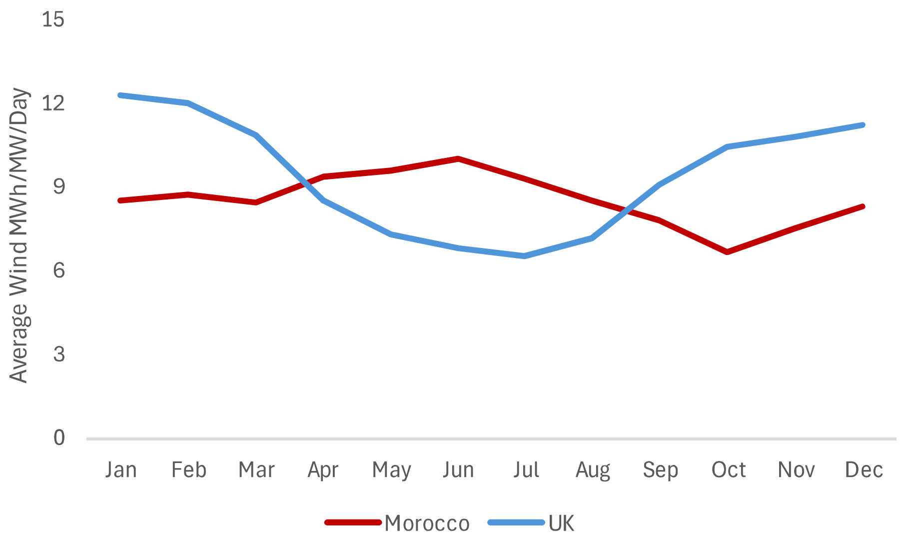

Figure 16. Month average daily wind generation, UK & Morocco (Adjusted for cable losses of 15%)
[Ref. 33, Author Analysis]

5.3.24 In conclusion, the raw generation profiles of the RES assets in Morocco are sufficiently different to the raw generation profiles of an equivalent asset in the UK, to demonstrate that the asset, even without BESS, provides temporal diversity of low-carbon supplies to the UK energy system, driven by a geographical separation and different weather patterns.

5.3.25 In practice, this means that a combined portfolio of Moroccan and UK RES is likely to deliver a more dependable and reliable generation profile the year, than a portfolio of either Moroccan or UK RES would do separately.

5.3.26 The benefit of dependable and reliable generation profile manifests in a reduced, but not removed, requirement for energy balancing (matching demand with variable supply) or reserve power supplies (on stand-by for times when variable generation is not high enough to meet demand).

5.3.27 In other words, by increasing variable renewable resources across a wide geography, not only is more energy able to be generated, but also the task of balancing that energy with consumption is easier, so a lower capacity of flexible assets would be needed to operate in support of the generation assets.

5.3.28 This analysis demonstrates that an increase in the diversity of the UK's electricity supplies leads to an increase in the security and reliability of the UK's energy system.

5.4 The role of flexible assets in the UK electricity system

5.4.1 The co-location of wind and solar with storage provides a significant element of dispatchability to the proposed development, meaning that it can be considered more as 'firm' generation rather than renewable generation, and this will bring benefits to the UK by reducing the need for alternate back-up generation assets and displacing carbon-emitting thermal generation from the UK's energy system.

5.4.2 The inclusion of storage in the proposed development provides flexibility benefits through normal market mechanisms (e.g. National Grid's Balancing Mechanism).

It is also possible that (some) essential system balancing services may be procurable from the Project.

5.4.3 The National Infrastructure Commission (NIC) describe the need for flexibility in the UK's future electricity system, stating that:

"Flexibility is needed to maximise the use of renewables when there is an abundance of generation, and to fill the supply gaps in periods of shortfall. Storage provides flexibility.

It is key that, alongside deploying renewables, the UK continues to drive innovation in the power sector to effectively build a flexible electricity system. Storage technologies, flexible demand, efficient interconnectors, and other innovations are also needed to support renewables and maintain the security of the electricity system." [Ref. 30, p6].

5.4.4 Flexibility is the ability to shift in time or location the consumption or generation of energy. Flexibility is also the ability to shift energy from one medium (vector) to another, e.g. electrical energy to gravitational potential energy through Pumped Storage schemes, and back again.

5.4.5 Flexibility helps the national electricity system function safely, securely, and efficiently. The full operation of flexible assets within that system requires them to both store energy from (or save) and release energy to (or use more) the energy system in response to changing supply and demand balances.

5.4.6 **Figure 17** illustrates the events, consequences, and value drivers over different timeframes for flexibility in the electricity system. Greater variability in residual demand (i.e. demand net of renewable generation supplied) will increase the need for flexibility solutions across multiple timeframes.

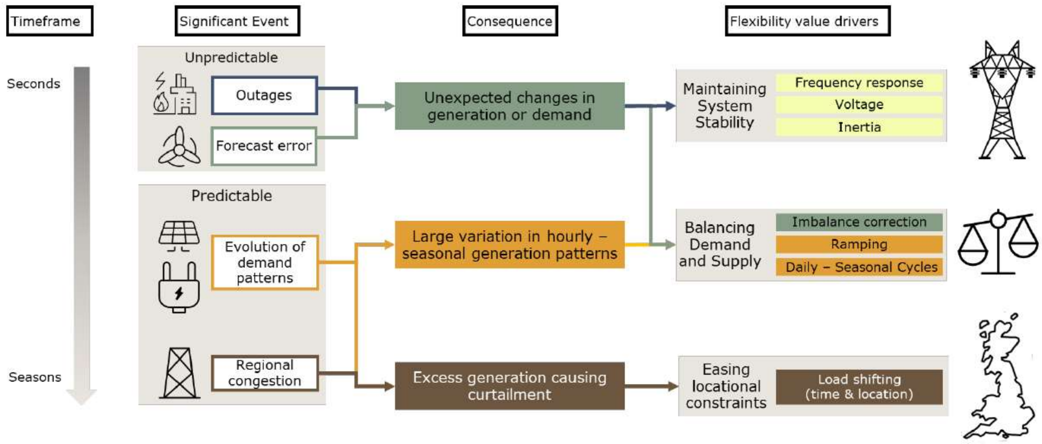

Figure 17. Drivers of Flexibility Requirements
[Ref. 31]

5.4.7 NPS EN-3 describes the government's support for solar which is co-located with storage [Ref. 32, Para 2.10.32] because of the benefits available to system operation. These benefits extend to any renewable energy development which is co-located with energy storage, and are:

- Energy which is generated but not immediately needed can be stored and dispatched to meet future demand
- Energy which has been stored can be dispatched in the place of generation to meet demand

- Storage can respond to instructions from the NESO to increase or reduce generation to help balance system supply with demand
- Storage can provide system balancing services to the NESO to support electricity system security and operation

5.4.8 An electricity system with a lower capacity of storage assets will not deliver the low-carbon, secure, and affordable electricity system the government is aiming for.

5.4.9 For example, if storage assets are not delivered alongside renewable generation assets, other flexible assets, such as carbon-emitting Combined Cycle Gas Turbines (CCGTs), must be kept available to provide flexibility. Carbon emissions will fall more slowly as a result.

5.4.10 Further, much larger capacities of renewable generation assets will be needed to meet periods of high demand under a plausible range of weather scenarios, adding to the cost of the electricity system and ultimately consumer bills.

5.4.11 The ability of a renewable electricity system without storage to meet demand in all weather scenarios will be significantly lower than a system with storage and will therefore be a less secure electricity system.

5.4.12 Electricity which is generated when it is not needed, cannot be saved until it is needed, reducing the efficiency of the electricity system and adding to costs and carbon emissions.

5.4.13 **Table 2** describes the potential contributions of storage assets to the UK electricity market. Storage assets are able to deliver different services. Each service is described and its applicability to the UK electricity market is explained.

5.4.14 The inclusion of storage, solar, and onshore wind elements within the Project means that the Project can deliver these benefits, subject to acceptable operational conditions.

5.4.15 NPS EN-1 notes that interconnectors, which are projects which share many technical characteristics with those enabled by the Proposed Development, *“provide the system with additional flexibility … and can also provide a range of ancillary services, such as voltage and black start services”* [Ref. 1, Para 3.3.34].

5.4.16 Historical weather data [Ref. 33] has been used to demonstrate the flexibility available from the Proposed Development.

5.4.17 An economically rational approach to operating the asset would see the renewable energy generated at the Moroccan facilities transmitted through the Proposed Development to the UK’s electricity system.

5.4.18 It is expected that the energy generated at the Moroccan facilities will often be greater than the quantity of energy which can instantaneously be transmitted through the Proposed Development. At these times, the energy will be stored in the Moroccan storage facilities.

5.4.19 Any stored energy may be released when the quantum of renewable energy generated is lower than is required to be transmitted from the Proposed Development to the UK electricity system.

5.4.20 At times, the energy transmitted through the Proposed Development may be reduced according to UK electricity system conditions. At these times, the quantum of energy reduced would result in renewable energy be stored, rather than transmitted directly to the UK.

Table 2. The potential contributions of storage assets to the electricity market
[Author Analysis]

Service	Explanation	Applicability
Trading	Forward balancing of anticipated energy supply with energy demand	Storage helps by directing energy from when it is produced to when it is needed
Balancing Mechanism	Being available to NESO to balance supply and demand at delivery	Storage can provide both upward and downward flexibility, and operating storage in support of a RES asset avoids the loss of any low-carbon energy generated by that asset. Stored energy can be dispatched over milliseconds to days, depending on technology and need
Frequency Response / Dynamic Services	Changing output over seconds / minutes to help maintain national system frequency at the statutory level of 50Hz	
Reserve Operation	Changing output over minutes / hours to re-balance supply and demand following a fault or other event on the electricity system	
Reactive Power	Locational service which supports the 'flow' of power from source to destination	A mandatory service for all transmission-connected assets, delivered by solar, other RES, and storage assets
Inertia	Helps to slow the rate of change of the electricity system in response to an unforeseen event, stopping faults from escalating	Storage can provide synthetic inertia through combinations of Dynamic Services, listed above
Black Start	A locational service which would help 'turn back on the lights' if the national electricity system failed	Storage may provide limited Black Start support, more so in combination with renewable generation assets
Constraint Management	Changing output in response to local energy supply, demand, and transmission conditions, to ensure locational adequacy at all timescales	Storage can provide constraint services, more so in combination with renewable generation assets
Infrastructure	By connecting generation assets where they are needed and where infrastructure already exists, less new electricity transmission and distribution infrastructure needs to be delivered	Co-locating renewable generation with storage increases the capacity factor and utilisation of the connection, reducing new infrastructure requirements, and ultimately, less assets and connection points will be needed

5.4.21 Alternatively, at these times the Moroccan storage facilities could stop dispatching energy. This would have the same effect, i.e. a lower quantum of energy delivered through the Proposed Development and onto the UK electricity system.

5.4.22 The Proposed Development will not be able to export excess UK-generated energy to the Moroccan electricity system.

5.4.23 At times, the Project's energy storage facilities in Morocco may be full, and the Moroccan generation facilities may be generating more energy than is required in the UK. At these times, the energy would be curtailed (lost) because there would be nowhere to store or consume it.

5.4.24 At other times, the Moroccan storage facilities may be empty, and the Moroccan generation facilities may not be able to generate as much energy as is required in the UK. At these times, energy transmitted from the Proposed Development to the UK would not be at its full capacity.

5.4.25 When the proposed capacity of renewable assets and storage capacity connected to the Proposed Development is considered (see **Section 2.1** of this Statement) it can be inferred that:

- Losses in low-carbon generated energy due to curtailment (i.e. when the supply of energy is greater than the demand for energy and the excess cannot be stored) is likely to be low
- The likelihood that there is no energy available for transmission through the Proposed Development to the UK electricity system is also low

5.4.26 The Author's analysis provides some indications of the likelihood of each of these situations occurring. These indications exclude the impact of breakdowns and/or scheduled maintenance, and should not be inferred as guarantees, or performance criteria, for Project performance.

5.4.27 The 'operating state' of the combined Moroccan facilities will have a bearing on the flexibility available from the Proposed Development. A summary is provided in **Table 3** of this Statement.

5.4.28 The asset will be fully flexible (upward / downward regulation) for over 85% (c.7500) hours per year, without curtailment. During these times the asset will be able to provide flexibility according to the market need, within its normal operational bounds.

Table 3. The Project may provide flexibility to the UK energy system [Author Analysis]

<table>
<tr><th>Technology</th><th>BESS empty</th><th>BESS partially full</th><th>BESS full</th></tr>
<tr><td>Generation zero</td><td>No flexibility services available.
c.5-10% of hours.</td><td colspan="2">Some flexibility services available from BESS.</td></tr>
<tr><td>Generation low</td><td>Some flexibility services available from the generation assets.</td><td>All flexibility services available.</td><td>All flexibility services available.
Downside flex may result in lost energy.</td></tr>
<tr><td>Generation high</td><td colspan="2">Some flexibility services available from the generation assets.</td><td>Some flexibility services available.
Downside flex may result in lost energy.
c. 5-10% of hours.</td></tr>
</table>

5.4.29 At other times the asset will be limited in the availability it can provide to the market, but this is in essence no different to how and when flexibility is available to the market from current providers, e.g. CCGTs.

5.4.30 In essence, therefore, the generation components connecting through the Proposed Development to the UK's energy system, will be capable of providing low-carbon flexibility to that system as a substitute for flexibility currently provided by carbon emitting generators.

5.4.31 The key characteristics of the Project and the Proposed Development which enable this flexibility are:

- The significant capacity of renewable generation sitting behind the connection
- The energy capacity of the co-located storage
- The weather-driven anticipated generation profiles of the combined solar + wind + storage asset
- The dedicated flow of power to the UK
- UK market requirements to provide commercially rational prices for providing flexibility to the UK

5.4.32 The Project is not a stand-alone solution to the UK's electricity trilemma of delivering low carbon, secure, and affordable energy supplies, but will work alongside other technologies including domestic wind and solar, as-yet undelivered low-carbon flexible assets, storage and interconnection, as encouraged by NPS EN-1.

5.4.33 The Proposed Development will increase the security and reliability of UK energy supplies through an increase in the diversity of supply.

