NORTH FALLS

Offshore Wind Farm

Needs Case and Project Benefits Statement (Clean)

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Glossary of Acronyms

AfL	Agreement for Lease
BEIS	Department for Business, Energy and Industrial Strategy
BESS	British Energy Security Strategy
CCC	Climate Change Committee
CCUS	Carbon capture use and storage
CfD	Contracts for Difference
CO_2	Carbon dioxide
CSNP	Centralised Strategic Network Plan
DCO	Development Consent Order
DESNZ	Department for Energy Security and Net Zero
ETNPR	Electricity Transmission Network Planning Review
ESO	National Grid Electricity System Operator
FES	Future Energy Scenarios
FTE	Full-Time Employment
GB	Great Britain (Isle of)
GGOW	Greater Gabbard Offshore Wind Farm
GHG	Greenhouse Gas
GVA	Gross Value Added
GW	Gigawatt
HND	Holistic Network Design
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
kWh	Kilowatt hour
LCOE	Levelised Cost of Energy
$MtCO_2e$	Metric tonnes of carbon dioxide equivalent
MW	Megawatt
MWh	Megawatt hour
NFOW	North Falls Offshore Wind Farm Limited
NOA	Network Options Assessment
NPS	National Policy Statement
NPV	Net Present Value

NSIP	Nationally Significant Infrastructure Project
Ofgem	Office of Gas and Electricity Markets
OTNR	Offshore Transmission Network Review
O&M	Operation and Maintenance
PEIR	Preliminary Environmental Information Report
RWE	RWE Renewables UK Swindon Limited
SSER	SSE Renewables Limited
UK	United Kingdom

Glossary

Agreement for Lease	Awarded to offshore wind farms to enable developers to further progress projects. Agreement for Lease can have terms up to 10 years in which developers are paying annual fees for the location.
Base Construction	Installation of the turbine that is anchored directly to the seabed.
Battery Storage Facilities	Devices that store energy from renewables, such as offshore wind, and then release when the power is needed.
Carbon Budget Orders	Provide the legal requirement to meet the restrictions on the total amount of greenhouse gases the UK can emit over a 5-year time period.
Carbon capture, use and storage	Involves the capture of carbon emissions from large sources such as industrial factories. The carbon emissions captured are then transported and either used or stored.
Centralised Strategic Network Plan	New electricity transmission network planning output which will consider onshore and offshore electricity transmission networks in Great Britain.
Contracts for Difference	A UK government scheme to increase investment in renewables by securing high upfront costs that will protect developers and consumers form volatile wholesale prices.
Development Consent Order	Obtaining permission for developments such as energy, transport, water and waste projects.
Electricity System Operator	Balances the supply and demand on the electricity network while also developing markets and advising on network investments. The ESO of Great Britain is National Grid.

Electricity Transmission Network Planning Review	A review commenced by Ofgem for planning for new demand and generation connections to the system.
EN-1	Overarching National Policy Statement for Energy which sets out the UK national policy for delivering major energy infrastructure.
EN-3	National Policy Statement for Renewable Energy Infrastructure assesses impacts specific to biomass, offshore wind energy, pumped hydro storage, solar PV and tidal energy.
EN-5	National Policy Statement for Electricity Networks Infrastructure ensures network development can incorporate renewables with minimal effects to the community and environment.
Energy Security	Consistent availability of energy at a reasonable price to support economic developments and environmental needs.
Cable	Connects offshore wind farms to deliver power to the onshore grid network.
Fossil Fuels	Hydrocarbon-containing material such as coal, oil and natural gas which are often burned for energy.
Future Energy Scenarios	Four different scenarios for the future of the whole system in the transition to net zero: Falling Short, Consumer Transformation, System Transformation, Leading the Way. Each stage has varied speed of decarbonization and level of societal change.
Greenhouse Gas	Gases in the atmosphere that increase the temperature of the Earth. These gases include carbon dioxide, methane, nitrous oxide and water vapor.
Holistic Network Design	The provision of an economic, efficient, operable, sustainable and coordinated Electricity Transmission System to support large scale offshore wind.
Landfall	The location where the offshore export cables come ashore at Kirby Brook.
Levelised Cost of Energy	A measure of the lifetime cost of producing energy for a specific system expressed as a cost per unit of energy generated (£/MWh).
Nationally Significant Infrastructure Project	Major infrastructure developments such as large-scale renewable energy projects.
Net Present Value	The sum of future cash flows with consideration of a discount rate over a period of time.

Network Options Assessment	The economic recommendations from the Electricity System Operator regarding network reinforcement projects.
Offshore Substation Platforms	Collects the electricity generated from the offshore wind turbines and transforms it to power.
Offshore Transmission Network Review	Delivered in 2020 by the government to ensure transmission connections for offshore wind were appropriately delivered and had reasonable environmental, social and economic costs.
Operating Cost	The cost to operate, maintain, and service an offshore wind farm.
Peak Demand	A period of time in which energy demand from consumers is the highest.
Scour Protection	A layer of material on the seabed positioned around the base of the wind turbine to protect against the current and waves.
Wind Turbine Generators	Placed in the wind turbine, converts the movement of the blades into electricity.

1 Executive summary

1.1.1 North Falls Offshore Wind Farm Ltd is seeking a Development Consent Order (DCO) for an offshore wind farm located approximately 40km off the East Anglian coastline. The Project would comprise of up to 57 wind turbines, offshore cabling, onshore cabling, onshore substation and a National Grid connection point, with an indicative lifespan of 30 years.

1.1.2 North Falls Offshore Wind Farm (hereafter 'North Falls') is a proposed extension to the existing Greater Gabbard Offshore Wind Farm. In February 2017, The Crown Estate launched an opportunity for existing wind farms to apply for project extensions. In August 2019, The Crown Estate confirmed that Greater Gabbard Extension (now North Falls) would be among seven projects that would be awarded an Agreement for Lease (AfL). As set out in the online publication titled "Offshore wind extension projects 2017", the 2017 extension opportunity was identified by The Crown Estate to help achieve the urgent need for renewable energy and recognising that extensions to existing offshore wind farms are a proven way of efficiently developing more offshore generating capacity (The Crown Estate, 2017).

1.1.3 The need for secure, low carbon and renewable electricity-generating Nationally Significant Infrastructure Projects (NSIP) of this kind is established by National Policy Statements (NPS). Point 3.3.58 in the Overarching NPS for Energy EN-1 emphasises the urgency for new electricity NSIP, stipulating that:

> *"Given the urgent need for new electricity infrastructure and the time it takes for electricity NSIPs to move from design conception to operation, there is an urgent need for new (and particularly low carbon) electricity NSIPs to be brought forward as soon as possible, given the crucial role of electricity as the UK decarbonises its economy."*

1.1.4 NPS EN-3 covers energy from biomass and / or waste over 50 megawatts (MW), offshore wind over 100MW and onshore wind over 50MW. Other types of renewable energy generation which are not currently commercially viable over 50MW onshore or 100MW offshore are not covered. Offshore wind energy generation installations typically meet these criteria and, therefore, the need for this technology is fully covered by the NPS.

1.1.5 With a generating capacity of over 100 megawatts (MW), North Falls meets these criteria and its status as a Nationally Significant Infrastructure Project sets out that the need for the Project is firmly established by the NPS. This Need Case & Project Benefits Statement has been prepared to confirm the policy context which governs the determination of the DCO application for North Falls and establishes the urgent need for the project.

1.1.6 This Needs Case & Project Benefits Statement (Document Reference: 2.1) demonstrates the evidence supporting the need for the delivery of North Falls and demonstrates the benefits of its planned pre-2030 delivery date as well as the potential impact of delaying delivery beyond the realisation of the Holistic Network Design.

1.1.7 The case underpinning the need for the Project is built upon North Fall's expected contribution to meeting three key national policy aims of:

- Decarbonisation to achieve net zero and the importance of developing at-scale zero-carbon electricity generation assets;
- Security of energy supply through realising geographically and technologically diverse supplies; and
- Affordability of electricity generated.

1.1.8 The current Renewables NPS EN-3, which came into force in January 2024, introduces the concept of 'critical national priority' for the provision of nationally significant new low carbon infrastructure. The British Energy Security Strategy (BESS) sets the UK's ambition for offshore wind at 50GW by 2030, which has been maintained in the Powering Up Britain: Energy Security Plan that builds on the BESS. The BESS also sets out proposals to accelerate deployment rapidly, with an aim to increase the pace of offshore wind deployment by 25%.

1.1.9 The content of this Needs Case & Project Benefits Statement (Document Reference: 2.1) is as follows:

- Section 2 provides an overview of the national policy drivers, project description, and details of the applicant.
- Section 3 presents the need for offshore wind, including a comparison to other renewable energy sources, a review of potential future energy mix scenarios and the grid decarbonisation pathways required in order for the UK to meet its legal net zero obligations. It also provides a review of the Offshore Transmission Network Review and discusses the potential impacts associated with its delay in wind generation delivery.
- Section 4 carries out an analysis of the economic efficiency of wind generation.
- Section 5 includes a discussion of the role wind generation has to play in the UK's decarbonisation pathway and energy security strategy, as well as summarising the benefits North Falls would bring to the local economy, and beyond.
- Section 6 concludes that new offshore wind farms such as North Falls provide a source of renewable energy with a wide range of benefits, including economic growth, energy security and decarbonisation of a key sector in order to meet the 2050 net zero target. North Falls would make a contribution both to the achievement of UK decarbonisation targets and would contribute to the economy by providing jobs during all phases of the project's lifetime.

1.1.10 After reviewing the impacts of delaying offshore wind farms this report finds that a delay beyond 2030 would jeopardise the UK's ability to meet the Sixth Carbon Budget as required by the 2050 target set out in the Climate Change Act 2008 (as amended). It would also increase pressure on the supply chain and skills required to meet the UK's legally binding decarbonisation targets.

1.1.11 North Falls is well suited to delivery ahead of 2030 and before the realisation of the Holistic Network Design due to its size, its efficient delivery as an extension from an existing Greater Gabbard Offshore Wind Farm, and its ability to coordinate routeing of cables onshore with a second project, Five Estuaries Offshore Wind Farm.

1.1.12 Five Estuaries Offshore Wind Farm is a planned wind farm to the east of the proposed offshore location for North Falls and the existing Greater Gabbard Offshore Wind Farm.

1.1.13 North Falls has sought opportunities for co-ordination with Five Estuaries as outlined in the Co-ordination Report (Document Reference: 2.5) and include a coordinated landfall location, a shared onshore cable route corridor, and a co-located onshore substation zone. Further opportunities for co-ordination will continue to be explored throughout the development phase of the project.

2 Introduction

2.1 General

2.1.1 The UK Government has identified new low carbon infrastructure as being a 'critical national priority'. As such, the purpose of this Needs Case & Project Benefits Statement (Document Reference: 2.1) is to evidence the requirement for the delivery of North Falls as soon as possible, and before the Holistic Network Design (HND). The HND sets out the network requirements to facilitate a coordinated approach for connecting an identified 23GW of offshore wind using centralised, strategic network planning.

2.1.2 The aim of the HND is to expediate the consenting and regulatory approval processes and deliver this coordinated network by 2030. Since it was first proposed however, the timeline for the planned follow-up Detailed Network Designs (DNDs) has been delayed. The Independent report of the Offshore Wind Champion released in March 2023 recognises there is concern that policy development timelines associated with the HND are not aligned with real-world project development (Offshore Wind Campion, 2023), and therefore could delay planned offshore wind farms with agreed grid connection dates such as North Falls.

2.1.3 North Falls proposes up to 57 wind turbines, offshore cabling, onshore cabling, onshore substation and a National Grid connection point, with an indicative lifespan of 30 years. North Falls will have a generating capacity in excess of 100 MW.

2.2 National policy drivers

2.2.1 The need for renewable energy, which North Falls would provide, is driven by national legislation and policy including the Climate Change Act 2008 (as amended) Order 2019 and the National Policy Statements (NPS).

2.2.2 The Climate Change Act 2008 (2050 Target Amendment) Order 2019 sets a legally binding target to ensure that the net UK carbon account is lower than the "1990 baseline" by 100% by 2050. This 100% reduction is equivalent to achieving 'net zero' CO_2 emissions.

2.2.3 The Carbon Budget Orders are made in accordance with the duty to set carbon budgets as required by the Climate Change Act 2008 (as amended). These Orders provide the legal requirement to meet the carbon budgets set out in Table 2.1.

Table 2.1 - UK Carbon Budgets

CARBON BUDGET	CARBON BUDGET LEVEL	REDUCTION BELOW 1990 LEVEL
1st carbon budget (2008 - 2012)	3,018 $MtCO_2e$	26%
2nd carbon budget (2013 - 2017)	2,782 $MtCO_2e$	32%
3rd carbon budget (2018 - 2022)	2,544 $MtCO_2e$	38%
4th carbon budget (2023 - 2027)	1,950 $MtCO_2e$	52%
5th carbon budget (2028 - 2032)	1,725 $MtCO_2e$	58%
6th carbon budget (2033 - 2037)	965 $MtCO_2e$	77%
7th carbon budget (2038 - 2042)	To be set in 2025	

2.2.4 Offshore wind projects fall under the NSIP regime and the need for such projects is covered by NPS EN-1 and EN-3. The Secretary of State is required to decide DCO applications in accordance with the NPS. This Needs Case & Project Benefits Statement (Document Reference: 2.1) builds upon the arguments made in the NPS documents and describes how and why the proposed project addresses relevant aspects of established and emerging government policy.

2.2.5 The case for need is built upon the contribution of the proposed development to the three important national policy aims of decarbonisation (net zero and the importance of developing at-scale zero-carbon generation assets); security of supply (geographically and technologically diverse supplies); and affordability.

2.2.6 The NPS were first prepared by the UK government in 2011 (DECC, 2011) under the Planning Act (Planning Act, 2008) and revised versions of NPS EN-1 to EN-5 were published in November 2023 and came into force in January 2024 (DESNZ, 2024). They set out the need and urgency for new energy infrastructure, with a framework against which major infrastructure projects should be assessed. The Planning Act requires that the NPS include an explanation of how it takes into account government policy relating to the mitigation of, and adaption to climate change. NPS relevant to the project include:

- NPS for Energy EN-1, which sets out national policy for energy infrastructure in the UK;
- NPS for Renewable Energy Infrastructure EN-3, which sets out policies relevant to nationally significant renewable energy installations (including offshore generating stations in excess of 100MW); and
- NPS for Electricity Networks Infrastructure EN-5, which sets out policies regarding new electricity network infrastructure associated with an NSIP.

2.2.7 Section 3.3 of the NPS EN-1 (DESNZ, 2023a) identifies the need for electricity generating capacity including reasons underpinning the need for renewable energy. It states that large capacities of low-carbon generation will be required to ensure that there is sufficient electricity to meet increased demand, to replace output from retiring plants and to ensure there is sufficient margin in our supply to accommodate unexpectedly high demand and mitigate risks such as unexpected plant closures and extreme weather events.

2.2.8 The NPS EN-1 concludes that it is necessary to bring forward new renewable electricity generating projects as soon as possible in order to largely decarbonise the power sector by 2030 and meet the UK's energy objectives. It is noted at point 3.3.20 that "*a secure, reliable, affordable, net zero consistent system in 2050 is likely to be composed predominantly of wind and solar*" (DESNZ, 2023a). Moreover, Powering Up Britain, sets a UK target of fully decarbonising the power sector by 2035. The need for new renewable electricity generation projects is therefore urgent.

2.2.9 A key update is that the current renewable energy infrastructure NPS EN-1 published in November 2023 (DESNZ, 2023a) states that low carbon infrastructure is now a critical national priority as follows:

> "*Government has concluded that there is a critical national priority (CNP) for the provision of nationally significant new low carbon infrastructure*."

2.2.10 Furthermore, Section 2.8.6 of NPS EN-3 (DESNZ, 2023b) states that: "*Given ambitions to deliver up to 50 GW of offshore wind by 2030… there is a need to speed up, and reduce delays in, the consenting process.*" The NPS also include detail on the role of strategic planning of energy networks, that consider the whole network rather than individual transmission projects. Regarding connections to the national transmission network, NPS EN-3 expects a more co-ordinated approach to offshore-onshore transmission.

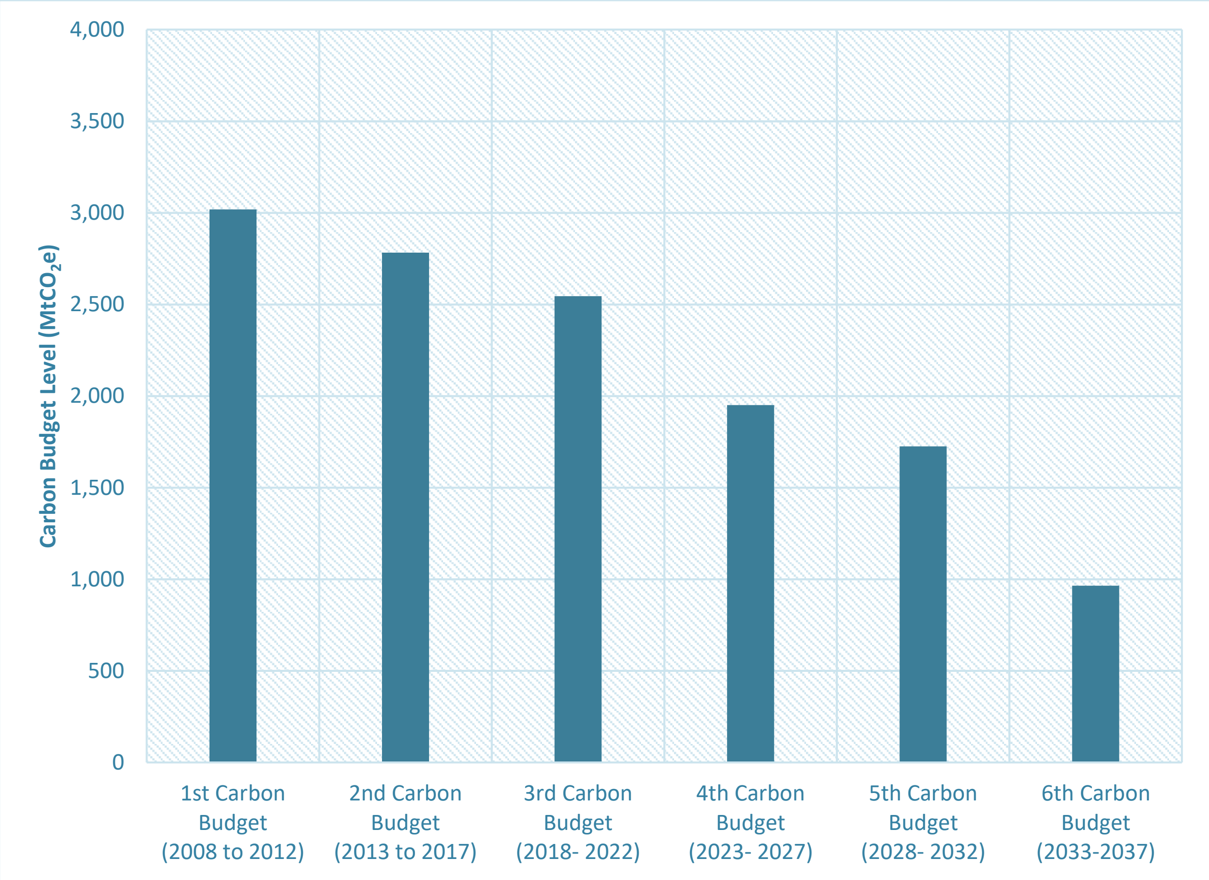

Figure 2.1 - The six Carbon Budgets up to 2037. The UK is currently in the Fourth Carbon Budget period (2023 to 2027).

2.2.11 The need for renewable energy including offshore wind is supported by a number of UK government strategies which all outline that low carbon energy is needed to support wider decarbonisation and meet the UK net zero targets. These UK government strategies include:

- Clean Growth Strategy- this strategy published in 2017 sets out proposals for the decarbonisation of all sectors of the UK economy through the 2020s. It recognises that the UK needs a range of energy generation infrastructure to ensure a reliable and affordable energy supply for consumers as well as to meet national and international commitments to tackle climate change.

- Ten Point Plan for a Green Industrial Revolution- published in 2020, this strategy outlines a green economic response to coronavirus and includes a focus on advancing offshore wind, setting a target for 40GW of offshore wind by 2030 (now 50GW as stated in the BESS).

- Powering our Net Zero Future- building on the Ten Point Plan, this energy white paper published in 2020 outlines how the UK will decarbonise its energy system, promote green jobs and reach net zero emissions by 2050.

- Net Zero Strategy: Build Back Greener- this strategy published in 2021 also builds on the Ten Point Plan and sets out an approach to meet the UK Carbon Budgets and net zero by 2050.It includes the target to have a low carbon electricity supply by 2035, bringing forward the government’s commitment to decarbonise the power system by 15 years.

- British Energy Security Strategy (BESS)- published in 2022, this strategy builds on the Net Zero Strategy to outline the acceleration of UK power for greater energy independence and long-term security in light of rising global energy prices. It also aims to increase the pace of offshore wind deployment by 25% and sets the target of 50GW of offshore wind by 2030 which is the latest Government target for offshore wind.

- Powering Up Britain- these plans published in 2023 set out how the Department for Energy Security and Net Zero aims to improve the UK’s energy security, maximise economic opportunities of the net zero transition and reach net zero by 2050. This includes the aims of doubling Britain’s electricity generation capacity by the late 2030s and fully decarbonising the power sector by 2035. The plans also outline investment in key industries including offshore wind.

- Offshore Wind Net Zero Investment Roadmap- as noted in Powering Up Britain, this roadmap published in 2023 outlines the investment needed for offshore wind, summarises government policy and funding and provides investors with suitable information to support investment decisions.