5.5 Conclusions on security and reliability

5.5.1 The Proposed Development is critical to enable low-carbon electricity generated in Morocco to be transmitted to the UK. The UK does not currently import electricity or other energy supplies from Morocco.

5.5.2 The Proposed Development therefore increases the geographic and political diversity of the UK's energy and electricity imports, improving the country's energy security.

5.5.3 UK net energy imports would increase by approximately 3% if the Proposed Development was to be operational, based on the UK's 2023 international energy balance, production, and consumption.

5.5.4 However, by enabling an increase in low-carbon electricity supplies, the Proposed Development would also enable a future reduction in the UK's demand for hydrocarbons, thereby applying a downward pressure on future UK oil and gas imports.

5.5.5 The Proposed Development therefore will, if consented, enable the development of a secure energy supply for consumers.

5.5.6 An analysis of the generation profile of the offshore assets which connect through the Proposed Development to the UK's electricity system has shown that it is not likely to be correlated to the generation profile of the same technologies based in the UK.

5.5.7 The government expects that by 2050, the majority of electricity supply will be from wind and solar (the constituent generation technologies included within the Project scope). Therefore, the uncorrelated nature of UK-based and international solar and wind supplies adds diversity to the supply of energy for UK consumers, increasing the security and reliability of UK supplies.

5.5.8 The NPSs confirm that assets which provide flexibility to the national electricity system, or to the energy system generally, are also needed to achieve national decarbonisation and energy security aims.

5.5.9 The Proposed Development, which is critical infrastructure to transmit low carbon energy from an internationally located solar, onshore wind, and storage facility, to the UK's electricity system, is therefore fully aligned with the government's aims.

6 CREATING AN AFFORDABLE ENERGY SUPPLY

6.1 Introduction to affordability

6.1.1 NPS EN-1 clarifies that *"value for money assessments are not required on applications for development consent for energy infrastructure projects"* [Ref. 1, Para 3.3.14].

6.1.2 However, in demonstrating the need for the Proposed Development, this chapter demonstrates that the Proposed Development would play an important role in enabling an energy system that meets the Government's objectives to create an affordable energy supply for consumers.

6.2 Levelised cost of renewable generation

6.2.1 The cost of renewable generation is an important enabler of its development. Levelised Cost of Energy (LCOE) is an important metric allowing all forms of generation to be compared with each other on a consistent basis. LCOE is calculated using a discounting methodology and is a measure of the lifetime unit cost of generation from an asset, including capital and operating costs. In-life cap capital and operating expenses, for example the re-powering of sites to manage anticipated degradation, are also anticipated.

6.2.2 **Figure 18** shows the results of the government's Electricity Generation Costs modelling [Ref. 34(2023)] with the range of values representative of different complexities of technical solution.

6.2.3 The figure shows a 'triple' of columns for each of five generation technologies. Each column within each triple shows the technology's anticipated LCOE for assets commissioning in 2025 (left hand column), 2030 (middle column) and 2035 (right hand column).

6.2.4 The modelling anticipates different projected operational lifetimes, load factors (a measure of the output of the plant per year versus its theoretical maximum if availability is unconstrained), capital and operational costs, and development duration to derive a range of cost projections. The blue bars show that range while the red columns represent the LCOE range under different projections for input fuel costs for those technologies which require a non-zero cost input fuel.

6.2.5 Government's modelling shows that UK-based renewable generation technologies hold a significant levelised cost benefit versus technologies which are reliant on fossil fuels, even when fuel input costs are included at a low level. This supports the government's expectation that the UK will be powered mainly by wind and solar in 2050, therefore significant capacities of these low-carbon generation technologies will need to come forward to meet that expectation [Ref. 1, Para 3.3.20].

6.2.6 A project with a lower LCOE would allow consumers to benefit through market mechanisms, see also **Section 6.3** of this Statement for more detail. For example, a project with a lower LCOE would be able to bid into a future CfD Allocation Round at a lower strike price than a project with a higher LCOE. If such a project secured an agreement and proceeded to operation, consumers would also benefit versus the case that it did not.

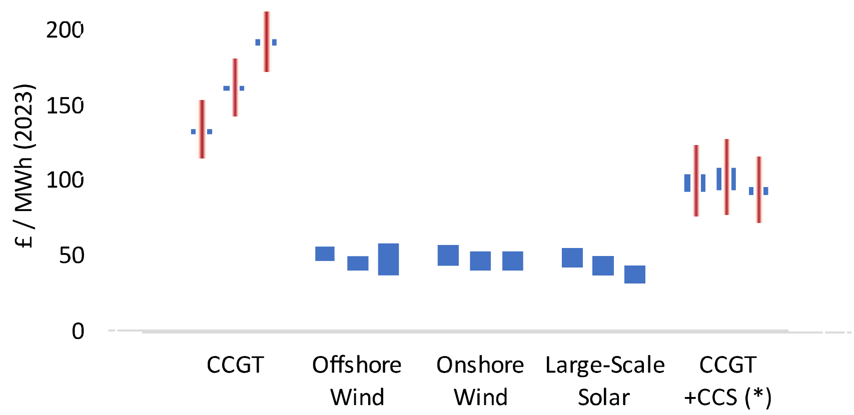

Figure 18. Levelised cost of energy comparison
[Ref. 34]

6.2.7 It also follows that projects with lower LCOE would be able to secure other forms of revenue agreements at a lower average price than similar projects with higher LCOE. As such, it is in the consumers benefit for developers to bring forward projects at a lower LCOE than comparable projects with higher LCOE.

6.2.8 Modelling and analysis by the International Renewable Energy Agency (IRENA) [Ref. 35] and shown in **Figure 19** shows that reductions in the LCOE of onshore wind have been experienced in Morocco as well as the UK. Gaps in the green columns (LCOE estimates for onshore wind in Morocco by commissioning year) indicate that no new onshore wind farms were commissioned in Morocco in that year.

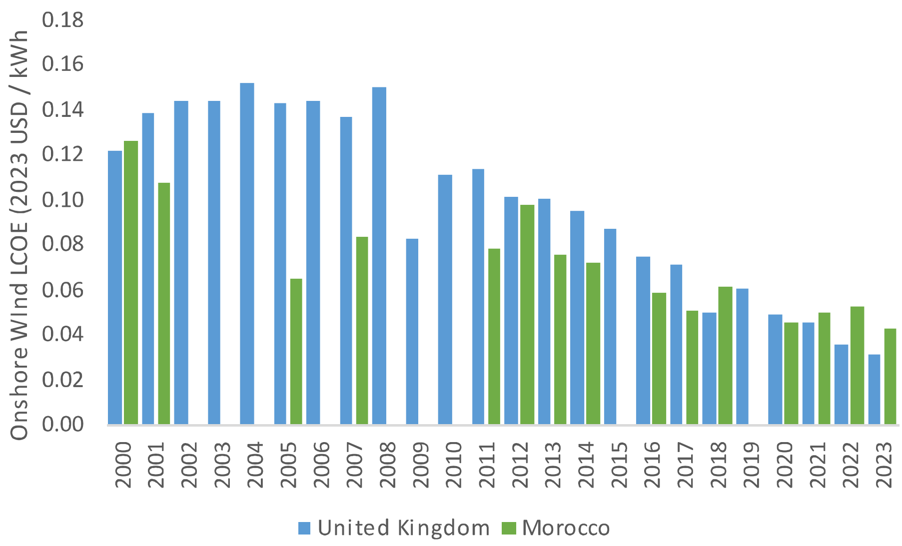

Figure 19. Levelised cost of onshore wind energy reductions in the UK and Morocco
[Ref. 35]

6.2.9 In the years between 2011 and 2023 where data is available for both Moroccan and UK facilities, Moroccan wind LCOE estimates were lower than estimates of contemporary developments in the UK in seven years, and more expensive in four years, although the data does not clarify the capacity or number of projects included in each annual sample.

6.2.10 While the LCOE of onshore wind in both countries is trending down, the data indicates the potential for onshore wind to be delivered at a lower LCOE in Morocco than in the UK.

6.2.11 IRENA has not published similar LCOE trajectories for solar power in the UK and Morocco, however an analysis of data sourced from the International Energy Agency (IEA) and shown in **Figure 20** suggests that the cost of solar generation in Africa is likely to be significantly lower on an LCOE basis than solar generation in the UK.

6.2.12 The Applicant expects the Project to operate with a load factor of approximately 75% for an operational life of circa 50 years. The additional capital costs of the BESS and subsea cable from Morocco to the UK will therefore be amortised over a large quantum of delivered energy, and it is likely that the Project will deliver low-carbon electricity to the UK for a cost which is competitive with other forms of generation currently under development in the UK.

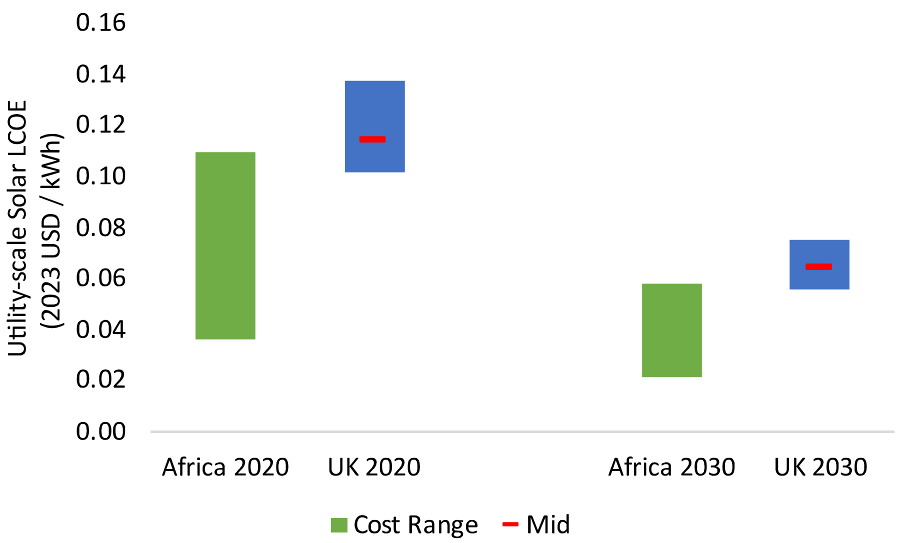

Figure 20. IEA levelised cost of solar energy projections for the UK and Africa
[Ref. 34, Ref. 36, Author Analysis]

6.2.13 **Figure 21** shows the results of a study by the National Renewable Energy Laboratory (NREL) in 2023 [Ref. 37]. Their study provides an update to an earlier 2016 study, and includes recent battery cost data points to capture recent trends in this rapidly evolving sector. The NREL's analysis shows that BESS capital costs have reduced since their 2022 estimates and are projected to reduce further through to 2050.

6.2.14 The NREL's analysis estimates for 4-hour systems are broadly, but not likely precisely, applicable to the BESS configuration proposed as part of the Project, however, provide an indication on the level of cost reductions expected in the sector for this type of infrastructure.

6.2.15 The generation assets which the Proposed Development will connect to the UK's electricity system include a 5GW / 22.5 GWh battery energy storage facility, or a 4.5 hour battery system.

6.2.16 A 4.5-hour system is likely to have lower cost projections than a 4-hour system, because some capital costs scale according to power capacity, rather than energy capacity.

6.2.17 The NREL report their price projections as a total system overnight capital cost expressed in units of $/kWh, based on a review of other literatures published in 2022 and 2023. The 2022 starting point for the analysis was $482/kWh, which the NREL state is *"on the high end but generally within the range of estimated current pricing"* [Ref. 37, p5]. The mid-trajectory of costs were evaluated as $326/kWh in 2030 and $237/kWh by 2050. The 2030 cost represents a reduction of 32% on 2022 costs.

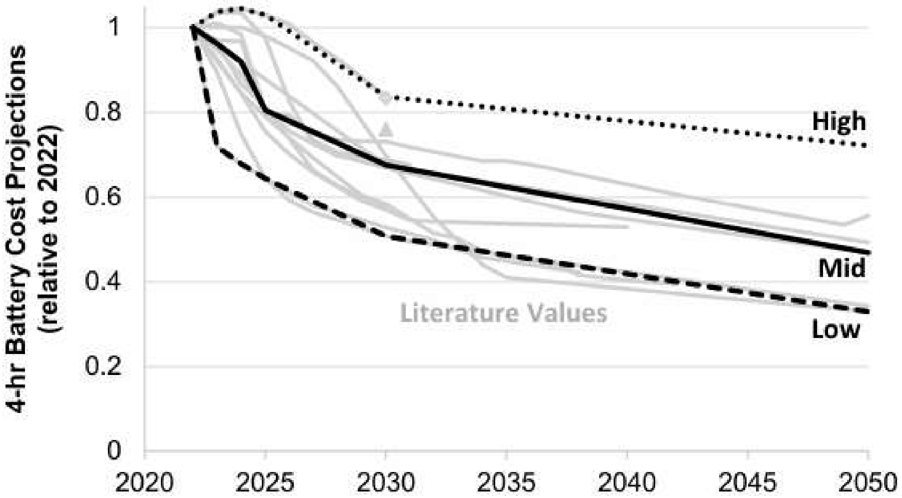

Figure 21. NREL Battery cost projections for 4-hour lithium-ion systems, with values relative to 2022

[Ref. 37, Figure 1]

6.2.18 The NREL estimate operating costs at 2.5% of the $/kW capacity cost for a 4-hour battery, which is assumed to be consistent with providing approximately one cycle per day (i.e. the equivalent of one full charge, one full discharge of the battery energy capacity each day) over an assumed 15 year lifetime of the system.

6.2.19 Ofgem has recently approved the largest ever investment in Great British transmission infrastructure, Eastern Green Link 2 (EGL2), a 2GW, 500km sub-sea HVDC link between Scotland and England. EGL2 is being developed to increase the amount of low-carbon power generated in Scotland able to flow to demand centres across the UK.

6.2.20 While each HVDC link is likely to incur project-specific costs, Ofgem's approval shows that the technology is cost effective in the application for which is it proposed as part of the Project. Namely, the transmission of low-carbon energy from where it is generated to where it is to be consumed.