2.3 CLEAN POWER 2030 ACTION PLAN - AN UPDATE TO UK GOVERNMENT STRATEGIES WAS PUBLISHED THROUGH THE CLEAN POWER 2030 ACTION PLAN IN DECEMBER 2024 (DESNZ, 2024B). THIS STRATEGY DISCUSSES THE RAPID AND MASS DEPLOYMENT OF NEW CLEAN ENERGY, INCLUDING OFFSHORE WIND, TO DELIVER A CLEAN POWER SYSTEM BY 2030. NEW CLEAN ENERGY CAPACITY WILL INCLUDE A TOTAL OF 43-50 GW OF OFFSHORE WIND AND IDENTIFIES OFFSHORE WIND OF HAVING "A PARTICULARLY IMPORTANT ROLE AS THE BACKBONE OF THE CLEAN POWER SYSTEM." TO SUPPORT RAPID DEPLOYMENT OF OFFSHORE WIND, THE STRATEGY IDENTIFIES THE NEED TO ACCELERATE THE PLANNING PROCESS ACROSS GREAT BRITAIN FOR ENERGY INFRASTRUCTURE, AS NETWORK AND OFFSHORE WIND DEVELOPMENTS WILL NEED TO BEGIN CONSTRUCTION BY 2026 IF THEY ARE OPERATIONAL BY 2030. Project description

2.3.1 In February 2017, The Crown Estate launched an opportunity for existing wind farms to apply for project extensions. North Falls applied for a lease to develop an extension to the western boundary of the existing Greater Gabbard Offshore Wind Farm (GGOW). In August 2019, The Crown Estate consulted on and then concluded a plan-level Habitats Regulations Assessment for the proposed extension projects and confirmed that Greater Gabbard Extension, now named North Falls Offshore Wind Farm would be among seven projects that would be awarded an Agreement for Lease (AfL).

2.3.2 The key components of North Falls comprises both offshore and onshore elements as set out below. Further details can be found within Environmental Statement (ES) Chapter 5 Project Description (Document Reference: 3.1.7) and includes:

- The construction and operation of up to 57 wind turbine generators and their foundations;
- the construction of up to two offshore substation platforms and a platform interconnector cable, or construction of one offshore substation platform and one offshore converter platform and a platform interconnector cable;
- the construction of a network of subsea array cables between the wind turbine generators and the offshore substation platform/s and/or offshore converter platform;
- the installation of up to two subsea export cable circuits between the offshore substation platform/s and the shore (the offshore cable corridor measuring approximately 57km in length);
- the installation of up to two cable circuits and associated ducting as part of the landfall connection works;

- the construction of up to two onshore underground cable circuits, cable ducting for two additional cable circuits for later installation, associated works (the onshore cable corridor measuring approximately 24km in length);
- the construction of an air insulated switchgear onshore substation located between Little Bromley and Ardleigh in the District of Tendring and County of Essex and connection to the proposed East Anglia Connection Node substation for distribution of power to the national electricity transmission network; and
- other works comprising but not limited to the construction of access routes, temporary construction compounds, drainage works, earthworks, temporary and permanent ecological and environmental mitigation, landscape works and habitat creation, and other works necessary or expedient for the purposes of or in connection with the relevant part of the authorised development.

2.3.3 The North Falls project comprises both offshore and onshore projects areas as described below.

- The offshore project area:
  - Offshore wind farm array area within which the wind turbine generators, array cables, offshore substation platform(s) and/or offshore converter platform would be located; and
  - Offshore cable corridor - the corridor of seabed from array areas to the landfall within which the offshore export cables would be located.
- The onshore project area:
  - Landfall – the location where the offshore export cables come ashore at Kirby Brook;
  - Onshore cable route – the Onshore route within which the onshore export cables and associated infrastructure would be located; and
  - Onshore substation – the compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid.

2.3.4 The North Falls array has a total area of 95km^2 located approximately 40km off the East Anglian coastline. The offshore cable corridor runs from the array area to the landfall location at Kirby Brook. Onshore export cables would transport the electricity to an onshore substation located near Ardleigh within the Tendring district of Essex, before it enters the National Grid.

2.4 The Applicant

2.4.1 The Applicant is North Falls Offshore Wind Farm Limited (NFOW) which is a joint venture between SSE Renewables Offshore Windfarm Holdings Limited (SSER) and RWE Renewables UK Swindon Limited (RWE), both of which are highly experienced operators and developers of offshore wind projects. Both organisations are committed to developing renewable energy in the UK.

2.4.2 SSER is a leading developer, owner and operator of renewable energy across the UK and Ireland, with a portfolio of around 4GW of onshore wind, offshore wind and hydro generation. Part of the SSER strategy is to drive the transition to a net zero future through the world class development, construction and operation of renewable energy assets.

2.4.3 RWE is one of the world's leading renewable energy companies. The company has onshore and offshore wind farms, photovoltaic plants and battery storage facilities with a combined pro-rata capacity of approximately 9GW.

2.4.4 Both SSER and RWE hold an extensive portfolio of existing UK offshore wind farms. In addition to the existing portfolio, RWE and SSER each (alone or as part of a developer consortium) are in the process of consenting a range of other wind farms including:

- Awel-y-Mor offshore wind farm off the coast of North Wales;
- Five Estuaries Offshore Wind Farm off the east coast of England;
- Dogger Bank South offshore wind farms, off the north-east coast of England;
- Berwick Bank offshore wind farm off the east coast of Scotland; and
- Dogger Bank D offshore wind farm, off the north-east coast of England.

2.4.5 This provides North Falls with valuable lessons learned and experiences from consenting, constructing and operating offshore wind farms, which would be used to inform the design of North Falls. It also provides a sound understanding of the potential impacts of the project through the ability to draw on available monitoring data.

3 The need for offshore wind

3.1 Need for renewable energy

3.1.1 As recognised by NPS EN-1, there is a need and urgency for new energy infrastructure amid increasing energy demand, the transition to a low carbon economy, the need for energy security and affordability, and to replace closing electricity generating stations. Powering Up Britain (DESNZ, 2023d) has set out four key objectives which are energy security, consumer security, climate security and economic security. In short, there is a need to increase energy security in the UK through an energy supply which contributes to decarbonisation in order to meet the 2050 net zero target.

3.1.2 As stated within the Intergovernmental Panel on Climate Change (IPPC) Synthesis Report, Summary for Policymakers of the Sixth Assessment Report (AR6) (IPCC, 2023), the benefit of near-term climate action will deliver co-benefits including air quality and health. Paragraph C2 outlines that conversely the delay in mitigation and adaption would:

> *"lock-in high-emissions infrastructure, raise risks of stranded assets and cost escalation, reduce feasibility, and increase losses and damages."*

3.1.3 As shown in Figure 3.1, the supply of energy via solar and wind farms are climate change mitigation measures which offer the greatest potential contribution to net emission reduction.

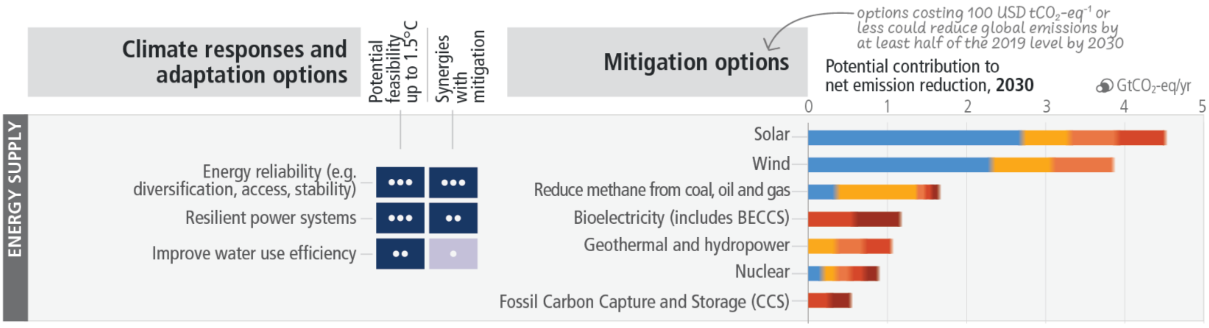

Figure 3.1 - Climate action summary from the IPCC AR6 report presenting options for scaling up climate action

3.1.4 Wind power is becoming an increasingly viable and important energy supply, with the unit cost of wind energy having reduced by 55% between 2010 to 2019 as stated in paragraph A.4.2 of the Synthesis Report, Summary for Policymakers. The cost-effectiveness of offshore wind power is further considered later in this report, through looking at the Levelised Cost of Energy in Section 4.2.

3.1.5 Offshore wind farms provide various benefits when compared to onshore wind farms. This includes that offshore wind farms have a greater capacity factor than onshore wind farms, with an average offshore wind turbine producing around 3.6MW compared to 2.5 to 3MW for an average onshore wind turbine (National Grid, 2023). This efficiency is enabled by greater tip heights, higher wind speeds and greater consistency. In addition, there is greater space for wind farms offshore and less visual impact for local communities. However, it is recognised that offshore wind makes up just one component of the future diverse renewable energy generation mix required in the UK, alongside other sources such as onshore wind and solar.

3.2 Future energy demands

3.2.1 As highlighted by NPS EN-1, electrification of parts of the heating, transport and industry sectors is placing additional demand on the energy sector. The NPS EN-1 states that electricity demand may be more than double by 2050 as these sectors make the change from fossil fuels to low carbon electricity to support their decarbonisation.

3.2.2 This is supported by page 45 in the Powering Up Britain – Energy Security Plan (DESNZ, 2023f) which states:

> *"As we transition to a more resilient and clean energy system, we anticipate that demand for electricity could double by 2050. Between now and then, the system will need to enable 50 gigawatts of offshore wind by 2030; and the decarbonisation of the power system, subject to security of supply, by 2035."*

3.2.3 The Impact Assessment for the Sixth Carbon Budget includes an illustrative range in tables 6 and 9 for electricity demand being 465 to 515TWh in 2035 and 610 to 800TWh in 2050 (DESNZ, 2023g). At the same time, electricity generation has fallen in the UK by 2.4% between 2018 and 2019 and by 15% between 2010 and 2019 due to the decommissioning of current energy infrastructure such as coal power stations. Generation continued to fall in subsequent years by 3.6% and 1.4% due to the Covid-19 pandemic and the availability of high net imports (reducing the need for UK generation) respectively. Total generation rose for the first time in 5 years between 2021 and 2022 by 5.3%, driven by a period of outages in French nuclear generation, increasing the need for UK-based generation and export (DESNZ, 2023h).

3.2.4 The future characteristics of Great Britain's (GB) energy and electricity demands are described through a set of possible scenarios developed on an annual basis by the National Grid Electricity System Operator (ESO). This annual publication is called Future Energy Scenarios (FES).

3.2.5 The latest FES released in July 2023 (ESO, 2023) states that the annual demand for energy from all sources in GB in 2022 was 1,399TWh, with 20% (286TWh) in the form of electricity. While our total energy demand must reduce significantly by 2050, electricity demand is expected to grow as carbon-intensive sources of energy are displaced by electrification, or production of non-carbon energy vectors by use of electricity such as hydrogen electrolysis. The proportion of energy demand met by electricity has increased from 19% in 2020 and is expected to reach up to 66% by 2050.

3.2.6 This is demonstrated in Figure 3.2 of this report which illustrates the potential peak electricity demand for GB to 2050. In the four scenarios, peak demand is anticipated to range between 59GW and 67GW by 2030; between 71GW and 83GW in 2040, and between 76GW and 96GW in 2050. Despite there being an anticipated drop in peak demand until 2025 in most scenarios, all scenarios show an increase in peak demand thereafter, driven by underlying industrial and commercial demand growth as well as the electrification of heating and transport.