6.2.21 The Applicant has stated that their cost projections for the Project, including the Proposed Development, indicate that the Project would be deliverable at a level which is competitive with other low-carbon baseload technologies already contracted under the CfD scheme.

6.2.22 However, as with all developments requiring development consent, final and binding commercial aspects including funding, contracting, and discussions on government subsidies, are undertaken only once a project is consented for development.

6.2.23 However, the Project comprises source generation technologies which, if deployed, are likely to bring significant cost benefits to the portfolio of generation that currently supplies low-carbon energy to the UK.

6.2.24 The competitive LCOE of significant elements of the whole Project indicate that consenting the Proposed Development would be likely to help to enable an energy system that meets the government's objectives to create an affordable energy supply for consumers.

6.3 Renewable generation reduces the traded price of UK power

6.3.1 In the UK power market, generators schedule themselves to generate in response to whether a market price signal for a specific period is above or below their marginal cost of generation. The marginal cost of generation is defined as the input fuel, carbon emissions, and other variable costs of generating one additional MWh.

6.3.2 Renewable generation has very low or zero marginal costs and therefore renewable assets generate as much power as they are able to, when they are available (i.e. whenever the wind is blowing or there is sunlight) and whenever power prices are positive.

6.3.3 The marginal cost of generation for conventional assets is higher than zero because of input fuel and carbon emissions costs. Conventional assets only generate when the market price is higher than their marginal cost of generation.

6.3.4 UK power is a 'pay as clear' market, meaning that the price of power is set at the marginal cost of the most expensive asset needed to meet demand for the period in question. If input fuel costs increase, marginal costs increase, and the price of power therefore also increases.

6.3.5 This is shown in simplified form in **Figure 22**. The shaded area shows the capacity of assets (x-axis, increasing) against the marginal cost of generation (y-axis). This is called the 'stack'. Renewable assets are to the left of the stack, at a zero marginal cost of generation (the light blue shaded area does not go higher than the line y = 0). Conventional assets are in the middle. The mid-blue shaded area shows that some assets have lower marginal costs than others and so will generate ahead of more expensive assets. Peaking assets, with very high marginal costs, are to the right of the stack.

6.3.6 The green vertical lines represent levels of electricity demand. As demand increases, e.g. from the dashed to the solid green line, assets with increasingly expensive marginal costs are brought on to meet demand, and market price increases. As demand falls (the green line moves to the left), assets 'fall out of the money' and stop generating. Market price therefore decreases to that set by a different asset with a cheaper marginal cost.

6.3.7 Increasing the output of renewable assets reduces the traded price of power. As renewable generation output increases, more electricity is generated at a zero marginal cost (the 'zero height' portion of the x-axis increases in length). For a fixed level of demand (i.e. a static green vertical line), the most expensive assets stop generating, leaving cheaper units to set the price of power.

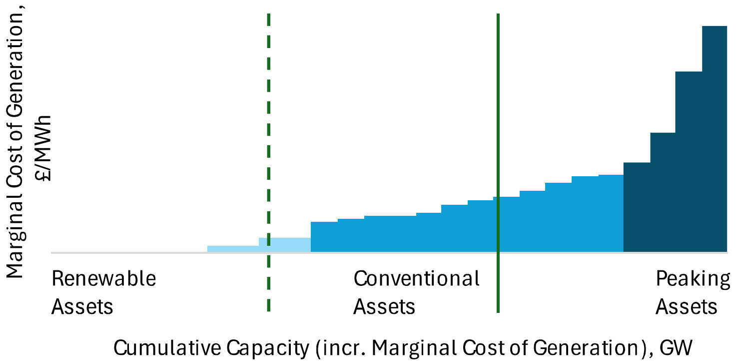

Figure 22. The marginal cost of generation sets the UK's price of electricity [Author analysis]

6.3.8 The competitive marginal cost of generation of significant elements of the whole Project, indicate that consenting the Proposed Development would be likely to help to enable an energy system that meets the government's objectives to create an affordable energy supply for consumers.

6.4 Shielding consumers from volatile international energy markets

6.4.1 The worked examples in **Figure 5** to **Figure 8** also illustrate how the marginal cost of electricity would be lower if the Project was operational than it would be if the Project was not operational.

6.4.2 This is because carbon emitting assets require an input fuel, e.g. gas, and the cost of that fuel must be included in the generator's marginal cost of generation. The cost of the carbon emitted must also be included in the generator's marginal cost of generation.

6.4.3 The cost of electricity generated at the Project and transmitted through the Proposed Development to the UK's electricity system does not require an input fuel and therefore has a very low marginal cost. If shown on **Figure 22**, the Project would lie to the left-hand end of the x-axis.

6.4.4 The energy transmitted to the UK electricity system would be dispatched in commercial preference to carbon emitting generation, and the price of electricity in the UK would reduce accordingly.

6.4.5 Volatile international energy markets impact the cost of fuel used in carbon emitting generation. If international energy prices increase, fuel costs increase, and the marginal cost of carbon-emitting assets will also increase. This effect is seen in the UK's electricity price, when carbon-emitting generators are providing energy to the UK's electricity system.

6.4.6 The marginal cost of electricity generated by the Project and transmitted through the Proposed Development will not be affected by international energy prices.

6.4.7 Subject to system operability needs, when renewable generation capacity is high enough at times to push carbon intensive assets fully off the grid, the price of power is no longer set by assets with volatile input fuel costs.

6.4.8 The development of greater capacities of renewable generation, including those developed with the capability also to deliver flexibility to the UK's energy system, will further increase the frequency of periods when renewable assets set the price of power.

6.4.9 In doing so, renewable generation, coupled with assets which can operate flexibly, such as the assets connected to the Proposed Development, reduce the UK's dependency on international energy markets, and reduce the UK consumer's exposure to their volatile prices.

6.4.10 Therefore, the Proposed Development, by enabling the transmission of low-carbon energy from the Project into the UK's energy system, enables an energy system that meets the Government's objectives to create an affordable energy supply for consumers.

6.4.11 Further, the Project helps to provide a shield for consumers against international energy price volatility.

6.5 The Contracts for Difference scheme benefits consumers

6.5.1 The Applicant has stated that the project proposes to generate revenues via the government's Contracts for Difference (CfD).

6.5.2 However, other support mechanisms, either in existence today or yet to be developed, may in the future be determined to be more suitable. Any support mechanism which fixes or regulates project revenues will also have a stabilising effect on consumer bills at the same time as providing increased revenue certainty for investors.

6.5.3 A CfD is a contract with the government-owned Low Carbon Contracts Company (LCCC). Principally, the CfD ensures that if the price of electricity falls below a specified 'strike price,' the generator is paid a 'top up' to make up the difference. However, if the price of electricity rises above the strike price, the generator 'pays back' the excess. Ultimately, the credits and debits arising from the CfD scheme are allocated to consumer bills.

6.5.4 The benefits of the CfD scheme are that:

- The scheme provides revenue certainty for investors and allows large-scale infrastructure developments to secure funding and get delivered
- The scheme pays profits earned through high market prices back to consumer bills

6.5.5 **Figure 23** provides a simplified pictorial of CfD contract mechanics. During periods when the market price (blue line) is lower than the Strike Price (dotted line), the difference between those prices, shown by the red areas, is collected through consumer bills and paid to the generator.

6.5.6 However, during periods when the market price is higher than the Strike Price, the difference shown by the green areas is collected from the generator and redistributed back to consumers.

6.5.7 During periods when international energy prices are high, UK electricity prices will also be high (see **Section 6.3**). However, if those prices extend above the Strike Price, the difference will be collected from the generator and redistributed back to consumers. Therefore, the CfD provides a shield for consumers against volatile international energy prices.

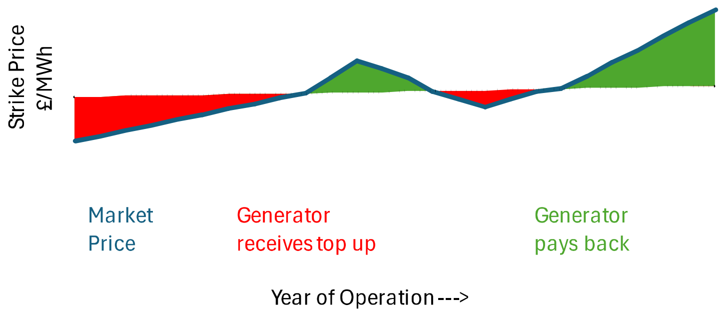

Figure 23. CfDs return excess profits to consumers in return for an agreed contract price

[Author analysis]

6.5.8 Since their introduction in 2013, approximately 33.5GW of capacity has been awarded a CfD (271 schemes). 29.5GW of this (239 schemes) is either operating or is under construction, with attrition from the scheme through reduced capacity, or terminated agreements, totalling 4GW. CfD terms have evolved over the last decade and now include many provisions which, among other things, provide increased financial protection for consumers and support electricity system operation [Ref. 20].

6.5.9 The Applicant has assessed that the government's CfD scheme is currently the most suitable financial support mechanism for the Project. By entering a CfD contract for the Project, the Project will contribute to an increase in the stability of consumer bills, and provide a shield for consumers against volatile international energy prices.

6.6 Conclusions on affordability

6.6.1 Onshore wind and utility scale solar power are currently two of the cheapest forms of electricity generation currently available. Both technologies provide the potential to realise a significant benefit against the cost of other leading electricity generation technologies, especially those which rely on input fuels.

6.6.2 The Applicant has stated that their cost projections for the Project, including the Proposed Development, indicate that the Project would be deliverable at a level which is competitive with other low-carbon baseload technologies already contracted under the CfD scheme, although final financial matters would be undertaken only following consent being granted for the Project.

6.6.3 The competitive marginal cost of generation and LCOE of significant elements of the whole Project indicate that consenting the Proposed Development would be likely to help to enable an energy system that meets the government's objectives to create an affordable energy supply for consumers.

6.6.4 The Applicant has assessed that the government's CfD scheme is currently the most suitable financial support mechanism for the Project although other support mechanisms, either in existence today or yet to be developed, may in the future be determined to be more suitable. By entering a CfD contract, or any support mechanism which fixes or regulates project revenues, the Project would contribute to an increase in the stability of consumer bills and provide a shield for consumers against volatile international energy prices.

7 OTHER BENEFITS OF THE PROPOSED DEVELOPMENT

7.1 Connections Action Plan

7.1.1 The Proposed Development comprises all offshore elements of the Project which lie within the UK Exclusive Economic Zone (EEZ), as well as onshore elements situated within the administrative areas of Torridge District Council and Devon County Council.

7.1.2 Importantly, onshore elements include a grid connection point for the Project to the NETS at Alverdiscott. Securing a timely grid connection is a critical enabler for low carbon infrastructure to contribute towards a zero-carbon electricity system in the 2030s but grid connection availability is currently constrained in the UK.

7.1.3 The government's election manifesto states that *"The national grid has become the single biggest obstacle to the deployment of cheap, clean power generation and the electrification of industry. With grid connection dates not being offered until the late 2030s, important business and infrastructure investment is being stalled or lost overseas. Labour will work with industry to upgrade our national transmission infrastructure and rewire Britain"* [Ref. 10, p55].

7.1.4 The Connections Action Plan explains that the efficient utilisation of existing networks can defer or negate the need for expensive new infrastructure, which takes time to deliver [Ref. 17, pp26&27] and that ensuring that existing and future capacity is allocated efficiently will allow timely connection offers, aligned with net zero objectives.

7.1.5 In relation to increasing network capacity, the Plan describes that there are two approaches. The first is to increase network build and the second, which is described as *"more efficient"* and *"typically lower cost",* is to *"maximise the use of the currently available and planned network capacity"* [Ref. 17, pp40&41].

7.1.6 Capacity allocation is defined in the Plan as an approach to *"maximise the benefits of available capacity such that projects that are more ready and able to connect can do so ahead of those which are stalled, while maintaining appropriate opportunities for technologies with varying lead times, in line with net zero pathways"* [Ref. 17, p44]. It is important to note that some investment may be required to unlock the benefits of currently available capacity.

7.1.7 Schemes which propose to develop technology which will support the move to net zero (such as solar and storage schemes) are therefore aligned with the government's aims and energy strategy. Schemes which propose to connect to existing and available infrastructure in a way which maximises the benefits of that infrastructure are aligned with the Connections Action Plan reforms.

7.1.8 Ensuring assets can connect to the electricity network where and when they need to is crucial to achieving net zero, as well as to delivering affordability for consumers and maintaining security of supply.

7.1.9 **Section 7.7** of this Statement describes the benefits associated with the location of the Proposed Development in relation to the use of existing infrastructure and the likelihood of the flow of electrical energy onto the NETS from the Proposed Development being largely uncurtailed.

7.1.10 **Section 0** of this Statement describes that the Applicant's modelling indicates that through the course of a year, energy exported from the international generation assets will be equivalent to approximately 18 hours of full export a day (i.e. an annual load factor of approximately 75%). The Project will therefore deliver a high utilisation of its proposed grid connection. The benefit of a high capacity factor is that a large quantity of energy can be provided for consumption through a single point of connection.

7.1.11 To provide the same quantity of energy from schemes with lower capacity factors would require more schemes, each with their own (potentially separate or new) point of connection to the NETS.

7.1.12 The Proposed Development is therefore consistent with the identified urgent need for schemes to come forwards to support the decarbonisation of the electricity system, and also to maximise the benefits of valuable available grid connection capacity as described in the Connections Action Plan.

7.2 The Project comprises components which are already in use

7.2.1 Government is actively supporting industry to progress on major new low-carbon generation technologies such as new nuclear, CCUS, and hydrogen, the first large-scale projects of which are considered to deliver in similar timeframes as the Proposed Development. The continued development of these new technologies does not reduce the need for the Proposed Development.

7.2.2 The need for new low-carbon infrastructure is unprecedented, and these technologies are not alternatives to each other, because they are all needed. Again, this is as set out in the NPSs.

7.2.3 Developments across a broad range of technologies must continue to cover the event that some technologies may not deliver to their current planned scale and timelines.

7.2.4 A key differentiation between the Project and other new technologies is that all of the component parts of the Project, including the Proposed Development, and covering both technical and commercial aspects, have already been deployed globally and where relevant in the UK at large scale.

7.2.5 In this respect therefore the risk of a delay in Project delivery could be considered to be lower than the risk of a delay in the delivery of projects using new technology, or technology which has not yet been implemented at scale.

7.2.6 The major constituent elements of the Project are:

- Sub-sea HVDC link from Morocco to the UK
- Large-scale ground-mounted solar panels
- Large-scale onshore wind turbines
- Large-scale battery energy storage facilities
- Revenue certainty, potentially provided by a Contracts for Difference

7.2.7 Each individual project will have its own unique characteristics and challenges due to location, geography, and other factors. The analysis included in **Section 7.3** of this Statement demonstrates that the component elements of the Project have been previously delivered at scales approaching that included in this Project.

7.2.8 As such, the delivery risk profile of the Project should be considered to be more similar to that associated with mature technologies, than that of nascent technologies. The Project therefore should present as a project which is deliverable within the timelines suggested by the Applicant. As such the project presents an opportunity to support the urgent need for decarbonisation through enabling an energy system that meets the UK's commitment to reduce carbon emissions and the Government's objectives to create a secure, reliable, and affordable energy supply for consumers.

7.3 Global experience in the deliverability of Project technical components

7.3.1 The HVDC component of the Project will comprise two cable systems. At least one cable system must be fully constructed before 'first power' can be delivered from Morocco to the NETS through the Proposed Development. By using two cable systems, a single-point vulnerability of the Project is removed. If one cable system was taken out of service for maintenance, the second cable system would allow energy to continue to flow to the UK, albeit at a lower maximum capacity.

7.3.2 Sub-sea HVDC cables already operate in UK waters, including:

- Western Link, commissioned in 2017, runs for nearly 400km under water between Scotland and England and has an operating capacity of 2.2GW [Ref. 38(1)]
- Viking Link, commissioned in 2023, runs for nearly 800km between Denmark and England and has an operating capacity of 1.4GW [Ref. 38(2)]
- North Sea Link, commissioned in 2021, runs for over 700km between Norway and England and has an operating capacity of 1.4GW [Ref. 38(3)]
- BritNed, commissioned in 2011, runs for over 250km between The Netherlands and England and has an operating capacity of 1GW [Ref. 38(4)]

7.3.3 Future HVDC links are already in development in UK waters, and more even have been highlighted as needed, including:

- Eastern Green Link 1 (EGL1) and Eastern Green Link 2 (EGL2) are new sub-sea HVDC cables connecting Scotland and England under the North Sea. EGL1 will run for nearly 200km and operate at a capacity of 2GW. Construction work is planned to commence in 2025. EGL2 will run for over 500km, of which approximately 70km will be buried underground onshore. Construction on this separate 2GW connector is planned to commence in 2024 [Ref. 38(5)]
- Figure 3 of NESO's Pathway to 2030 Holistic Network Design [Ref. 38(6)] shows that nearly one half of the links between proposed offshore wind farms and the onshore NETS are proposed to utilise HVDC technology
- Part 5 of NESO's Beyond 2030: Celtic Sea publication [Ref. 38(7)] shows that one of three potential links from potential future Celtic Sea wind farm areas to the NETS has been proposed as HVDC, with an operating capacity of approximately 1.5GW

- In November 2024, Ofgem approved five major new undersea energy links including three interconnectors and two new Offshore Hybrid Assets, totalling over 6GW of subsea cross-border HDVC links Ref. 38(8)

7.3.4 From the evidence available, it is clear that subsea HVDC is commonplace in UK waters. Cable lengths have increased since the first links became operational. Links with higher operating capacities than the proposed operating capacity of each of the Project's HVDC links are already operational in UK waters, and more are planned.

7.3.5 Large-scale ground mount solar projects are increasingly commonplace globally, with 78 schemes of 0.5GW or larger listed as operational based on a June 2024 assessment [Ref. 39]. The same dataset lists over 500 schemes currently in development which are over the same scale threshold, including the Project. 48 of these globally dispersed schemes are indicating their proposed installed capacity will each be over 3GW.

7.3.6 Large onshore wind projects are also increasingly common with 49 projects located in North America, Asia, Oceania, and Europe already operating with over 0.5GW of capacity [Ref. 40]. The same dataset lists over 319 schemes currently in development which are over the same scale threshold, including the Project. 26 of these globally dispersed schemes are indicating their proposed installed capacity will each be over 3GW.

7.3.7 While the inclusion of a development project in the datasets cited does not guarantee the future delivery of that project, the number and scale of large scale renewable projects globally is clearly increasing, and this Project presents in line with, rather than ahead of, leading global schemes of the day in terms of its location (latitude) or scale for either solar or onshore wind components.

7.3.8 Large-scale battery energy storage systems are also already in operation globally. Three of the largest projects globally are all located in California and are over 0.6GW / 2GWh [Ref. 41].

7.3.9 Therefore, should consent be achieved for all parts of the Project, including the Proposed Development, the construction and commissioning phase of the project development process would be able to proceed with pace to support the urgent need to enable carbon emission reductions in the UK.

7.4 Delivering projects which comprise many multiples of standard components

7.4.1 The largest operational solar, onshore wind, and storage facilities have been, or are intended to be, built in stages. One of the critical characteristics of these technologies is that scale is achieved through the installation of multiples of standard, small units, rather than the construction of single large pieces of equipment.

7.4.2 Projects which comprise many multiples can start to produce power sooner than projects comprising single large equipment projects. Only a smaller, critical number of components must be commissioned before 'first power' can flow, whereas single large equipment projects must generally be fully completed before commissioning.

7.4.3 Delivering low-carbon power to the grid at the earliest opportunity is critical to meet the urgent need to enable an energy system that meets the UK's commitment to reduce carbon emissions.

7.4.4 Projects with multiples can also be constructed more quickly, through parallel construction pathways rather than the necessity that single large equipment projects must be constructed sequentially.

7.4.5 Projects with multiples can be less complex than single large equipment projects. This can reduce construction risk, and also provide opportunities to speed up construction through the application of institutional learning gained in the early stages of construction.

7.4.6 The technical deliverability of large-scale energy projects is critical to their success, as well as their ability to deliver to the urgent need for low-carbon generation which has been identified by government.

7.4.7 Being comprised of many multiples of standard solar, wind, and battery storage components, the Project is well placed to deliver with pace and scale should consents be secured. The Project, of which the Proposed Development is a critical part, is therefore also well placed to deliver to the urgent need for low-carbon generation which has been identified by government. However, commercial feasibility is also important.

7.5 UK experience in the deliverability of Project commercial components

7.5.1 Funding the large up-front construction costs of renewable generation projects, including the Project of which the Proposed Development is part, requires investors to be confident the quantum and timing of projected project returns.

7.5.2 The Applicant has stated that the project proposes to generate revenues via the government's Contracts for Difference (CfD) scheme, the UK government's mechanism for supporting low-carbon electricity generation.

7.5.3 The CfD scheme has already awarded contracts to 29.4GW of UK-based renewable generation, including 3.7GW of solar PV and 2.8GW of onshore wind generation. 0.7GW of this capacity is already operational with 1.6GW more solar and onshore wind capacity expecting to connect before the end of April 2025 [Ref. 20].

7.5.4 A CfD has also been awarded to Hinkley Point C, the only new UK nuclear power project currently in construction, demonstrating that the scheme has been used to secure multi-billion pound investments in single projects.

7.5.5 If a CfD was not available to stabilise project revenues, other commercial mechanisms exist which would provide similar protections for investors as well as consumers (see **Section 6.3** of this Statement). Such mechanisms may include long-term Power Purchase Agreement(s) (PPAs) for all or some of the energy transmitted through the Proposed Development. Agreement(s) could be awarded to different types of counterparty, including corporates, local governments, or UK energy market participants / suppliers.

7.6 Summary of Project techno-commercial deliverability

7.6.1 Each constituent techno-commercial component of the Project has already been delivered and is operational in the UK, with evidence provided to support the deliverability of the Project at the scale proposed.

7.6.2 In contrast, at least one critical techno-commercial component of the other major technologies listed previously is either currently undefined or has not been delivered at the scale proposed or needed to support government's decarbonisation plans.

7.6.3 It is important to re-iterate at this point, that this Statement does not seek to justify or promote the exclusion of any other generation technologies from the UK's future generation mix.

7.6.4 However, it is also important to reiterate that the government considers that *"It is prudent to plan on a conservative basis to ensure that there is sufficient supply of energy to meet demand across a wide range of future scenarios"* [Ref. 1, Para 3.4.29], including, for example, where the future use of new technologies is limited.

7.6.5 Therefore, while delivery risk exists across a wide range of technologies, it is critical that no viable technology, or viable project, is prevented from continuing to be developed into a valuable measure to play an important role in enabling an energy system that meets the UK's commitment to reduce carbon emissions and the Government's objectives to create a secure, reliable, and affordable energy supply for consumers.

7.6.6 Therefore, it is proposed that the Project's development risk profile may be considered to be as low if not lower than that of nascent technologies which are not yet proven in operation, consented, have secure commercial arrangements or a combination of those factors.

7.6.7 As such it is proposed that the Project is at least as likely to deliver important benefits to support the delivery of government's energy strategy as are other more nascent technologies, and as such the Project is urgently needed.

7.7 Electricity system benefits of the proposed location

7.7.1 NPS EN-1 states that *"To produce the energy required for the UK and ensure it can be transported to where it is needed, a significant amount of infrastructure is needed"* [Ref. 1, Para 2.1.3].

7.7.2 NPS EN-1 also recognises that *"the case for a new connection or network reinforcement is demonstrated if the proposed development represents an efficient and economical means of connecting a new generating station or storage facility to the network"* [Ref. 1, Para 3.3.78].

7.7.3 In support of demonstrating the need for the Proposed Development, this section provides evidence that the Proposed Development is an efficient and economic means of enabling a significant quantity of energy to be available to consumers through a single connection point, away from areas of Great Britain in which significant network development needs have already been identified, and which, due to its location, is unlikely to be subject to high levels of curtailment.

7.7.4 The Proposed Development will connect to the NETS at Alverdiscott in Devon. Alverdiscott is an existing National Grid substation with connections to the north towards Bristol, to the south into Cornwall and around the south coast towards Exeter and Southampton, and towards London and population centres in the South East.

7.7.5 From Bristol, the NETS connects to South Wales and the Midlands, themselves areas of significant consumer demand, and along the M4 corridor also towards population centres in the South East.

7.7.6 The substation connects to a 400kV high-voltage section of the NETS.

7.7.7 NESO subdivides its network into operational areas by means of system boundaries. These boundaries are not hard, nor physical, but differentiate areas within which NESO characterise power flows. The existence of many boundaries between points of power supply and points of power demand implies that those power flows may be more difficult, less efficient or both, for NESO to manage.

7.7.8 The cost of operating the network, including managing power flows, incurs a cost. That cost is ultimately charged back to consumer bills. Therefore the existence of many boundaries between points of supply and demand may apply upward pressure on consumer bills.

7.7.9 **Figure 24** shows the NETS in the southern part of the UK. Blue lines represent 400kV transmission connections. Red lines represent connections which operate at lower voltages and therefore have a lower power transfer capacity. Substations are shown as red or blue points, depending on their operating voltage. NESO's boundaries are marked with green dashed lines.

7.7.10 The approximate location of the Proposed Development is marked with a red cross.

7.7.11 Although the NESO monitors all boundaries to ensure that the NETS operates safely and securely at all times, those boundaries which are most important to the supply of power in the UK are showcased in a publicly accessible weekly Operational Transparency Forum.

7.7.12 Many of the boundaries most actively reported on by NESO in that forum are those across which power generated in Scotland and the north of England flows towards more southerly demand centres.

7.7.13 High levels of generation connecting to the northern network causes constraints on existing electricity network infrastructure. Constraints may require generators 'behind the constraint' to turn down their generation, while other generators 'infront of the constraint' may be required to turn up. Turn down due to a constrained electricity network is called curtailment.

7.7.14 In the 12 months starting 1st July 2023 and ending 30th June 2024, NESO data showed that wind generated 67.1TWh of energy. Transmission constraints amounted to 5.6TWh of curtailment (c.8% of net generation) and constraints due simply to there being 'too much wind energy on the system' totalled an additional c.0.6TWh, or less than 1% of net generation.

7.7.15 Curtailment in the UK is therefore currently more to do with where electricity is generated, than how much electricity is being generated.

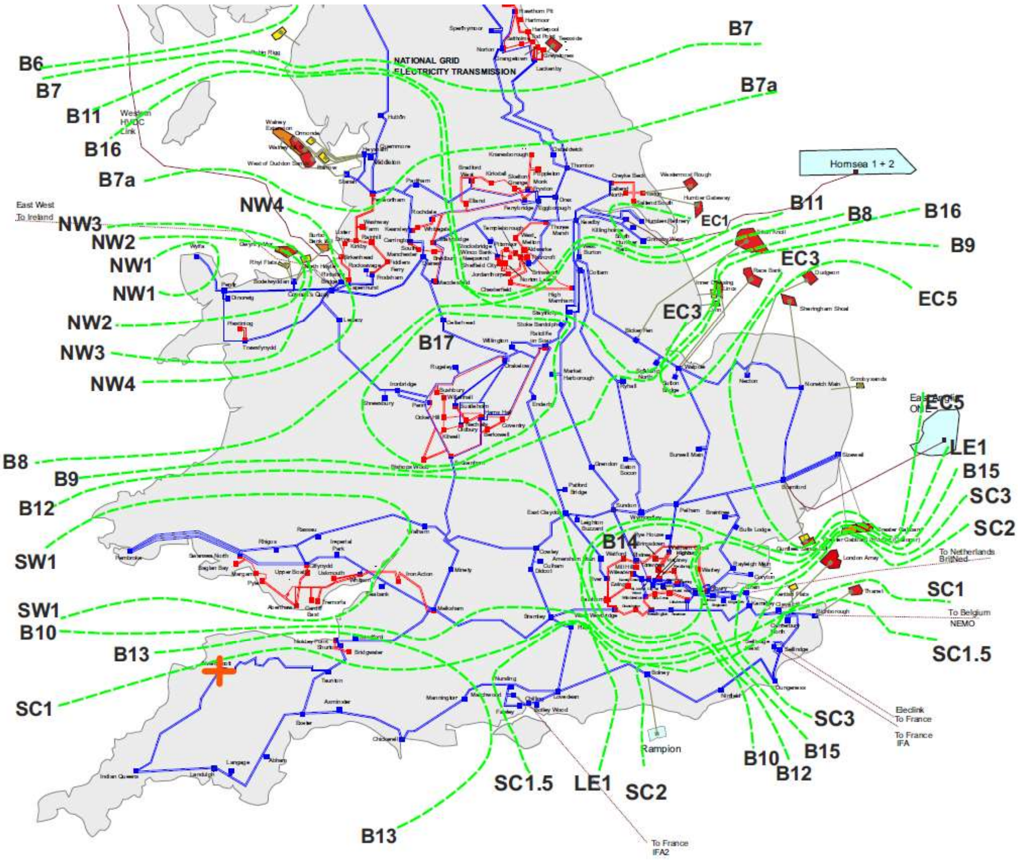

Figure 24. Schematic of the southern portion of the UK NETS
[Ref. 42(2023), Appendix A]

7.7.16 Curtailment for network constraints currently results in a compensation to the asset operator for the electricity which would have been generated and sold but for the fact that that energy was not accepted onto the transmission system.