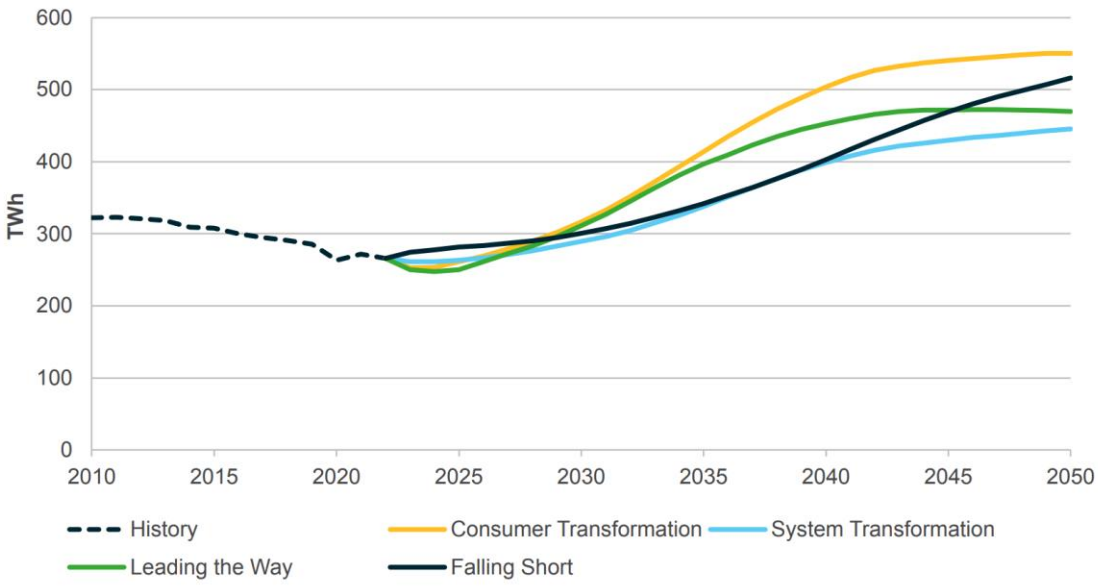

Figure 3.2 - Predicted total annual consumer electricity demand. Source: FES 2023

3.2.7 Large capacities of low carbon generation will be required to ensure there is enough electricity to meet this increased demand given the recent trend of decreasing UK electricity generation discussed in paragraph 3.2.3 and the expected continued decrease in energy generated by gas. This involves new renewable energy infrastructure, such as North Falls. North Falls would offer a source of renewable energy to help meet the increasing energy demand, especially in light of the decommissioning of UK coal power stations, and at the time of writing, reduced global supply of gas from Russia.

3.2.8 Additionally, as explained in the NPS EN-1, a large capacity of low carbon energy is not only required to meet the energy demand but also to mitigate risks such as unexpected plant closures and extreme weather events.

3.3 Generation targets and grid decarbonisation pathways

3.3.1 The UK has an offshore wind capacity target of 50GW by 2030, as outlined in the BESS (DESNZ, 2022) and upheld in Powering Up Britain. This is a substantial increase from previous commitments of 30GW set out within the Offshore Wind Sector Deal (DESNZ, 2019) and the subsequent target of a 40GW contribution from offshore wind by 2030, outlined in the Ten Point Plan for a Green Industrial Revolution (DESNZ, 2020). The increased target follows the continued identification that more offshore wind energy is needed by 2030 to meet the UK net zero targets.

3.3.2 Currently 14.7GW of energy is generated from offshore wind farms in the UK (Renewable UK, 2023). Additionally, approximately 17.7GW of offshore wind capacity has been consented, with 3.7GW in construction. According to the National Grid ESO Transmission Entry Connection (TEC) Register (July 2024), only 14GW of proposed offshore wind farms have a grid connection offer on or before 2030, including North Falls. As such there is a deficit of 17.6GW to meet the 50GW target by 2030, as shown in Figure 3.3. Moreover, based on the current rate of deployment, the UK is set to fall short of the 50GW target by 2030 and not meet 50GW until 2048 (IPPR, 2014).

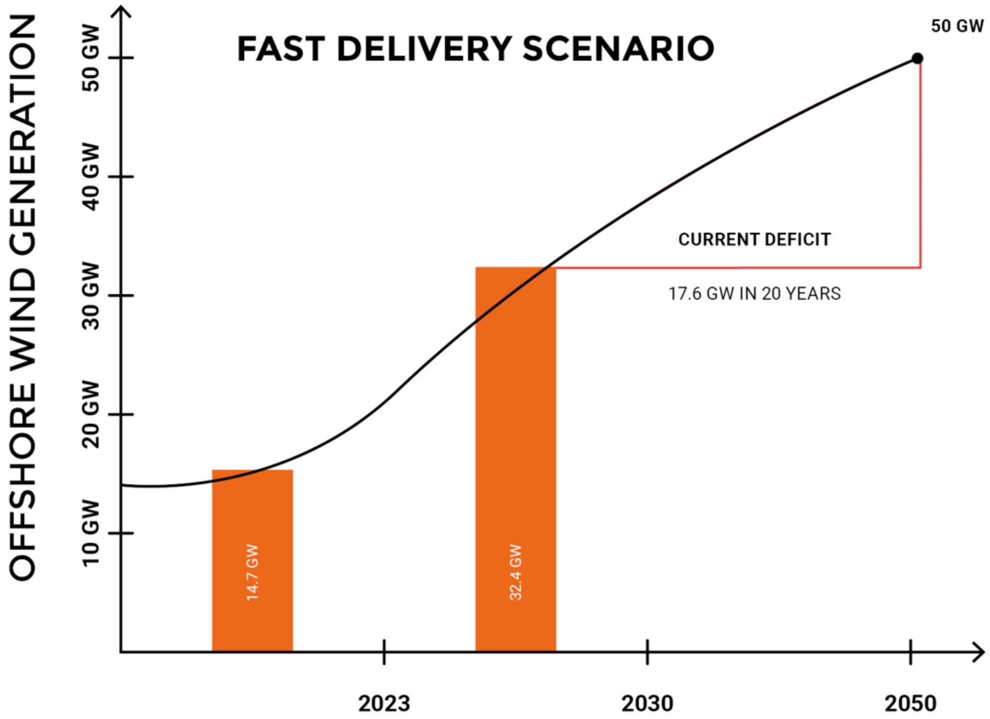

Figure 3.3 - Trajectory of offshore wind farm generation in the UK

3.3.3 The FES 2023 sets out different ways that the UK can achieve net zero by 2050, and a decarbonised electricity system by 2035. The four scenarios include Falling Short, System Transformation, Consumer Transformation and Leading the Way. Consumer Transformation and System Transformation are two ways to reach net zero by 2050, while Leading the Way would reach net zero before 2050 and Falling Short would not reach net zero by 2050. The FES 2023 highlights that renewable energy plays a large role in the scenarios where net zero is met by 2050, with the power sector reaching net zero emissions by 2034 in Leading the Way and Consumer Transformation, and by 2035 in System Transformation. It is highlighted that a net zero power sector is a prerequisite for the decarbonisation of other sectors through electrification.

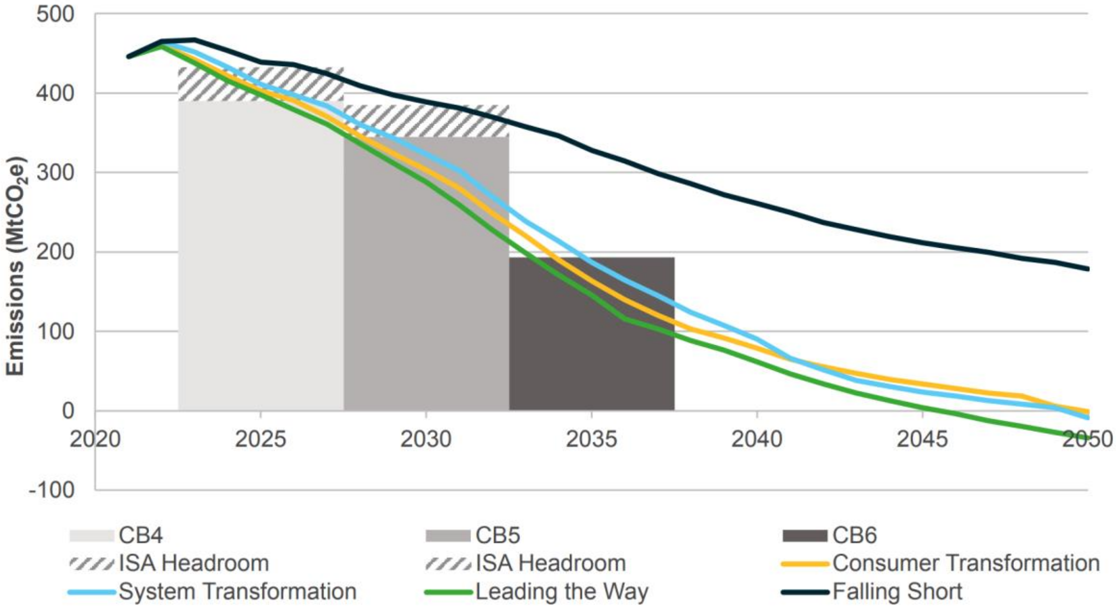

Figure 3.4 - Total net GHG emissions for each FES 2023 scenario including Carbon Budgets. Source: FES 2023

3.3.4 Figure 3.4 illustrates the carbon emission pathways associated with each of the FES 2023 routes to net zero in comparison to the Fourth, Fifth, and Sixth Carbon Budgets (CB). A significant reduction in emissions allowances can be seen from CB5 to CB6 including the removal of the allowance made for the International Aviation and Shipping (IAS) headroom. The FES 2023 states that for the UK to meet CB6 we will need to see significant changes across the economy, such as more renewable electricity production, deployment of carbon capture use and storage (CCUS) and shifting away from petrol and diesel vehicles and gas boilers.

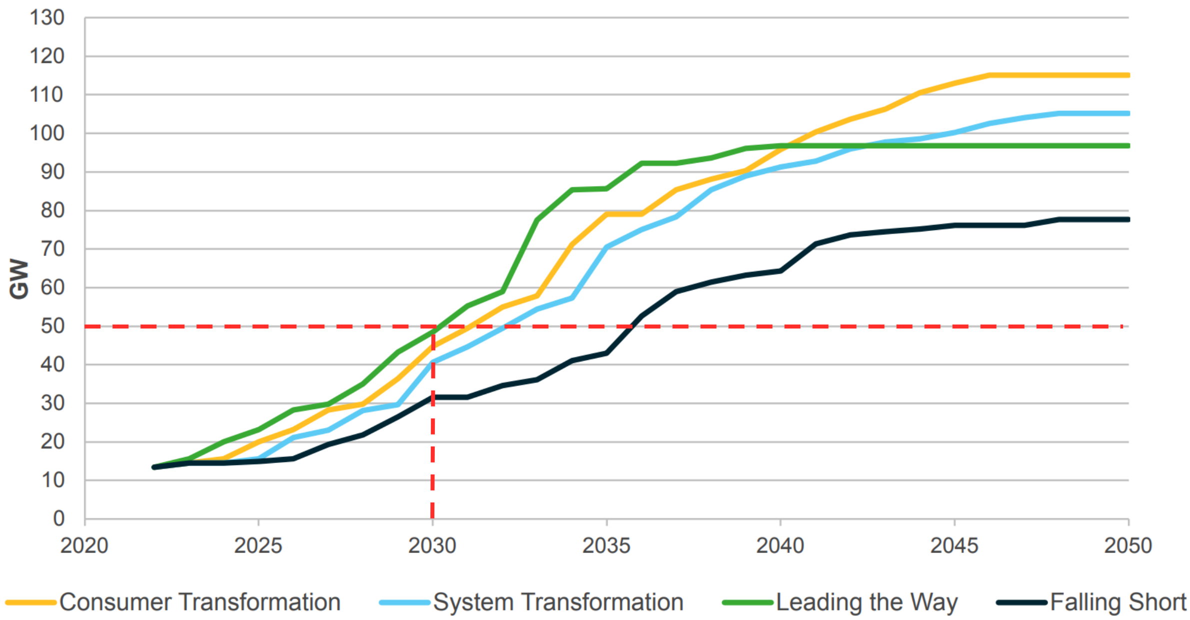

Figure 3.5 - Offshore wind capacity in GW for each FES 2023 scenario. Source: FES 2023

3.3.5 The required offshore wind generation capacity for each FES 2023 pathway is shown in Figure 3.5. The dashed line represents the Government's target for 50GW of offshore wind by 2030. All scenarios show significant increase in offshore wind, however only the “Leading the Way” scenario reaches this generation capacity by 2030.

3.3.6 By comparing offshore wind capacity in Figure 3.5 with the onshore wind, solar and marine capacity in the FES 2023, it is found that in all scenarios offshore wind generation capacity is higher than any other renewable energy source by 2030 and this trend continues to 2050, highlighting the reliance of the UK’s net zero target on wind power.

3.3.7 Within the 2022 version of the FES (ESO, 2022) the likelihood of the UK meeting its ambition for 50GW of offshore wind by 2030 is presented positively, with even the slowest acting “Falling Short” scenario reaching 50GW by 2036. It recommends that the rate of turbine installation needs to increase from its current maximum of 4 per day to a level of 6 a day. The presentation of the trends in the 2023 report however state that it is credible that the 50GW target will not be met by 2030 due to the challenges to be overcome in areas such as grid connection, turbine size, physical constraints, supply chain capacity and the length of the planning process.

3.3.8 A white paper review carried out by the Energy Futures Lab (Imperial College London, 2021) concludes that to achieve the Powering Up Britain strategy’s goal of a net zero electricity supply for GB in 2035, the capacity of offshore wind needs to exceed 108GW of generation. This is not only a sevenfold increase on the current installed capacity of 14.7GW but is also more than double the UK government's target for 2030. The above highlights the deficit of offshore wind capacity and the subsequent need to deliver North Falls.

3.4 Status of Centralised Strategic Network Plan (CSNP), offshore transmission network review (OTNR), and Offshore Co-ordination Support Scheme (OCSS)

3.4.1 The NPS EN-1 sets out a need and urgency for new energy infrastructure with action required in the near-term to meet the future energy demand, generation and decarbonisation targets.

3.4.2 Integrating new offshore wind farms to the existing transmission network is an essential component and key to delivering the above benefits, including decarbonisation and energy security.

3.4.3 A Holistic Network Design (HND) is being developed under the Offshore Transmission Network Review (OTNR) by the National Grid Electricity System Operator (ESO) for projects covered by the Pathway to 2030 workstream of the OTNR (Ofgem, 2022a). This forms part of the planned transformation of ESO's network planning process as they transition to the Centralised Strategic Network Plan (CSNP). This is being developed in collaboration with Ofgem's Electricity Transmission Network Planning Review (ETNPR). The CSNP aims to proactively identify, design and progress investments in the network and to ensure that the transmission network is planned holistically, onshore, offshore, and across vectors.

3.4.4 The new National Energy System Operator (NESO) who launched on the 1 October 2024 are leading the preparation of the CSNP framework which is to encompass a range of different processes and outputs. It will include the publication of system requirements, a roadmap of potential longer-term options, as well as a plan of projects for delivery. A series of transitional Centralised Strategic Network Plans (tCSNP) for the electricity transmission network have been published.

3.4.5 The FES 2023 report released in July 2023 provides an update of progress to date on the CSNP:

- The first transitional CSNP was published in July 2022. This included the HND and the Network Options Assessment (NOA) 2021/22 Refresh. The HND proposed a coordinated approach for connecting 24GW of in-scope offshore wind which provided an offshore network design and a set of onshore network investment recommendations required to deliver the UK Government's ambition for 50GW of offshore wind by 2030.
- The second transitional CSNP was published in March 2024.
- Following the publication of Ofgem's "Decision on the initial findings of our Electricity Transmission Network Planning Review" (Ofgem, 2022b)

in November 2022, it is expected that Ofgem will undertake further consultation on the next level of detail of the CSNP and continue to support the process now being led by NESO who are responsible for delivering the CSNP.

3.4.6 As part of the progression of the CSNP framework NESO published a series of documents in December 2024 and also held a public consultation on these documents from 9 December 2024 to the 20 January 2025. These documents are as follows:

- The Strategic Spatial Energy Plan (SSEP) Draft Methodology (NESO, 2024a), which sets out the principles and method for delivering the SSEP;
- The Centralised Strategic Network Plan (CSNP) high level principles (NESO, 2024b) which are to underpin the methodology for the CSNP; and
- The Transitional CSNP2 (tCSNP2) Refresh methodology (NESO, 2024c), which is a refreshed version of the interim network planning approach.

3.4.7 North Falls has been working with the Department for Energy Security and Net Zero (DESNZ) to explore an offshore grid connection option as part of the OTNR process. There are three options for grid connection as outlined in Section 5.3.1 of ES Chapter 5 Project Description (Document Reference: 3.1.7) with Option 1 and Option 2 comprising of an onshore electrical connection at a National Gird connection point – the proposed East Anglia Connection Node (EACN) substation. Option 3 comprises an offshore electrical connection supplied by a third party.

3.4.8 National Grid Electricity Transmission (Sea Link), National Grid Ventures (Nautilus and EuroLink), North Falls, and Five Estuaries Offshore Wind Farm have been working together and exploring the potential for offshore coordination as part of the OTNR and OCSS.

3.4.9 On 3 September 2024 (approximately two months after North Falls DCO submission), the Secretary of State for DESNZ decided not to grant further funding to explore the potential for offshore cable and offshore grid connection coordination as part of the OTNR “Early Opportunities” workstream and advised key stakeholders accordingly. Whilst the workstream identified that an offshore cable and grid connection point was technically feasible, it identified the potential for significant additional costs and delay.

3.4.10 While the Secretary of State has decided not to grant further funding for this workstream, an offshore cable coordinated connection point remains a grid connection option within the North Falls DCO application.

3.4.11 Grid connection Option 3 for North Falls provides a connection point for North Falls to connect to an offshore coordinated cable option brought forward by a third party outside of the OTNR workstream, should that cable route and option be promoted and be environmentally, regulatory and commercially viable within appropriate timescales. Currently, no third party is promoting a co-ordinated offshore solution to facilitate a grid connection point for North Falls. North Falls is thus currently reliant on a radial connection solution.

3.4.12 Further information on the OTNR and the Offshore Co-ordination Support Scheme (OCSS), and further context to the decision made by DESNZ is included within Section 3 of the Co-ordination Report (Document Reference: 2.5).

3.4.13 The NPS EN-3 and EN-5 expect a more co-ordinated approach to transmissions, where multiple offshore wind farms connect to onshore networks together, as opposed to single wind farm connection. Section 10 of the Co-ordination Report (Document Reference: 2.5) provides a full assessment against the relevant paragraphs of NPS EN-3 and NPS EN-5 with respect to co-ordination.

This chart contains a selection of recent policy targets and ambitions in relation to net zero and energy security and highlights how they compare to the different scenarios. Analysis for FES 2023 commenced before the publication of several key policy documents and does not signify that any individual targets cannot be met across the range of scenarios.

CT Consumer Transformation; LW Leading the Way; ST System Transformation; FS Falling Short; Policy

		2022	By 2025	By 2030	By 2035	By 2040	By 2045	By 2050	Maximum potential by 2050
Emissions	Meets 2050 Net Zero target	446 $MtCO_2e$ emissions[1]						CT LW ST	Net zero by 2046 LW
	Meets 5th carbon budget			CT LW ST	FS				
	Meets 6th carbon budget				CT LW ST			FS	-34 $MtCO_2$ in 2050 LW
Electricity supply	50 GW of offshore wind	13 GW		LW	CT ST	FS			115 GW CT
	Up to 5 GW floating offshore wind	0 GW			CT LW ST	FS			20 GW CT
	Up to 70 GW of solar	14 GW				LW		CT	91 GW LW
	No unabated natural gas-fired generation capacity (subject to security of supply)	36 GW				LW	ST	CT	LW reaches this target in 2036 LW
	Up to 24 GW nuclear generation capacity	6.1 GW							16 GW CT
Energy storage	100 GWh of non-battery electrical storage	2.5 GW / 26 GWh			LW		CT		134 GWh LW
	30 GWh of battery electrical storage	2.7 GW / 3.1 GWh		LW		CT		ST	63 GWh LW

Figure 3.6 - FES 2023 Summary of net zero scenarios showing performance against a range of policy targets and ambitions in relation to net zero and energy security.

4 Economic efficiency

4.1 Metrics and methodology

4.1.1 The Powering Up Britain: Energy Security Plan (DESNZ, 2023f) sets a vision for a "*future of cheap, clean and British energy*" which includes a strategy to increase supply of low-carbon energy such as enhancing the UK's strength in wind generation whilst ensuring a cost-effective transition to our future net zero grid.

4.1.2 When considering a cost-effective transition, it is not appropriate to assess only the upfront capital costs of a renewable energy project which may only be a fraction of the total costs in comparison with the annual maintenance and financing costs. One must therefore consider the lifetime cost of the project.

4.1.3 An important measure of the lifetime cost of renewable energy generation is its Levelised Cost of Energy (LCOE). The LCOE allows comparison between energy systems such was wind, solar and nuclear power sources despite differing lifespans, capital cost and project sizes because it reflects the per-unit cost of electricity generated and technology-specific discount rates are used. LCOE is a measure of the energy system cost per energy unit generated from an asset over its lifetime and is calculated using a discounting methodology, including capital and operating costs as well as anticipated in-life capital and operating expenditure. The LCOE is expressed as a cost per unit of energy generated (£/MWh) and both the cost of the energy system and the total energy to be generated are expressed as Net Present Value (NPV), through the use of a discount rate. This allows us to calculate the overall cost-effectiveness of an energy system over its lifetime as well as allowing all forms of generation to be compared with each other on a consistent basis.

4.1.4 An alternative measure to LCOE is to calculate the payback period of a project or asset. This method however requires assumptions to be made about the price at which electricity can be sold to the grid or to an end user which can impact its accuracy and lead to a poor indicator of cost-effectiveness.

4.2 Levelised cost of energy

4.2.1 LCOE is defined as the price at which the generated electricity should be sold for the system to break even at the end of its lifetime. It can be calculated using the following equation:

Equation 4.1 - Levelised Cost of Energy

$$\textbf{LCOE} = \frac{\textbf{NPV of Total Costs Over Lifetime}}{\text{NPV of Electrical Energy Produced Over Lifetime}}$$

$$LCOE = \frac{\sum_t^n \frac{I_t + M_t}{1 + r^t}}{\sum_t^n \frac{E_t}{1 + r^t}}$$

4.2.2 Where t refers to the year with t = 0 being the start of the asset construction, n the asset lifetime, I is the investment expenditure (capital cost), M are the running costs (fixed and variable), r the discount rate, and E is the electricity generation (in kWh) all for year t.

4.2.3 The discount rate is used to account for financing costs. It is used to depreciate cash flow in order to account for the return that the asset investor would require, and it depends on aspects such as returns of alternative investment opportunities, as well as real and perceived risks. This adds complexity to the calculations, but it is important when considering anticipated lifetimes of more than 15 years.