7.7.17 An asset located on a transmission network which is well connected to demand centres, is unlikely to be curtailed for the same reasons as the majority of current curtailment in the UK, however the possibility of curtailment for non-locational reasons remains.

7.7.18 In such circumstances, curtailment would occur because more energy was being generated than that which could be consumed or stored at that time. **Figure 22** of this Statement shows that an excess of supply reduces market price, incentivising price-sensitive demand to increase, or in extremis, incentivising supply to shut down to avoid having to pay (rather than being paid) to generate. Critically, neither of these outcomes results in a compensation payment from consumers to the asset operator for the electricity they have not generated.

7.7.19 In summary, NESO's northern boundaries require a higher level of monitoring and operational control due to the frequency of constraint already occurring across them. Constraints and curtailment across boundaries further south, including those around the location of the Proposed Development, are currently lower.

7.7.20 Therefore, connecting the Proposed Development into Alverdiscott would likely bring power to consumers with fewer operational interventions and lower constraints than potentially may be required if the Proposed Development was connected at another location.

7.7.21 The task to decarbonise the UK's electricity system is unprecedented. For this reason, the Connections Action Plan makes clear that the UK should aim to *"maximise the use of the currently available and planned network capacity"* [Ref. 17, p41].

7.7.22 NESO's Holistic Network Design activity seeks to establish a coordinated view of the UK's future electricity system needs. In October 2024, NESO were asked by government to continue this work to develop the first Strategic Spatial Energy Plan (SSEP) for Great Britain, taking NESO's Holistic Network Design forwards.

7.7.23 **Figure 25**, **Figure 26**, and **Figure 27** summarise NESO's published views on future network development needs at the time of Application submission.

7.7.24 **Figure 25** shows the enormous amount of activity required to increase the capacity of transmission infrastructure required to bring Scottish and northern English wind (both onshore and offshore) south towards the UK's demand centres to support delivery plans for 2030.

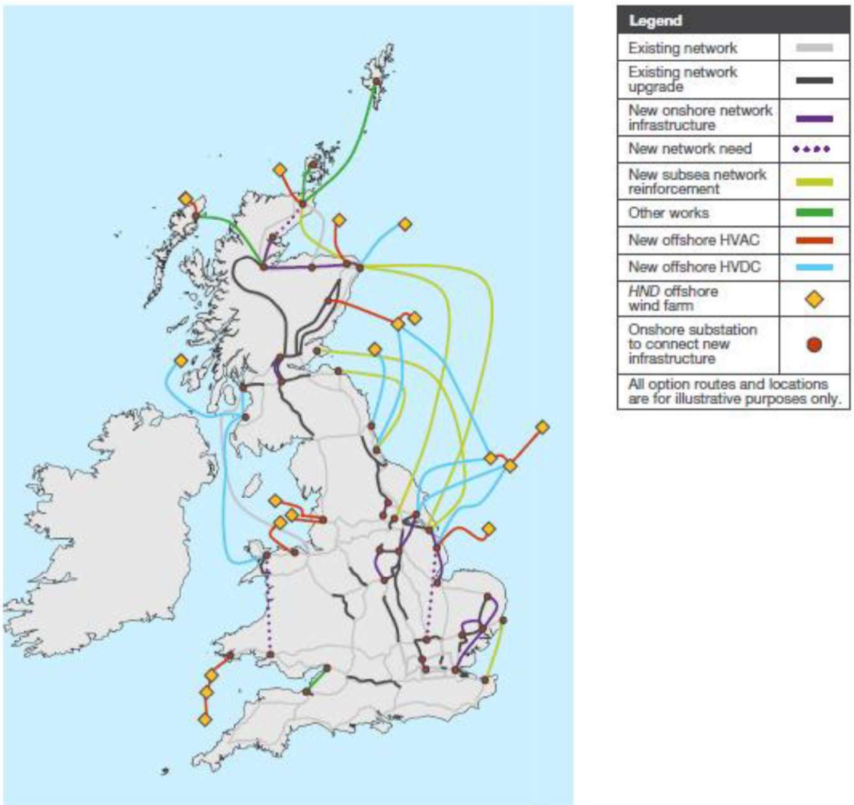

Figure 25. Previously necessary UK NETS upgrades plus those identified as part of NESO's HND 2030
[Ref. 44, Figure 3]

7.7.25 NESO have also indicated that even more new infrastructure will be required to provide a secure and robust connection beyond 2030 for new renewable generators, both planned and under development, to the grid. **Figure 26** shows that NESO's current view is that the significant part of this infrastructure will be required in Great Britain's northern and eastern areas.

7.7.26 NESO's Transmission Works Register (TWR) Report [Ref. 43] lists the component activities required before connections can be delivered. Only schemes which have accepted a connection agreement are listed on this report.

7.7.27 The TWR report lists eight works items related to the Proposed Development. Just two of these are specific to the Proposed Development, including works on the Alverdiscott substation itself to accommodate a connection for the Proposed Development. It is likely that a similar level of substation-specific upgrade work would be required if the Proposed Development was to connect to a different substation, because of the grid connection capacity contracted for the Proposed Development.

7.7.28 The other six works items are activities required to deliver in total up to 20.8GW of new connections (20 schemes in all) across the south west, including the Proposed Development.

7.7.29 These six works items also comprise other works at National Grid's Alverdiscott substation, as well as reconductoring and uprating some existing transmission lines to increase their power transfer capacity and operational reliability.

7.7.30 Critically, these works are largely incremental improvements to existing infrastructure rather than wholesale redesigns of the same, or even the design and construction of new infrastructure.

7.7.31 The connection of other generators to the existing network around Alverdiscott is also foreseen. Specifically, in August 2024, NESO published their plans to facilitate connection of up to 4.5GW of capacity which may be awarded seabed leases as part of The Crown Estate's Floating Offshore Wind Leasing Round 5.

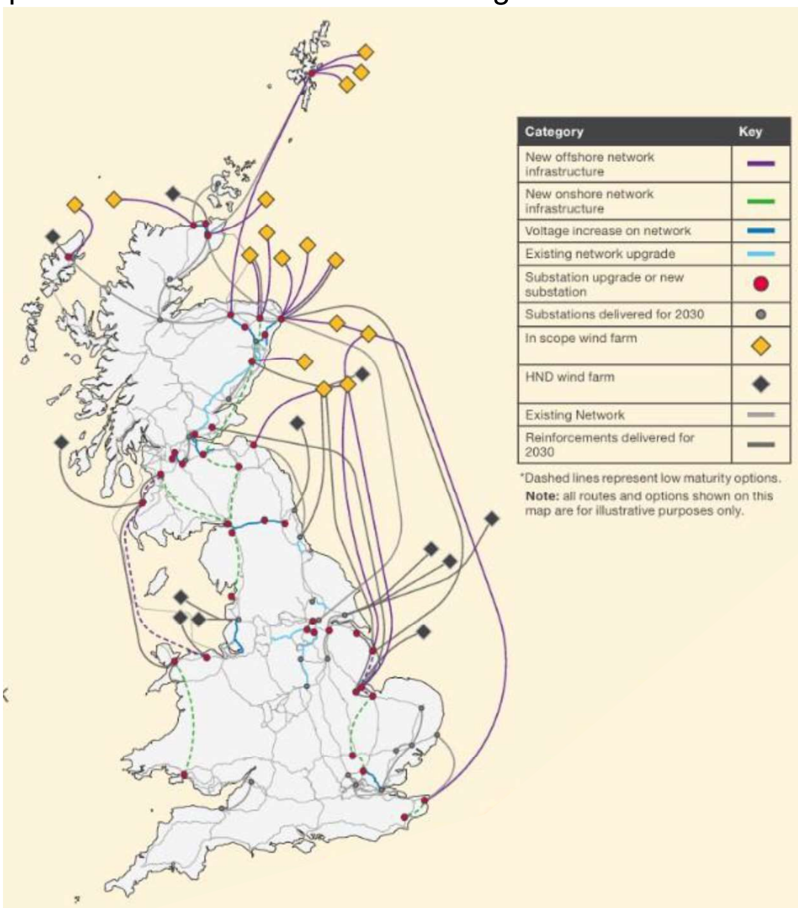

Figure 26. Map of network infrastructure to be delivered beyond 2030 [Ref. 45, Figure 1]

7.7.32 **Figure 27** shows NESO's current plan, and the necessary onshore and wider works required to accommodate higher energy flows arising from the successful development of new offshore wind in the Celtic Sea in the 2030s.

7.7.33 **Figure 27** also shows a lighter scale of transmission upgrade works required to facilitate these potential connections than the significant scope of works required in Great Britain's northern and eastern areas to connect generation capacity proposed in those areas.

7.7.34 The connection of the Proposed Development, other developments, and the future potential Celtic Sea Wind to the NETS at and in the region of Alverdiscott substation, without significant upgrades being needed to facilitate such connections, suggests that the infrastructure in the area may be utilised significantly more efficiently than it currently is without excessive transmission investment cost or transmission system operational interventions. The Proposed Development goes towards making more efficient use of this existing infrastructure.

7.7.35 The evidence provided here suggests that the location of the Proposed Development is consistent with delivering to the need identified in the Connection Actions Plan to increase network capacity in an efficient and low-cost way, by maximising the use of the currently available and planned network capacity in the south west of England, and away from areas of Great Britain where transmission networks are already constrained and in need of upgrades.

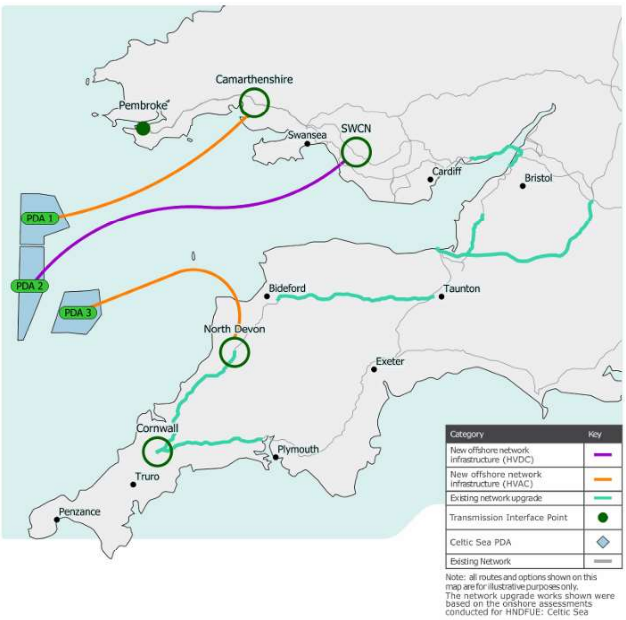

Figure 27. Recommendation for Beyond 2030: Celtic Sea connections [Ref. 38(7), p26]

7.8 Conclusions on other benefits of the project

7.8.1 The Proposed Development is consistent with the identified urgent need for schemes to maximise the benefits of valuable available grid connection capacity as described in the Connections Action Plan. To provide the same quantity of energy from schemes with lower capacity factors would require more schemes, each with their own (potentially separate or new) point of connection to the NETS.

7.8.2 The wider Project comprises large-scale onshore wind, large-scale ground-mount solar and large-scale battery energy storage facilities. Each of these components has already been delivered at a large scale globally. Projects currently under development globally are proposed at a greater scale than those already delivered, and the Project.

7.8.3 Schemes of a similar scale to the Proposed Development have already been delivered in the UK. Sub-sea HVDC cables which are proposed to link the international generation assets with the Proposed Development have also been delivered in the UK, with many more proposed and under construction.

7.8.4 Being comprised of many multiples of standard solar, wind, and battery storage components, should consent be achieved for all parts of the Project, including the Proposed Development, the construction and commissioning phase of the project development process would be able to proceed with pace to support the urgent need to enable carbon emission reductions in the UK.

7.8.5 The delivery risk profile of the Project should therefore be considered to be more similar to that associated with mature technologies, than that of nascent technologies. The project therefore presents an opportunity to support the urgent need for decarbonisation through enabling an energy system that meets the UK's commitment to reduce carbon emissions and the Government's objectives to create a secure, reliable, and affordable energy supply for consumers.

7.8.6 Alverdiscott substation is away from areas of Great Britain where transmission networks are already constrained and are in need of upgrades. The connection of the Proposed Development at Alverdiscott would make efficient use of existing and available network infrastructure without needing excessive transmission investment cost or transmission system operational interventions.

7.8.7 The location of the Proposed Development is consistent with delivering to the need identified in the Connection Actions Plan to increase network capacity in an efficient and low-cost way, by maximising the use of the currently available and planned network away from areas of Great Britain where transmission networks are already constrained and are in need of upgrades.

8 OVERALL CONCLUSIONS

8.1.1 This Statement of Need concludes that the benefits brought by the Proposed Development to the national urgent need to reduce UK carbon emissions while ensuring a reliable, secure, and affordable supply, should be accorded very significant weight when assessing the planning balance.