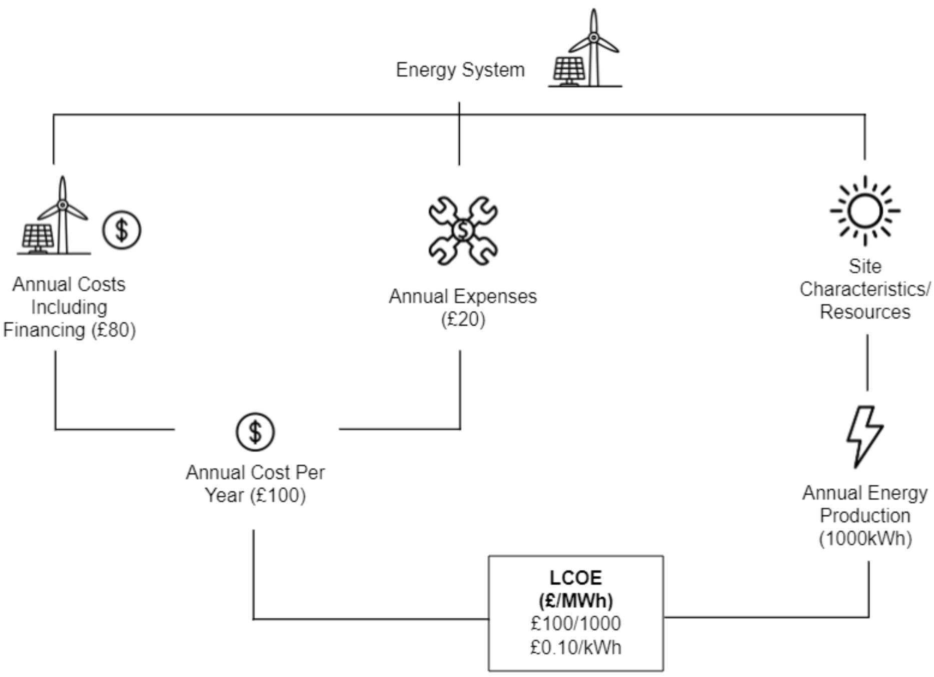

Figure 4.1 - Schematic description of LCOE calculation

4.2.4 Figure 4.1 shows a diagrammatic explanation of the LCOE calculation, using example costs and energy production figures to support understanding.

4.2.5 It is expected that the capital and operating costs of offshore wind farms will decrease over time, as well as by size of farm and turbine due to economies of scale. A prediction of these costs were made by the Department for Business, Energy & Industrial Strategy (BEIS) (BEIS, 2020;2023). The predicted offshore wind costs given in the Electricity Generation Costs Report 2023 are shown in Table 4.1. The sharp increase in pre-development costs in 2030 as projects awarded under The Crown Estate Leasing Round 4 come online, with higher associated option fees and construction rent than previously estimated.

Table 4.1 - Key technical assumptions for offshore wind (by commissioning year)

	2025	2030	2035	2040
Projected turbine size (MW)	14	17	20	20
Pre-development cost (£m)	130	410	460	460
Construction (£m)	1,500	1,400	1,300	1,300
Fixable O&M (£/MW/year)	43,300	42,100	42,200	42,400
Variable O&M (£/MWh)	1	1	1	1
Load factor (net of availability)	61%	65%	69%	69%
Operating period	30 years			

4.3 Assessment of North Falls

4.3.1 Recent analysis on generation costs by both BEIS and the International Renewable Energy Agency (IRENA) illustrates that wind generation is already more economically attractive than most other existing forms of generation, including hydrogen-fired combined cycle gas turbines (CCGT), and is matched only by onshore wind and large-scale solar PV.

4.3.2 As offshore wind technology has matured, there has been a significant reduction in the cost of energy produced by offshore wind in recent years. The UK's Electricity Generation Costs (BEIS, 2023) estimates that by 2030 the LCOE produced from offshore wind would be reduced to £39/MWh, whereas the 2016 iteration of this document estimated the 2030 LCOE from offshore wind to be

£103/MWh. This demonstrates the rapid decrease in the LCOE due to investment.

4.3.3 This trend is consistent outside the UK, with IRENA reporting that the global LCOE of offshore wind declined by 60% between 2010 and 2021, with a 13% reduction in 2021 alone (IRENA, 2021). In Europe the LCOE of newly commissioned projects fell 29% between 2020 and 2021, which IRENA attributes to growing developer experience, greater product standardisation, manufacturing industrialisation, and economies of scale.

Figure 4.2 - Offshore wind global weighted average LCOEs (2000-2024) Source: IRENA Renewable Cost Database

4.3.4 Another supporting source of information is the fourth allocation round (BEIS, 2022) of the UK Government's Contracts for Difference scheme (CfD) which concluded in July 2022. This was notable for the ongoing reduction in cost of offshore wind projects to as low as £37.35/MWh, compared with the first CfD round in 2015 which resulted in costs of up to £120/MWh. This demonstrates the progress being made with a reduction in costs by 69% in seven years.

4.3.5 It should be noted however that in the fifth round of the CfD allocation there are no new offshore wind project contracts (DESNZ, 2023j). This is despite there being the potential for 5GW of projects. The starting price for the auction was higher than in the last round, at £44/MWh, however developers have argued that this was too low amid increasing costs. This poses a risk to the UK's plan to reach 50GW by 2030 and in turn the decarbonised electricity system by 2035 and the 2050 net zero target, highlighting the importance and urgency of North Falls to contribute to the above targets.

4.3.6 High coal and fossil gas prices in 2021 and 2022 have further undermined the competitiveness of fossil fuels, making wind even more attractive. With the unprecedented surge in European fossil gas prices, new fossil gas generation in Europe may become uneconomic over its lifetime. The London School of Economics and Politic Science has identified that decreasing cost competitiveness with renewables, and new government regulation limiting the use of fossil fuels could cause fossil fuel infrastructure such as pipelines and power plants to become stranded assets (LSE, 2022). This is supported by data from BEIS which shows that whilst the LCOE produced from offshore wind is decreasing, the opposite is true for electricity produced by combined cycle gas turbine technology rising from £85/MWh in 2025 (BEIS, 2020), £139/MWh in 2030 (BEIS, 2023) up to £179/MWh in 2040 (BEIS, 2023).

4.3.7 Table 4.2 and Figure 4.3 present a comparison of the predicted LCOE for projects commissioned in 2030, as presented in Annex A of the Electricity Generation Costs Report 2023. This data shows that offshore is competitive with large scale solar PV and onshore wind, and has a significantly lower LCOE than CCGT, energy from waste generation and pumped hydro storage. All six presented generation sources provided a lower LCOE than more traditional fossil fuel generation such as open cycle gas turbines which has a predicted LCOE of up to £413/MWh.

Table 4.2 - LCOE estimates for projects commissioned in 2030, taken from the Electricity Generation Costs Report 2023 Appendix A

LCOE BREAKDOWN (£/MWH)	**LARGE-SCALE SOLAR (PV)**	**OFFSHORE WIND**	**ONSHORE WIND**	ENERGY FROM WASTE **(EFW CHP)**	**COMBINED CYCLE GAS TURBINE (CCGT H)**	**PUMPED HYDRO STORAGE**
Pre-development costs	3	2	3	4	<1	4
Construction costs	24	20	23	191	7	82
Fixed O&M costs	9	16	9	39	2	19
Variable O&M costs	0	1	6	58	2	46
Fuel & carbon costs	0	0	0	-145	127	0
Other Costs	0	1	0	-33	0	0
Total	**37**	**39**	**41**	**113**	**139**	**151**

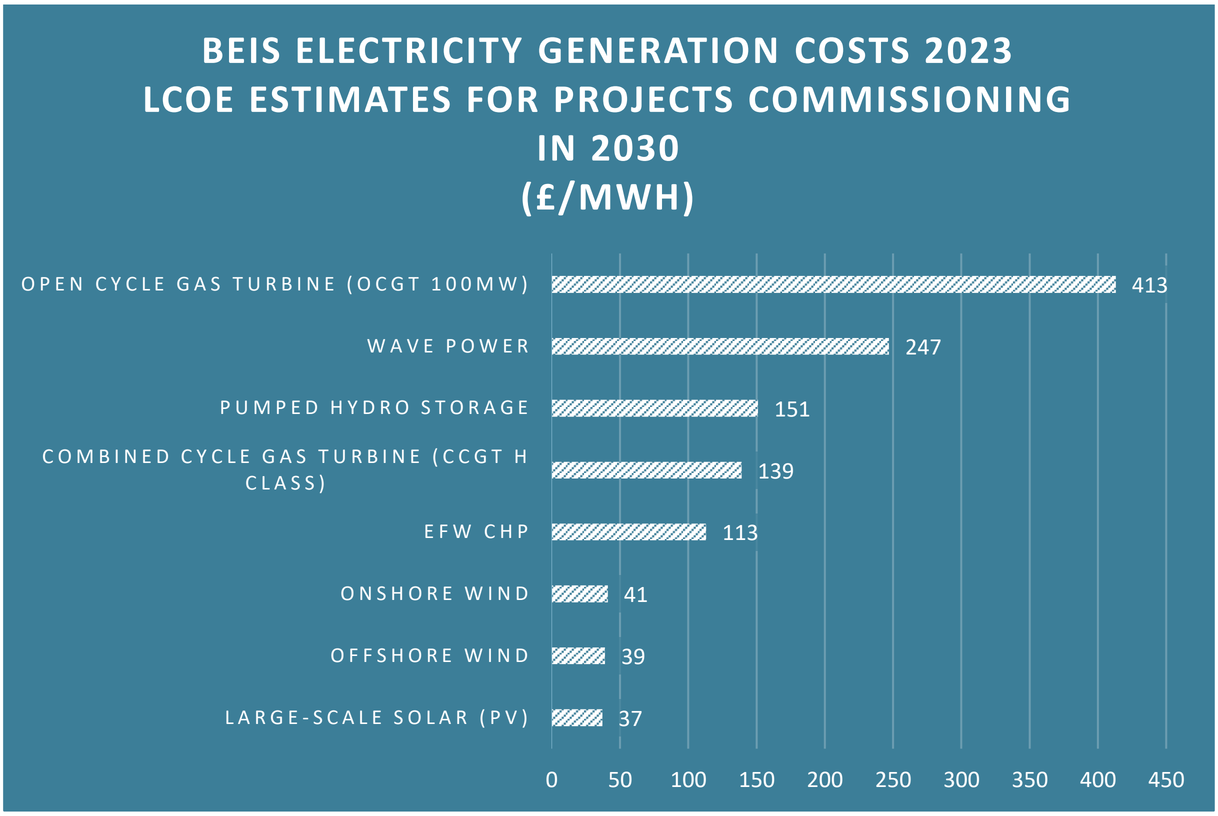

Figure 4.3 - Summary of predicted 2030 LCOE

4.4 Summary of cost-effectiveness

4.4.1 In summary, the main points relating to the economic efficiency of offshore wind are as follows:

- Offshore wind power reduces the market price of electricity by displacing more expensive forms of generation such as the increasing cost of coal and gas. This delivers benefits for electricity consumers;
- Due to technological advances, the costs of offshore wind power have reduced consistently and significantly since 2015;
- Offshore wind power is economically attractive in GB against other forms of renewable generation such as large scale solar and onshore wind; and
- Size remains important, and maximising the generating capacity of projects improves their economic efficiency.