8.1.2 Urgent and unprecedented actions are required on a global scale to halt climate change. A rapid increase in the supply of low carbon electricity is needed for the UK to meet its legally binding climate change targets. Increasing the supply of energy from renewable sources is a critical part of the UK's strategy to achieve net zero by 2050, a key step towards which is the government's national mission for 'Clean Power by 2030'.

8.1.3 However, the need for new clean power does not stop at 2030. The continued delivery of low-carbon generation facilities beyond 2030 is necessary to meet future electricity demand growth and achieve essential wider societal carbon savings. It is also important to continue to bring forward schemes in case 'Clean Power by 2030' is not achieved.

8.1.4 Government has concluded that there is a Critical National Priority for low-carbon infrastructure to come forward urgently to achieve the UK's energy objectives of delivering a low-carbon, secure, and affordable energy system. The Proposed Development is within the definition of Critical National Priority Infrastructure set out in the National Policy Statements.

8.1.5 If the Proposed Development is determined under Section 104 of the Planning Act 2008, the policy test set out in NPS EN1 is that: *"Subject to any legal requirements, the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy. Government strongly supports the delivery of CNP Infrastructure and it should be progressed as quickly as possible"* [Ref. 1, Para 3.3.63].

8.1.6 The NPSs do not set out any maximum targets for low-carbon infrastructure development [Ref. 1, Para 3.2.3]. The UK should be developing as much low-carbon infrastructure as is possible, and as quickly as possible, to meet the urgent need to reduce carbon emissions while ensuring a reliable, secure, and affordable supply.

8.1.7 The NPSs also confirm that assets which provide flexibility to the national electricity system, or to the energy system generally, are also needed to achieve national decarbonisation and energy security aims. The Proposed Development, which is critical infrastructure to transmit low carbon energy from an internationally located solar, onshore wind, and storage facility to the UK's electricity system, is therefore fully aligned with the government's aims.

8.1.8 If however the Proposed Development is determined under Section 105 of the PA 2008, this Statement of Need provides evidence in support of the benefits brought forward by the Proposed Development in relation to enabling a low-carbon, reliable, secure and affordable energy system for consumers.

8.1.9 Decarbonisation will increase demand for electricity. Policies are already in-flight which are increasing, or are set to increase, electricity demand. Therefore, a significant number of new low-carbon electricity schemes, including the Proposed Development, are required to meet that demand and enable an energy system which is consistent with the UK's objectives to reduce carbon emissions while ensuring a reliable, secure, and affordable supply.

8.1.10 Progress has been made in the development of different low-carbon electricity generation technologies in the UK and globally. However, many of the technologies with potential to play a role in the delivery of a net zero energy system currently have uncertain delivery timescales. All techno-commercial elements of the Proposed Development and the international generation assets to which it connects, are already proven in delivery at or approaching the scale proposed, in the UK or globally. Developments with the proven ability to achieve carbon savings comfortably within the next decade, such as the Proposed Development, are essential to keep the UK on its legally binding carbon reduction path.

8.1.11 Being comprised of many multiples of standard solar, wind, and battery storage components, should consent be achieved for all parts of the Project, including the Proposed Development, the construction and commissioning phase of the project development process would be able to proceed with pace to support the urgent need to enable carbon emission reductions in the UK.

8.1.12 The Proposed Development allows for a maximum export of 3.6GW to the UK's electricity system and the Applicant's analysis indicates that through the course of a year, energy exported from the international generation assets will be equivalent to approximately 18 hours of full export a day (i.e. an annual load factor of approximately 75%).

8.1.13 The Proposed Development therefore presents a unique opportunity to connect a high capacity, high load factor low-carbon energy source to the UK electricity system through a single existing grid connection point, with a proposed first connection date in 2030.

8.1.14 This is a material issue when considering how the UK is to meet the urgent need for low-carbon generation as is set out in the NPSs, given the current constraint in configuring existing connections and delivering new connections for proposed low-carbon electricity generators in the UK.

8.1.15 The Proposed Development is needed so that the Project's international generation assets can enable an energy system that meets the Government's objectives to create a secure, reliable, and affordable energy supply for consumers to security of supply. Aggregated generation output from wind, solar, and storage is more predictable, less variable, and more flexible than output from a single generation technology, providing security and reliability of supply benefits for consumers.

8.1.16 Reliable and flexible low-carbon electricity supplies are needed to support a high level of reliability and security of energy supply for consumers. Storage facilities also contribute to security of supply by storing energy when it is generated in abundance and releasing it to the grid when it is needed. Storage facilities also provide grid balancing services which are essential for the safe and secure operation of the UK's electricity system.

8.1.17 Solar and onshore wind facilities are already among the cheapest form of electricity generation in the UK and globally. By generating low carbon electricity from low-cost, large-scale renewable supplies, the more expensive and more carbon intensive forms of generation are displaced from the grid. Low-cost, large-scale renewable supplies therefore enable a reduction in carbon emissions from UK generated electricity, and lower the market price of electricity.

8.1.18 The generating facilities located in Morocco which are proposed to connect to the Proposed Development include co-located onshore wind, solar, and storage. The profile of low carbon energy generated at the Moroccan facilities would increase the diversity of supplies to the UK, complementing UK-based renewable supplies.

8.1.19 In combination, and at the capacities proposed, the facilities at Guelmim Oued Noun would also provide a significant element of dispatchability to the Proposed Development, meaning that it can be considered more as 'firm' generation rather than renewable generation. This will bring benefits to the UK by reducing the need for alternate back-up generation assets and displacing carbon-emitting thermal generation from the UK's energy system.

8.1.20 The location of the Proposed Development enables the Project to make use of existing and available grid infrastructure. Further, no adverse grid operability effects or curtailments are anticipated as a result of connecting the Project to the UK's electricity system through the Proposed Development. The location of the Proposed Development is away from areas of the electricity system which have already been identified as in need of network and capacity upgrades to support existing and new generation capacity connections.

8.1.21 In summary, a significant capacity of low-carbon generation is urgently needed to enable carbon emission reductions in the UK. The Proposed Development will, if consented, transmit low-cost, large-scale renewable supplies from an international generation facility to the UK's electricity system. By doing so, the Proposed Development will address the climate change emergency that affects everyone's lives and the environment, by playing an important role in enabling an energy system with secure, low-carbon, and affordable supplies.

9 AUTHOR CREDENTIALS

9.1.1 This Statement has been authored by Mr. Si Gillett. Mr Gillett is a UK energy market professional with experience including integrated oil majors, integrated electricity utilities, and independent consultancy.

9.1.2 Humbeat is an independent electricity consultancy, established by Mr Gillett in 2016, to support participants in the UK's transition to a low-carbon electricity and energy system. The consultancy supports and advises private individuals and organisations with pre- and post-construction electricity developments by providing commercial and strategic advice in relation to those developments.

9.1.3 Humbeat works across all electricity generation technologies which are important to the transition to a zero-carbon electricity system. Ground mount solar developments have played an increasingly major role in Humbeat's work since 2017. Humbeat has been commissioned to provide electricity market expertise to over 15,000MW (MW = megawatt) of development-phase renewable generation developments across the UK, ranging from small sites to large-scale nationally significant infrastructure developments. Humbeat specialises in assessing, describing, and quantifying the benefits specific technologies and individual developments bring to the overarching and urgent need for decarbonisation in the UK.

9.1.4 Mr Gillett has authored Statements of Need for many Nationally Significant Infrastructure Projects (NSIPs) and TCPA applications for electricity generation infrastructure. He has represented Applicants and Appellants as expert witness during Open Hearings and input into written Examination and Appeal processes. So far, six of the solar and two of the offshore wind NSIPs for which Mr Gillett has authored Statements of Need have been granted Development Consent Orders.

9.1.5 Mr Gillett is currently supporting ten other nationally significant low-carbon electricity generation infrastructure developments by providing electricity market and low-carbon transition expertise to their development teams, as well as multiple engagements on TCPA planning applications for solar and solar + storage developments.

9.1.6 Mr Gillett has over 20 years' experience in energy sectors including petroleum and natural gas liquids and conventional, nuclear, and renewable electricity, on both the generation and sale side. A wide range of energy experience provides a robust basis for a balanced assessment and analysis of the UK energy sector as a whole. This is especially important as the journey to Net-Zero involves more integrated and system-level thinking than has ever previously been required in the electricity sector.

9.1.7 Mr Gillett holds master's degrees in mathematics, and in nuclear regulation.

10 REFERENCES

Ref. 1. UK Gov, Overarching National Policy Statement for Energy (EN-1), November 2023

Ref. 2. Direction by the Secretary of State for Energy Security and Net Zero ("The Secretary of State") under Section 35 of the Planning Act 2008 relating to the Xlinks Morocco – UK Power Project

Ref. 3. United Nations, Paris Agreement, 2015, accessed October 2024 here

Ref. 4. IPCC, Sixth Assessment Report, April 2022, accessed October 2024 here

Ref. 5. IPCC, Press Release, Urgent climate action can secure a liveable future for all, 20th March 2023, accessed October 2024 here

Ref. 6. World Meteorological Organisation, news report accompanying the Global Annual to Decadal Climate Update (2024-2028), 2024, accessed August 2024 here

Ref. 7. UNFCC, COP28 Outcomes, accessed January 2024 here

Ref. 8. UK Gov, Energy Secretary convenes COP leaders past, present and future to offer UK support and leadership in responding to the climate crisis, accessed August 2024 here

Ref. 9. Climate Change Committee, CCC advises 81% reduction in emissions by 2035, accessed October 2024 here

Ref. 10. The Labour party, Change – Labour Party Manifesto 2024, accessed July 2024 here

Ref. 11. Energy Systems Catapult, Innovating to Net Zero, 2020, accessed November 2024 here

Ref. 12. Climate Change Committee, Annual Progress Reports to Parliament (2019 – 2024), available here

Ref. 13. NESO, Clean Power 2030, Advice on achieving clean power for Great Britain by 2030, accessed here

Ref. 14. National Grid Electricity System Operator, Annual Future Energy Scenarios (2012 - 2024), accessed August 2024 here

Ref. 15. UK Gov, Digest of UK Energy Statistics (DUKES): energy, accessed August 2024

Ref. 16. UK Gov, Powering Up Britain, 2023, including:

(1) Joint Overview

(2) Responding to Independent Review of Net Zero Recommendations

(3) Responding to CCC Annual Progress Report Recommendations

(4) Net Zero Growth Plan

(5) Energy Security Plan

Ref. 17. The Department for Energy Security and Net Zero and Ofgem, Connections Action Plan, November 2023

Ref. 18. National Grid ESO, ESO leads the way with major initiative to accelerate connections to the electricity transmission grid, 2023, accessed August 2024 here

Ref. 19. UK Gov, Renewable Energy Planning Database, accessed October 2024 here

Ref. 20. Low Carbon Contracts Company, CfD Register, accessed October 2024 here

Ref. 21. Embedded Capacity Registers are published under the OpenData initiative for each of the six Distribution Network Operating companies, accessed October 2024. Data is available upon request

Ref. 22. National Grid ESO, TEC Register, accessed October 2024 here

Ref. 23. The Guardian, Hinkley Point C could be delayed to 2031 and cost up to £35bn, says EDF, January 2024, accessed here

Ref. 24. National Infrastructure Commission, National Infrastructure Strategy, Fairer, Faster, Greener, 2020

Ref. 25. UK Gov, Government reignites industrial heartlands 10 days out from the International Investment Summit, October 2024, accessed October 2024 here

Ref. 26. National Energy System Operator, Demand Data 2023, accessed October 2024 here

Ref. 27. Elexon, HH Generation by Fuel Type, accessed October 2024 here

Ref. 28. NESO, Carbon Intensity Forecasting Methodology, accessed October 2024 here

Ref. 29. UK Gov, British Energy Security Strategy, 2022

Ref. 30. National Infrastructure Commission, Renewables, recovery, and reaching Net Zero, 2020

Ref. 31. UK Gov, Benefits of Long Duration Electricity Storage, BEIS Research Paper Number 2022/019, 2022

Ref. 32. UK Gov, Overarching National Policy Statement for Renewable Energy Infrastructure (EN-3), November 2023

Ref. 33. Data sources for wind and solar power over multiple years using Modern-Era Retrospective analysis for Research and Applications (MERRA) reanalysis dataset produced 29th February 2016, see www.renewables.ninja

(1) Pfenninger, Stefan and Staffell, Iain (2016). Long-term patterns of European PV output using 30 years of validated hourly reanalysis and satellite data. Energy 114, pp. 1251-1265. doi: 10.1016/j.energy.2016.08.060

(2) Staffell, Iain and Pfenninger, Stefan (2016). Using Bias-Corrected Reanalysis to Simulate Current and Future Wind Power Output. Energy 114, pp. 1224-1239. doi: 10.1016/j.energy.2016.08.068

Ref. 34. UK Gov, Electricity generation costs, issued on three-year cycle, in 2013, 2016, 2020 and 2023

Ref. 35. IRENA, Renewable Power Generation Costs in 2023, accessed October 2024 here

Ref. 36. International Energy Agency, Levelised cost of electricity by technology in Africa, accessed October 2024 here

Ref. 37. NREL, Cost projections for utility-scale storage, 2023, accessed October 2024 here

Ref. 38. Information resources on current and potential future subsea HVDC cables in UK waters, accessed October 2024, including:

(1) Western Link HVDC, accessed here

(2) Viking Link, accessed here

(3) North Sea Link, accessed here

(4) BritNed, accessed here

(5) Eastern Green Link 1 accessed here (1), and Eastern Green Link 2, accessed here (2)

(6) NESO, Pathways to 2030 Holistic Network Design, accessed here

(7) NESO, Beyond 2030: Celtic Sea, accessed here

(8) Ofgem, Next generation of interconnectors, accessed here

Ref. 39. Global Solar Power Tracker, Global Energy Monitor and TransitionZero, June 2024 release. Data is available upon request

Ref. 40. Global Energy Monitor, Global Wind Power Tracker, June 2024 release. Data is available upon request

Ref. 41. Information resources relating to operational Battery Energy Storage Systems, accessed October 2024, including

(1) Tera-Gen Edwards Sanborn (California), accessed here

(2) Calpine Nova (California), accessed here

(3) Vistra Moss Landing (California), accessed here

Ref. 42. NESO, Electricity Ten Year Statement, published annually, accessed October 2024 here

Ref. 43. NESO, Transmission Works Register Report, October 2024, accessed through NESO's landing page here

Ref. 44. NESO, Pathway to 2030 Holistic Network Design, accessed October 2024 here

Ref. 45. NESO, Beyond 2030, accessed October 2024 here

The majority of hyperlinks referenced above are to government websites; or websites for national or international chartered professional institutes, including those of government agencies.