5 Project Benefits

5.1 Introduction

5.1.1 This section sets out the benefits that North Falls would contribute on a national, regional and local scale. It makes the case for the urgent delivery of North Falls, ahead of the HND, to bring forwards these benefits and the renewable generating capacity as soon as possible.

5.1.2 North Falls would make an important contribution to UK policies and targets through the generation of low carbon, renewable electricity. This would have a beneficial effect on both the UK and local communities. The following project benefits are linked to the three national policy aims identified in the ES (Environmental Statement) - decarbonisation, energy security and affordability.

5.2 Decarbonisation

5.2.1 Today's electricity mix is made up primarily of gas, renewables and nuclear, supplemented by a few other sources. Fossil fuels are still heavily relied on, particularly to provide adjustability to match demand. Renewable generation capacity has increased dramatically in the last 10 years and would need to be increased further for the UK to meet its legal commitment of net zero by 2050. As set out in Section 3, the decarbonisation of energy will drive the transition to net zero across all sectors of the economy. What's more, the decarbonisation of other sectors is expected to require at least double of today's electricity generating capacity by 2050.

5.2.2 The need for the decarbonisation of electricity is clear and the Climate Change Committee (CCC) have identified this as a 'core' measure to achieve the UKs 2050 net zero target. The CCC states that decarbonisation must occur not only within the electricity generation sector, but also in other energy consuming sectors. This is because most sectors need to reduce emissions to close to zero by 2050 for the net zero target to be achieved. The CCC anticipates a future of:

> *"Extensive electrification, particularly of transport and heating, supported by a major expansion of renewable and other low-carbon power generation."*

5.2.3 National Grid identify that renewables play a large role in all modelled Future Energy Scenarios (FES) and that rapid uptake is required to enable all scenarios. In the most ambitious scenario of the four, 50GW of offshore wind by 2030 is targeted compared to the current generation of 14.7GW of offshore wind. This is the target set out in the BESS, emphasising the need for increasing offshore wind generation as early as possible.

5.2.4 Delaying wind power installations and reducing the rate of renewable energy coming online is not an option if we are to decarbonise the grid in line with the 2035 power sector decarbonisation target set out in Powering Up Britain and facilitate decarbonisation in all sectors across the UK in order to meet the sixth carbon budget, and ultimately reach net zero by 2050 in line with the Climate Change Act 2008 (as amended).

5.3 Cost of living impacts

5.3.1 Powering Up Britain- the Net Zero Growth Plan (DESNZ, 2023k) states that:

> *"established technologies, such as offshore wind turbines, need to be constructed at pace to meet our ambitions for decarbonising power and delivering wholesale UK electricity prices that rank among the cheapest in Europe by 2035".*

5.3.2 Fossil fuels have become increasingly expensive amid global events such as Russia's invasion of Ukraine. The UK's reliance on fossil fuels has therefore caused an increase in electricity bills given that gas sets the marginal wholesale electricity price. As noted in Powering up Britain:

> *"When Putin invaded Ukraine in February 2022, it exposed mainland Europe's over dependence on Russian gas…Since the end of February 2022, average wholesale gas and electricity prices have been over three times higher than their average over the preceding four years."*

5.3.3 As stated in the Powering Up Britain- Net Zero Growth Plan, to reduce high household energy bills, the UK should move to cleaner and cheaper energy for protection against volatile international energy markets. Therefore, increasing the development of offshore wind farms, such as North Falls, would decrease reliance on fossil fuels, decreasing the wholesale electricity price and household energy bills in the UK. This in turn would help to decrease local and UK deprivation levels and fuel poverty by increasing affordability.

5.3.4 North Falls could contribute to both the reduced cost of energy and the decarbonisation of the national grid. Providing renewable energy at a reduced cost through the national grid, means a net zero future is accessible and affordable, supporting the delivery of a 'just transition'. Ensuring a just transition to net zero is a social justice issue and requires that the benefits of a net zero future be distributed equally and accessibly across society, leaving no one behind.

5.3.5 As presented in Section 4.3, offshore wind benefits from a low LCOE compared to combustion-based generation technologies, and deploying those renewable energy with low LCOE such as offshore and onshore wind and large scale solar is expected to reduce the market price of electricity when compared to constructing new CCGT or EfW generation. Delaying the construction of wind farms could therefore exacerbate and extend the current cost of living crisis by delaying the opportunity to deliver affordable electricity for all.

5.4 Energy security

5.4.1 Energy security describes access to reliable, clean and affordable sources of energy. Electricity generation capacity needs to meet maximum peak demand, as well as ensuring the quality of the supply. The UK currently relies on imported energy to meet demand, with 63% of gas being imported in 2021 (ESO, 2023).

5.4.2 Key issues associated with energy security in the UK are:

- The decline in fossil fuel reserves (in particular North Sea oil and gas);
- The required ongoing closure and decommissioning of existing aging fossil fuel and nuclear electricity generating infrastructure; and
- The need for replacement sources of energy.

5.4.3 Reliance on global markets leaves the UK vulnerable to spikes in world energy market prices, political pressure, potential physical supply disruptions and the knock-on effects of supply challenges in other countries.

5.4.4 Diversifying energy generation through increasing renewable energy generation, including from offshore wind, which North Falls contributes to, allows the UK to generate more domestic energy and thereby reduces the reliance on international supply.

5.4.5 The need for energy security and the vulnerability of the UK energy market to price spikes increases the urgency of wind generation projects. Delaying wind farm construction would extend the UK's energy insecurity, exposing the UK to market fluctuations further into the future.

5.5 Local economy

5.5.1 As recognised in various UK Government strategies including the 'Net Zero Strategy: Build Back Greener', significant economic benefits could be captured from decarbonising trends. Wind farms provide opportunities for social and economic growth. The Offshore Wind Sector Deal (DESNZ, 2019) estimates that through the deployment of 30GW of installed capacity by 2030, offshore wind could support 27,000 jobs in the UK, covering all aspects of a wind farm.

5.5.2 An assessment of potential socio-economic impacts of the Project has been undertaken and is presented within ES Chapter 31 Socio-economics (Document Reference: 3.1.33). It is estimated that North Fall's annual Gross Value Added (GVA) contribution to the UK economy would be around £4.9 to £70 million[1] during construction, of which between £0.7 to £7.3 million would be anticipated to be captured locally (in Essex and Suffolk). During the operational phase, North Fall's contribution to GVA would be around £18.3 to £20 million, of which between £8.9 to £9.3m would be anticipated to be captured locally.

[1] The figures presented in this section are a summary of the outcomes of the socio-economic chapter of the ES, which in order to provide a precautionary but robust impact assessment presents three outcome scenarios – a worst case, a baseline case and an enhanced case scenario. The range of figures given in this section relate to the worst case and enhanced case scenarios.

5.5.3 Employment numbers are estimated to be between 50 and 730 Full Time Employment (FTE) jobs per year for the construction phase (including onshore and offshore infrastructure), of which 7 to 80 jobs are anticipated to be local.

5.5.4 Once operational, there would be employment opportunities associated with the ongoing operation and maintenance (O&M) of both the onshore and offshore infrastructure. It is estimated that between 110 and 200 FTE jobs would be generated, of which at least 90 would be local. Additionally, there would be local employment opportunities associated with the decommissioning activity.

5.5.5 As outlined in the ES Chapter 31 Socio-economic (Document Reference: 3.1.33) there may be opportunities for businesses across several sectors to benefit from the construction and operational and maintenance activities related to North Falls. In the context of offshore wind farm developments, the greatest supply chain opportunities are likely to be in construction and civil engineering, manufacturing, transport, energy generation and professional, scientific and technical services. The Chapter finds that employment in construction, land-based transport and civil engineering is more concentrated in Essex than the national average. In Suffolk, all sectors have a Location Quotient (LQ) above 1, indicating the local economy has supply chain strengths in several key sectors which could potentially benefit from the development.

5.6 Social benefits to local communities

5.6.1 The above employment opportunities not only provide economic benefits, but also social benefits to local communities given that job creation is linked to increases in wellbeing.

5.6.2 Of particular social benefit is the opportunity for local companies, provision of education and support for early careers through junior positions and apprenticeships, as well as the possibility of jobs for ex-fishermen.

5.6.3 North Fall’s location in the East of England is well placed to provide social benefits given the region’s offshore wind heritage and the fact that more than 800 supply chain companies are already operating in the region, ready to leverage new opportunities. North Falls is well placed in the East of England which is home to one of the largest offshore wind development zones with capital expenditure exceeding £15 billion in the next 10 years (Generate, 2022). The East of England holds favourable geography near the Southern North Sea and has offshore energy and marine capabilities which has allowed the area to develop a robust supply chain with more than 800 supply chain companies operating in the region. North Falls could provide opportunities for local supply chain involvement through turbine supply, installation and commissioning, and operation and maintenance. In turn, this would create social benefits to the local communities through the provision of labour and services from North Falls.

5.6.4 The sooner that North Falls is delivered, the sooner the social and economic benefits are felt, enabling the wider region to benefit from upskilling, income generation and supporting a better quality of life.

5.7 Extension to Greater Gabbard Offshore Wind Farm

5.7.1 North Falls is being developed as an extension to GGOW as one of The Crown Estate offshore wind extension projects 2017. GGOW is a 504MW farm which has been operational since 2012, generating enough low-carbon renewable energy each year to power the equivalent of over 400,000 UK homes (SSE, 2021).

5.7.2 GGOW was a pioneering project for the UK offshore wind industry and for many years the 140-turbine site was the largest wind farm under development world-wide.

5.7.3 GGOW was awarded development rights from The Crown Estate in 2003. Planning permission was granted four years later, and in 2008 onshore construction work began around Sizewell in Suffolk. Offshore construction began, and in 2011 the first two turbines produced power to the National Grid. All 140 turbines were commissioned and have been producing power since 2012.

5.7.4 Lowestoft was selected as the Operations and Maintenance base in 2009, creating 100 jobs with 95% of those recruited from the local area. This was in addition to the hundreds of jobs created during construction. GGOW has engaged 10 apprentices since the start of operation and invested £165,000 in training GGOW based staff.

5.7.5 Since opening in 2012, GGOW Ltd has donated more than £60k in support of the local community through the Greater Gabbard Community Fund. By the operation of GGOW funding is made available to community groups to deliver benefit in Lowestoft and the surrounding areas. To be eligible for funding these community groups must enhance the quality of life for local residents, contribute to vibrant, healthy, successful and sustainable communities, or promote community spirit and encourage community activity.

5.7.6 The above local economic benefits discussed in Section 5.5 should also be considered alongside existing operational wind farms in proximity to North Falls. For example, GGOW represents a £1.5 billion investment and has created hundreds of jobs during the construction phase as well as 100 long-term recruits to the operations base, of which 95% were from the local area. Additionally, more than 10 local apprentices have graduated from the wind farm’s apprentice training scheme as wind turbine and balance-of-plant technicians.

5.7.7 GGOW has also provided junior engineering roles and employed ex-fishermen as part of an initiative to find locally skilled people to fill requirements for roles. North Falls would similarly provide contracting opportunities for local companies and career opportunities for local people throughout each phase of its lifecycle.

5.7.8 Extensions to operational wind farms such as proposed for North Falls are an efficient way of developing more offshore generating capacity.

6 Conclusion

6.1.1 Offshore wind is strongly supported by the UK policy, with the NPS EN-3 outlining that nationally significant new low carbon infrastructure and associated network infrastructure is a 'critical national priority'.