To ensure that the Planning Inspectorate has control of the availability and content of sources which are not classified as such, the source material has been included as separate Appendices to this report.

Those references included as separate Appendices are:

Ref. 23

Ref. 38(1)-(5), and

Ref. 41(1)-(3)

Reference 23: The Guardian, Hinkley Point C could be delayed to 2031 and cost up to £35bn, says EDF, January 2024

Energy industry

This article is more than **9 months old**

Hinkley Point C could be delayed to 2031 and cost up to £35bn, says EDF

As nuclear plant is hit by further delay, real cost will be far higher after inflation is included, as project uses 2015 prices

Alex Lawson
Tue 23 Jan 2024 18.50 GMT

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In 2007, the then EDF chief executive said that by Christmas in 2017, turkeys would be cooked using electricity generated from atomic power from Hinkley. Photograph: Ben Birchall/PA

The owner of Hinkley Point C has blamed inflation, Covid and Brexit as it announced the nuclear power plant project could be delayed by a further four years, and cost £2.3bn more.

The plant in Somerset, which has been under construction since 2016, is now expected to be finished by 2031 and cost up to £35bn, France's EDF said. However, the cost will be far higher once inflation is taken into account, because EDF is using 2015 prices.

The latest in a series of setbacks represents a huge delay to the project's initial timescale. In 2007, the then EDF chief executive Vincent de Rivaz said that by Christmas in 2017, turkeys would be cooked using electricity generated from atomic power at Hinkley. When the project was finally given the green light in 2016, its cost was estimated at £18bn.

"Like other major infrastructure projects, we have found civil construction slower than we hoped and faced inflation, labour and material shortages, on top of Covid and Brexit disruption," said Stuart Crooks, the project's managing director, in a message to staff.

Crooks said: "Running the project longer will cost more money and our budget has also been affected by rising civil construction costs. It is important to say that British consumers or taxpayers won't pay a penny, with the increased costs met entirely by shareholders."

EDF had previously said that the first reactor unit at the nuclear site would be due to be complete by June 2027, with a 15-month buffer period which was likely to be used – putting its completion at September 2028, and a further year for the second unit. It costs were estimated between £25bn and £26bn, and this was later revised up to £32.7bn in February 2023.

EDF gave three scenarios, ranging from becoming operational is 2029, to delays pushing this back to 2031.

It said that the cost of completing Hinkley will be between £31bn and £34bn, although if completion is delayed to 2031 costs would rise to £35bn.

In December it emerged EDF's partner in the project, China General Nuclear, had halted funding for Hinkley. The move came after the government took over CGN's stake in Hinkley's proposed sister site, Sizewell C in Suffolk, stripping the Chinese state-owned company of its role in the project.

The latest financial estimates are based on accounting in 2015 figures, meaning the total cost of the project could be far higher when inflation over the last decade is factored in. Hinkley's ballooning costs have proved controversial with French taxpayers, which are picking up the tab.

Hinkley Point C and Sizewell C are expected to herald a new era of nuclear plants touted by the government.

Last year the government launched a delivery body, Great British Nuclear, with the aim of accelerating the development of new nuclear projects. Earlier this month ministers set out plans for out for the "biggest nuclear power expansion in 70 years".

However, the Hinkley Point C delay will add to concerns over project delays and costs, as well as skills in an industry earmarked to deliver a quarter of the national electricity demand by 2050.

Crooks wrote: "Dome lift happened 24 months later than we had planned when we began in 2016. Of that delay, 15 months was due to the global pandemic. So, beyond Covid, we've lost nine months since we started. That's not perfect, but for the first nuclear plant to be built in Britain since 1995, it's not bad."

Crooks said that project was "well past the halfway mark" and "many risks are now behind us".

EDF said in January it would delay the shutdown of four of its UK nuclear reactors for at least two years and increase investment in its British nuclear fleet.

Explore more on these topics
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EDF reportedly seeking up to £4bn from investors to finish Hinkley Point C
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Physicist MV Ramana on the problem with nuclear power
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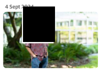

South Korean state-owned nuclear developer in talks to build UK plant
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Sizewell C in Suffolk granted nuclear site licence
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Reference 38(1): Western Link HVDC

Investment & Innovation

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WESTERN HVDC LINK

Western Link is a £1.2 billion high voltage direct current (HVDC) subsea electricity link delivered and operated by SP Transmission (SPT) and National Grid Electricity Transmission (NGET). It is the highest capacity single subsea link in the world and it is also the first bi-directional subsea interconnector (capable of transmitting energy in both directions).

It connects Hunterston on the west coast of Scotland with Flintshire Bridge, on the Wales/England border, through a route of some 420km of underground cable, of which approximately 385km is subsea.

Cables being pulled ashore at Ardneil Bay in Scotland through ducts under the beach

This connection boosts the transmission of energy between Scotland and Wales and England. It helps maximise the use of Scottish renewable energy throughout the UK. With a capacity of 2,200 megawatts (MW) it is able to supply the electrical demand of more than two million homes every year. This link also makes a significant contribution to security of supply by effectively doubling Scotland's import capacity.

A rare look inside one of the Western Link valve halls where the AC (alternating current) electricity that is used on the main network is transformed into DC (direct current) electricity to allow it to be transferred efficiently through the long cables.

With the huge potential of growing renewable energy both being connected and planned to be connected in Scotland, the Western Link is delivering long term benefits to our customers while simultaneously supporting the UK Government's ambitions of decarbonising our economy, and ultimately enabling Net Zero carbon emissions.

Key facts on the project:

1. In its first five years since its completion (2017 – 2022), **Western Link transmitted 23,483GWh of green energy**.
2. **The subsea marine cable is approx. 385km long.** DC circuits can transmit power more efficiently over long distances, on fewer cables than equivalent AC circuits.
3. **The 600,000V cable is just 6" in diameter but weighs over 50kg / meter**
4. Across the planning, development and build stages of the project – **Western Link supported 450 high-quality jobs** in our communities.
5. The Western Link is a clear example of our commitment to investing in the UK and has a **planned lifespan of 40 years**.
6. Whilst electrical power is often expected to flow from north to south, the Western Link **will allow power to flow in both directions** according to future electricity supply and demand requirements.
7. During the development and build of the project, **marine engineers found the wreck of a WW1 German U-boat** while surveying the sea bed off the coast of Wigtownshire. Folklore has it the sinking may even have been the result of an attack by a great sea monster...

Other HVDC projects

As the UK continues on its path to net-zero, further HVDC links around the coast of the UK will play a critical role in maximising the networks ability to use new renewable energy generation efficiently. We have a number of exciting HVDC links at various stages of delivery:

Eastern Green Link 1 – joint venture between SP Energy Networks and National Grid.

- EGL1 is a 196km, two gigawatt (GW) high voltage direct current (HVDC) electrical superhighway to be built between the Torness area in East Lothian, Scotland and Hawthorn Pit in County Durham, England.
- Contracts worth over £1.8 Billion have been placed with the main construction phase commencing in 2025
- It will use cutting edge 525kV XLPE cable technology and will be the first subsea system of its type in the world.

Eastern Green Link 4 – joint venture between SP Energy Networks and National Grid.

- Eastern Green Link 4 (EGL4) is a second east coast High Voltage Direct Current (HVDC) electrical link being developed in partnership with National Grid Electricity Transmission. At more than 500km it will be significantly longer than EGL1 and will connect Fife in Scotland with Norfolk in England.

Further West Coast links

We are working to understand options for further links on the West Coast based on potential future needs of the energy system.

Reference 38(2): Viking Link

About Viking Link

Viking Link is a 1400 MW high voltage direct current (DC) electricity link between the British and Danish transmission systems connecting at Bicker Fen substation in Lincolnshire and Revsing substation in southern Jutland, Denmark.

The project involves the construction of converter sites and installation of onshore and offshore cable in each country. These are then connected to the substations. Viking Link is approximately 765 km long and allows electricity to be exchanged between Great Britain and Denmark.

The interconnector enables the more effective use of renewable energy, access to sustainable electricity generation and improved security of electricity supplies. It also benefits the socio economy of both countries.

Reference 38(3): North Sea Link

The content on our website is currently undergoing maintenance, if you have any questions regarding this please contact the Customer team, nsl.customerenquiries@nationalgrid.com

What is North Sea Link (NSL)?

Commissioned in 2021, North Sea Link is a joint venture between Norwegian Transmission Operator National Grid. The 720 kilometre subsea interconnector is the longest in the world and connects Norway to Great Britain.

Linking Nordic and British energy markets brings a number of benefits:

- Providing opportunities for shared use of renewable energy, helping both countries to meet domestic and international climate change targets.
- Increasing the security of electricity supplies for both countries.
- Providing additional transmission capacity for electricity to be traded between both countries, supporting economic growth in Norway and the Great Britain.

North Sea Link video

Reference 38(4): BritNed

BritNed

The BritNed cable connects the Dutch and British energy markets.

Location	Type	Category	Status	Tags
Great Britain, Netherlands	Interconnection	offshore	finished	BritNed

260 kilometres cable

This two-way 1,000 MW high-voltage direct current connection has a length of 260 km and runs from the Isle of Grain (in Kent) to Maasvlakte (near Rotterdam). The operational and technical management of the cable is in the hands of BritNed Development Ltd, a joint venture of British energy company National Grid and TenneT subsidiary NLink International.

This connection is part of a major Anglo-Dutch investment programme to ensure continuing security and diversity of supply and stimulate the use of sustainable electricity. The interconnector also contributes to a more open electricity market, providing greater import and export opportunities for the future.

Trade

Electricity has been traded on the BritNed-cable since 2011. Market participants access the interconnector capacity through a combination of explicit and implicit auctions. Power flows are driven by factors such as supply, demand and prices in each market. The implicit auctions are facilitated by the APX energy exchange, now merged with EPEX SPOT. Explicit auctions are carried out via BritNed Development's own auction system, Kingdom®. This approach gives market parties more choice in how they bid on capacity, contributing to greater transparency on European electricity markets.

Commercial cable

BritNed is a commercial interconnector, which means it is funded and operated independently from our regulated business. TenneT and National Grid are jointly responsible for the investment and the risks.

Read more

Visit the BritNed website

Inside the BritNed interconnector converter station

Contacts

Jeroen Brouwers
Media Relations

Mediarelaties

+31 (0)26 373 26 00 | press(at)tennet.eu

Service Center
TenneT Netherlands

For questions about the project.

0800 836 63 88 | servicecenter(at)tennet.eu

NorNed

The Dutch and Norwegian electricity grids have been interconnected by the NorNed cable since 2008. The NorNed cable is 580 km long and has ...

COBRAcable

The COBRAcable will have a capacity of approx. 700 MW, will be around 325 kilometres long, and will run from Eemshaven (the Netherlands) to...

NordLink

The exchange of power enabled by NordLink will increase security of supply for the German and Norwegian grid and will allow exchange of...

Reference 38(5)(1): Eastern Green Link 1

About EGL1

EGL1 is a 196km long high voltage direct current (HVDC) link. A HVDC link functions like a superhighway for electricity, allowing large amounts of power to be transmitted over long distances before being fed into the electrical grid.

The link will be constructed in three main sections:

1.Scottish point of connection

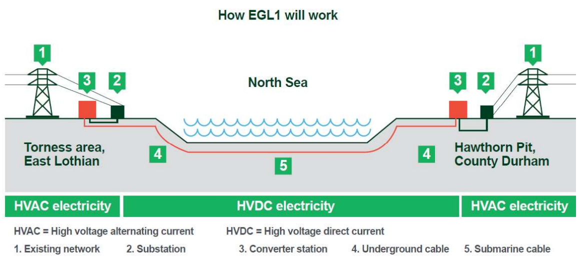
In the Torness area in East Lothian, we will build a new onshore converter station adjacent to existing industrial facilities and connect into a new substation near Branxton to tie into the existing transmission network. Underground electricity cables will be installed to connect the substation to the converter station and from the converter station to the landfall point south of Thorntonloch beach.

2. Marine cable route

176km of subsea cables will be installed from south of Thorntonloch beach, through Scottish and English waters to a landfall point just north of Seaham, in County Durham.

3.English point of connection

Underground onshore cables will be installed from the landfall point just north of Seaham, to a new converter station and substation at Hawthorn Pit, County Durham, between the villages of Murton and South Hetton. Several existing overhead line connections into the substation at Hawthorn Pit will also be reconfigured, resulting in fewer pylons than there are today.



Converter stations and substations

A converter station converts electricity between alternating current (AC) and direct current (DC). AC is used in the UK transmission network system as this is easily converted to different voltages for industrial, commercial and domestic use, while DC is used for transmitting large amounts of electricity efficiently over long distances. In the UK this is normally through subsea cables. Our converter stations will house the technology that will enable clean electricity to be transmitted through the 196km cable link.

Substations are crucial for the day-to-day operation of the network and for controlling the voltage of electricity between the country-wide transmission network and people's homes and businesses. They house switchgear and other critical operational plant alongside transformers which 'step down' the high-voltage electricity running in the transmission network to lower voltage electricity which is suitable for everyday use.

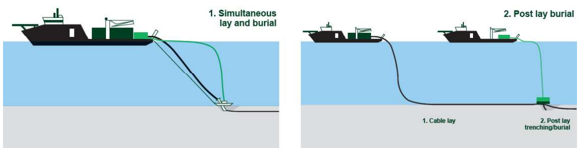
Our cables and their installation

The HVDC link will consist of two electrical cables and a fibre optic cable, running 176km under the sea: most of its 196km length.

Onshore, these will be either direct buried, installed in ducts or carried in cable bridges depending on the site condition and will be fully reinstated on completion.

Offshore, we use two methods to lay the cables under the seabed: simultaneous lay and burial (fig.1) and post lay and burial (fig 2).

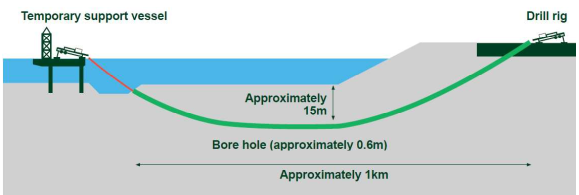
The seabed surface conditions determine which method we use. During simultaneous lay and burial, one vessel both lays and buries the cables, and during post lay and burial, one vessel will lay the cables and a second follows behind and uses a range of specialist equipment to bury it.



To make landfall, the cables will be installed using Horizontal Directional Drilling (HDD).

This method drills conduits to carry the cables under the intertidal zone and the near-shore seabed at the landfall points and then installs ducts which the cables can later be pulled through.

This approach minimises work in the intertidal zone and also reduces related environmental impacts including those on protected species and sensitive habitats, and on people using the foreshore.



For more information on converter stations and cables, including diagrams, maps and images, please view the public consultation materials in the Document library.

If you have any questions about our project, please get in touch with our community relations team.

Reference 38(5)(2): Eastern Green Link 2

Go-ahead for UK's biggest subsea connection project

Eastern Green Link 2

Media centre > Press releases

13th August 2024 - *Press release*

Ofgem has today confirmed its final approval on the costs associated with delivery of Eastern Green Link 2 (EGL2), enabling construction to start on the 525kV, 2GW subsea connection between Peterhead in the north-east of Scotland and Drax on the east coast of England.

The energy regulator's final decision on the project assessment for the 500km+ high voltage direct current (HVDC) connection is the key final approval in the regulatory process and allows construction to get underway later this year, with the connection due to be operational in 2029.

And in a separate development that underlines the progress being made on the project, Aberdeenshire Council has recently granted final planning approval for a new HVDC converter station to be built near Peterhead, with construction to begin at the site near Boddam later this year.

Delivered as a joint venture by National Grid and SSEN Transmission, EGL2 will include the longest HVDC subsea cable in the UK and is the UK's single largest electricity transmission project ever, providing enough electricity to power two million homes.

At a total expected nominal investment of around £4.3bn*, it's the single largest-ever investment in electricity transmission infrastructure in Great Britain and one of the most significant, strategic investments in energy infrastructure the country has seen in recent years.

Contracts have now been awarded to deliver the project, including with Prysmian Group to supply around 1,000km of cable and with Hitachi Energy and BAM for the supply of converter stations at either end of the subsea cable.

EGL2 is part of SSEN Transmission's Pathway to 2030 programme, a £20bn investment to upgrade the electricity network in the north of Scotland to unlock the country's renewable energy resources in support of national net zero and energy security targets. It is also part of National Grid's The Great Grid Upgrade, 17 major infrastructure projects that will update the grid network boosting energy security, affordability and helping England and Wales become more self-sufficient.

Ricky Saez, EGL2 Project Director, commented: "Ofgem's decision to issue its final project assessment decision is a major milestone, and testament to the hard work of our project teams within SSEN Transmission and NGET in getting us to the stage where construction can begin later this year.

"We're also delighted that Aberdeenshire Council has granted approval for our HVDC converter station near Peterhead, and we'd like to thank the council for their efficient handling of our applications and for their recognition of the importance of the project which will support hundreds of skilled jobs during the construction phase and thousands more across the wider economy.

"Not only will EGL2 will play a major role in bolstering energy security and contributing to net zero targets, it will also provide a lasting legacy in local communities where our teams are already supporting local environmental initiatives that enhance community wellbeing.

"This is a commitment that will continue throughout the lifetime of the project and beyond, as we aim to be a positive force in the communities we operate."

Sandy Mactaggart, Director of Offshore Delivery for SSEN Transmission, said: "With HVDC technology set to play a leading role in the energy transition, the delivery of EGL2 will build on our significant expertise demonstrated through the success of our Caithness-Moray HVDC link, and the ongoing delivery of our Shetland HVDC link.

"We now look forward to working with our partners in NGET on construction and delivery of this important project, and on future projects including the proposed Eastern Green Link 3 where work is already underway to secure the supply chain."

Zac Richardson, Offshore Delivery Director for National Grid said: "Ofgem's funding decision is a major milestone for EGL2, the single largest-ever investment in a UK electricity transmission infrastructure project. We now look forward to delivering supply chain contracts, jobs, and skills, and helping to fulfil the government's ambition for the UK to be a clean energy superpower."

Jonathan Brearley, Ofgem CEO, said: "Ofgem is fully committed to supporting the government to meet its aims of getting clean power by 2030. Today's announcement is a further step in putting the regulatory systems and processes in place to speed up network regulation to achieve its aim.

"Accelerated Strategic Transmission Investment (ASTI) accelerates approval times for projects such as Eastern Green Link 2 (EGL2) by up to two years. However, streamlining the process does not mean blank cheques for developers as we are able to step in and make financial adjustments to maximise efficiency and consumer benefit."

Notes to editors

EGL2 is part of the significant amount of new network infrastructure required for net zero and will play a critical role in supporting the UK's future security of supply, reducing dependence and price exposure to volatile global wholesale gas markets. Find out more about this ground-breaking project by visiting www.easterngreenlink2.co.uk.

For information on Eastern Green Link 3, please visit our project webpages.

* Ofgem has calculated a total expected nominal investment figure of £3.4bn, which is based on 2018/19 prices, the base for the price control. Adjusted for inflation this equates to around £4.3bn.

Similar reading

Tunnel Boring Machine for National Grid's VIP project in Eryri set to arrive in North Wales

15 November 2024

National Grid is reaching a major milestone on the Eryri Visual Impact Provision (VIP) scheme with the arrival of its Tunnel Boring Machine (TBM) to the project site.

Go ahead for electricity superhighway

15 November 2024

Ofgem has given the green light to Eastern Green Link 1 - a new electricity superhighway along Britain's east coast. A joint venture between National Grid Electricity Transmission and SP Energy Networks, the £2.5bn project will transport enough clean, renewable electricity to supply 2 million homes.

National Grid welcomes major milestone for the UK's first hybrid interconnectors to connect offshore wind

12 November 2024

Today, Ofgem announced it has approved the Initial Project Assessment for the LionLink and Nautilus electricity interconnectors, which determines the needs case of new projects for British consumers.

Reference 41(1): Tera-Gen Edwards Sanborn (California)

EDWARDS SANBORN SOLAR STORAGE PHASE 1A & 1B

The initial phase of the Edwards Sanborn solar facility is one of the largest solar-plus-storage projects in North America and is situated in Kern County, California. The facility is located on both private land as well as land leased from Edwards Air Force Base. In total, the project spans over 4,600 acres. In total, the project spans 4,600 acres and was awarded the Presidential Federal Sustainability Award for its advancement of Carbon-Free Electricity.

The Edwards Sanborn Storage Project Phase 1A and 1B both have significant energy storage components. This Phase 1 comprises of 971 MW of energy storage, enough capacity to supply 971,000 homes for approximately 4 hours on a single charge

Construction began in 2020, with phases becoming operational throughout 2022 and 2023. The project has a solar energy capacity of 807 megawatts and a battery storage capacity of over 3 gigawatt hours. Collectively, this project can provide up to 1,300 MW of power to the grid.

Future project phases that are currently in development will interconnect an additional 2,000 MW of solar and energy storage to the CAISO grid. When complete, the Edward Sanborn franchise will provide up to 3.35 gigawatts of solar storage onto the grid.

Terra-Gen is currently looking for new, driven team members!

Join Our Team

Reference 41(2): Calpine Nova (California)

BATTERY ENERGY STORAGE AT CALPINE: ENHANCING GRID RELIABILITY ACROSS CALIFORNIA

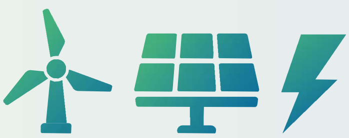
CALPINE®

Calpine is at the forefront of California's clean energy revolution, investing in battery storage projects statewide to bolster grid reliability and support the transition to renewable energy sources. With a total of 2,000 MW of battery storage in development, Calpine is playing a pivotal role in securing California's energy future.

What is Battery Energy Storage?

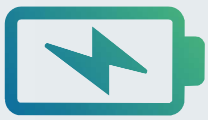
Battery energy storage is a reliable, cost-effective method of storing excess energy during periods of high supply and low demand, releasing it during peak demand times to maintain grid stability and prevent service disruptions like power outages.

STEP 1: ENERGY PRODUCED



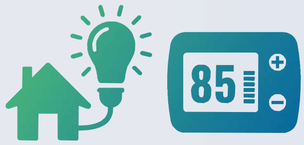
Energy is produced from power plants and at times, supply is higher than demand.

STEP 2: CHARGE BATTERIES



Excess energy is delivered to a battery energy storage system.

STEP 3: DELIVER ENERGY



When demand for energy rises, batteries release stored energy to deliver reliable service to homes and businesses.

Storing Renewable Energy

Renewable energy from sources like solar and wind power is intermittent, often unable to meet peak demand. Battery energy storage systems address this challenge by storing excess energy from renewables and releasing it when demand is highest.

NOVA POWER BANK

Location: Menifee, California

Capacity: 680 MW upon completion,
powering 680,000 homes for up to 4 hours

Communities Served: Statewide

Timeline:
- Phase I-IV: 620 MW in 2024
- Phase V: 60 MW in 2025

Nova Power Bank, Calpine's flagship battery storage facility, is set to become one of the largest in the world upon completion. Using lithium-ion chemistry technology, Nova will provide critical grid reliability and support statewide demand periods. The storage capacity at Nova will be utilized by Southern California Edison, Peninsula Clean Energy, and San Diego Gas & Electric, benefitting residents across the state.

Construction

Constructed under a project labor agreement, Nova Power Bank is being constructed by Mortenson and includes 1,200 battery containers supplied by BYD.

Reference 41(3): Vistra Moss Landing (California)

NEWS RELEASES

Vistra Completes Milestone Expansion of Flagship California Energy Storage System

350 MW / 1,400 MWh addition is online and bolstering California grid reliability this summer

IRVING, Texas, Aug. 1, 2023 /PRNewswire/ -- Vistra (NYSE: VST) is announcing that it has completed the 350-megawatt/1,400-megawatt-hour Phase III expansion of its Moss Landing Energy Storage Facility, bringing its total capacity to 750 MW/3,000 MWh, the largest of its kind in the world. The Phase III expansion achieved commercial operation on June 2 and is now storing power and releasing it to California's grid. It will operate under a 15-year resource adequacy agreement with Pacific Gas and Electric Company (PG&E) beginning August 1.

"As we navigate this energy transition to cleaner fuel sources, the ability to balance that shift with both reliability and affordability is paramount," said Jim Burke, Vistra president and CEO. "Continued investment in energy storage, like our Moss Landing site, allows us to harness and store a substantial and growing amount of power from intermittent renewables and then deliver that electricity when customers need it most."

Burke continued, "We appreciate the continued partnership with PG&E, which allows us to bring our expertise in energy storage to bolster the reliability of California's growing renewable portfolio and provide much-needed power to its residents."

The Phase III project, which is made up of 122 individual containers that together house more than 110,000 battery modules, was completed on schedule and within budget in just 16 months, despite a challenging supply chain environment and tremendous rainfall.

Moss Landing Energy Storage Facility is co-located on the site of Vistra's existing natural gas-fueled Moss Landing Power Plant in Monterey County – a site that has provided critical electricity to Californians since 1950.

"Like our other energy storage projects, we've been able to locate this project at a site that has historically been used for electricity production, enabling the reuse of a site with existing industrial zoning and infrastructure and with the physical space for potential growth. In addition, revitalizing existing sites ensures the local communities continue to benefit from ongoing operations while we provide affordable electricity to consumers."

Executing on its commitment to grow its zero-carbon portfolio has made Vistra a market leader in battery energy storage, as it now owns the second-most energy storage capacity in the country. In addition to its California assets, Vistra owns and operates two solar facilities, one solar-plus-storage facility, and a 260-MW storage facility, all in Texas. Additionally, Vistra has a robust pipeline of projects, including four solar installations and 10 other storage and solar-plus-storage facilities, all in various stages of development in Illinois and Texas.

With a commitment to affordability, reliability, and sustainability, Vistra announced earlier this year its intention to further grow its zero-carbon portfolio through the acquisition of Energy Harbor's 4,000-MW nuclear fleet. Once the transaction closes, which is expected later this year, Vistra will own and operate the second-largest competitive nuclear fleet in the country, with 6,400 MW of carbon-free nuclear power. The company also continues to operate a large, dispatchable power fleet that brings flexibility and reliability while the country continues to transition to low-carbon resources.

About Vistra
Vistra (NYSE: VST) is a leading Fortune 500 integrated retail electricity and power generation company based in Irving, Texas, providing essential resources for customers, commerce, and communities. Vistra combines an innovative, customer-centric approach to retail with safe, reliable, diverse, and efficient power generation. The company brings its products and services to market in 20 states and the District of Columbia, including all major competitive wholesale power markets in the U.S. Serving approximately 4 million residential, commercial, and industrial retail customers with electricity and natural gas, Vistra is one of the largest competitive electricity providers in the country and offers over 50 renewable energy plans. The company is also the largest competitive power generator in the U.S. with a capacity of approximately 37,000 megawatts powered by a diverse portfolio, including natural gas, nuclear, solar, and battery energy storage facilities. The company owns and operates the 750-MW/3,000-MWh battery energy storage system in Moss Landing, California, the largest of its kind in the world. Vistra is guided by four core principles: we do business the right way, we work as a team, we compete to win, and we care about our stakeholders, including our customers, our communities where we work and live, our employees, and our investors. Learn more about our environmental, social, and governance efforts and read the company's sustainability report at https://www.vistracorp.com/sustainability/.

SOURCE Vistra Corp.

For further information: Media: Meranda Cohn, Media.Relations@vistracorp.com, 214-875-8004 or Analysts: Meagan Horn, Investor@vistracorp.com, 214-812-0046