6.1.2 New nationally significant offshore wind farms such as North Falls would provide a source of renewable energy with a wide range of benefits, including economic growth, energy security and decarbonisation of a key sector in order to meet the 2050 net zero target.

6.1.3 North Falls will support the urgent need for rapid deployment of offshore wind energy as outlined in UK Government strategy update of Clean Power 2030 Action Plan.

6.1.4 North Falls would make a measurable contribution to the achievement of UK decarbonisation targets, which in turn contributes towards global commitments to mitigate climate change.

6.1.5 By generating renewable electricity in the UK, North Falls would also help to reduce the UK's reliance on imported energy and improve UK energy security. The key benefits of offshore wind energy as a contributor to the renewable energy mix are as follows:

- Diversification and security of home-grown energy generation capacity which make use of an abundant source of energy;
- A technology with potential to make significant and rapid contributions to the national renewable energy targets;
- Economic development and job creation, both within the UK and further afield within the supply chain; and
- Very low lifetime CO_2 emissions per unit of electricity generated.

6.1.6 In addition to meeting national and international targets, North Falls would contribute to the economy by providing jobs during all phases of the project's lifetime.

6.1.7 The target of offshore wind farm generation to be delivered by 2030 has been raised from 30GW in 2019 to 40GW in 2020 to the current 50GW target set in 2022. This is linked to both the expected increase in energy demand in the UK, as well as the evolving UK Net Zero strategy which relies on the decarbonisation of the grid in order to meet the 2050 net zero target, particularly for industries and sectors such as transport and manufacturing which are relying on electrification in order to decarbonise.

6.1.8 There is currently 14.7GW of energy generated from offshore wind farms in the UK (Renewable UK, 2023). There is a large ambition to increase this - reflected by there being approximately an additional 17.7GW of offshore wind capacity which has been consented, with 3.7GW in construction.

6.1.9 Only 14GW of consented offshore wind farms have a grid connection offer on or before 2030, including North Falls (National Grid, 2024). This shows there is a deficit of 17.7GW to meet the 50GW target by 2030 and highlights the need to deliver North Falls. Based on the current rate of deployment, the UK is set to fall short of the 50GW target by 2030 and not meet 50GW until 2048. If the offshore wind farms proposed for connection before 2030 were delayed, this would increase the climate change risk associated with energy security and potentially increase social inequality associated with increasing energy costs as set out in Section 5.3.

6.1.10 The reduction of both construction and operation costs predicted in the next 10 years may encourage developers of other planned wind farms to delay their projects, placing greater strain on the UK's ability to meet the Sixth Carbon Budget. The developers of North Falls however are willing to bring their investment forwards to deliver North Falls prior to 2030 in line with the agreed grid connection date.

6.1.11 The delay of offshore wind farms proposed for connection before 2030 until the delivery of the Holistic Network Design (HND) and NESO's Centralised Strategic Network Plan (CSNP) could jeopardise the UK's ability to meet the Sixth Carbon Budget as required by the 2050 target set out in the Climate Change Act 2008 (as amended). It would require a significant increase in the rate of delivery of offshore wind generation after the HND in order to still meet the 50GW of generation required by 2050. The impact of this potential delay is shown in Figure 6.1 which highlights that the current generation capacity deficit of 17.6GW would need to be delivered within 10 years, compared to the planned delivery scenario shown in Figure 3.3 which closes the same generation capacity deficit over 20 years. This increase in rate of offshore wind roll out will put pressure on the supply chain and skills required as well as reduce the total energy generated by offshore wind leading up to 2050.

6.1.12 For these reasons North Falls should be delivered as soon as possible and before the coordination of the HND and the CSNP.

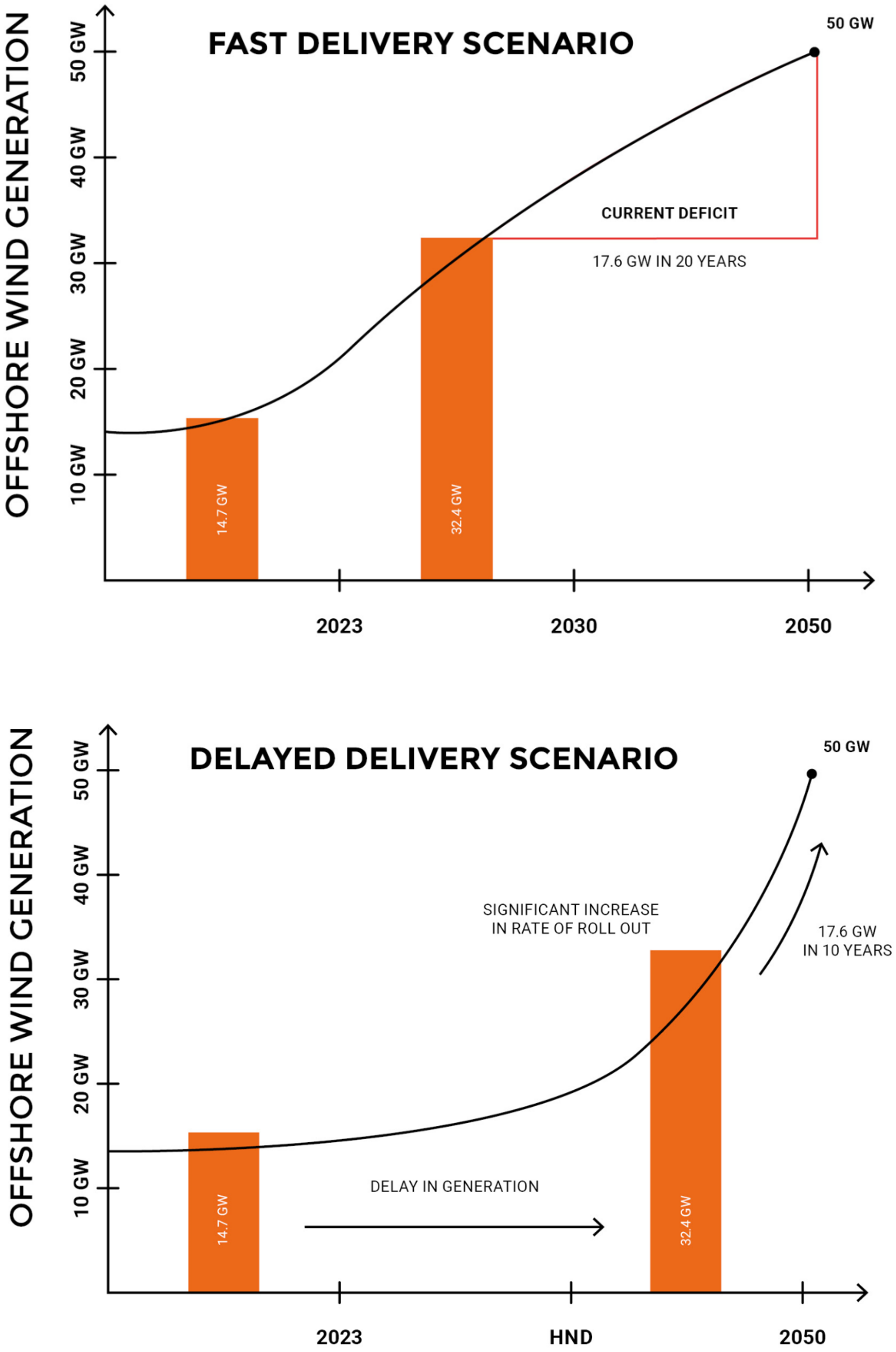

Figure 6.1 - Potential trajectory of UK offshore wind generation highlighting the impact of delayed delivery on the required roll out rate

References List

Department for Business, Energy & Industrial Strategy (BEIS) (2023). Electricity Generation Costs. Available at: https://assets.publishing.service.gov.uk/media/652fa0b56b6fbf000db75881/electricity-generation-costs-2023.pdf?trk=public_post_comment-text [Accessed 14 October 2023]
Department for Business, Energy & Industrial Strategy (BEIS) (2022). Contracts for Difference and Capacity Market Scheme Update 2022 (round 4). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1125343/cfd-cm-scheme-update-2022.pdf [Accessed 14 October 2023]
Department for Business, Energy & Industrial Strategy (BEIS) Electricity Generation Costs (2020). Available at: https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020 [Accessed 14 October 2023]
Department of Energy and Climate Change (DECC) (2011). National Policy Statement for energy infrastructure. Available at: https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure [Accessed 7 July 2023]
Department of Energy Security and Net Zero (DESNZ) (2019). Offshore wind: Sector Deal. Available at: https://www.gov.uk/government/publications/offshore-wind-sector-deal [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2020). The ten point plan for a green industrial revolution. Available at: https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2022). British Energy Security Strategy. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy [Accessed 11 September 2023]
Department of Energy Security and Net Zero (DESNZ) (2023a). Planning for new energy infrastructure: revisions to National Policy Statements. Available at: https://www.gov.uk/government/consultations/planning-for-new-energy-infrastructure-revisions-to-national-policy-statements [Accessed 11 September 2023]
Department of Energy Security and Net Zero (DESNZ) (2023a). Overarching National Policy Statement for Energy (EN-1). Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf [Accessed 22 January 2024]
Department of Energy Security and Net Zero (DESNZ) (2023b). National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3.pdf [Accessed 22 January 2024]

Department of Energy Security and Net Zero (DESNZ) (2023c). National Policy Statement for Electricity Networks Infrastructure (EN-5). Available at: https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf [Accessed 22 January 2024]
Department of Energy Security and Net Zero (DESNZ) (2023d). Powering Up Britain. Available at: https://www.gov.uk/government/publications/powering-up-britain [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2023e). Powering Up Britain- Energy Security Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1148252/powering-up-britain-energy-security-plan.pdf [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2023f). Impact Assessment for the sixth carbon budget. Available at: https://www.legislation.gov.uk/ukia/2021/18/pdfs/ukia_20210018_en.pdf [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2023g). UK Energy in Brief. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1182129/UK_Energy_in_Brief_2023.pdf [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2023h). Contracts for difference allocation round 5 results. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1183230/cfd-ar5-results.pdf [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2023i). Powering Up Britain- The Net Zero Growth Plan. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147457/powering-up-britain-net-zero-growth-plan.pdf [Accessed 14 October 2023]
Department of Energy Security and Net Zero (DESNZ) (2024). National Policy Statements for energy infrastructure. Available at: https://www.gov.uk/government/collections/national-policy-statements-for-energy-infrastructure [Accessed 22/01/2024]
Department of Energy Security and Net Zero (DESNZ) (2024b). Clean Power 2030 Action Plan: A new era of clean electricity. Available at: https://assets.publishing.service.gov.uk/media/677bc80399c93b7286a396d6/clean-power-2030-action-plan-main-report.pdf [Accessed 04 March 2025]
ESO (2022) Future Energy Scenarios Archive. Available at: [redacted] [Accessed 14 October 2023]
ESO (2023). Britain's Electricity Explains 2022 Review. Available at: https://www.nationalgrideso.com/news/britains-electricity-explained-2022-review [Accessed 14 October 2023]

ESO (2023). Future Energy Scenarios. Available at: [redacted] [Accessed 14 October 2023]

Generate (2022). Offshore Wind in the East of England. Available at: [redacted] [Accessed 14 October 2023]

Imperial College London (2021). Net-zero GB electricity: cost-optimal generation and storage mix. Available at: [redacted] [Accessed 14 October 2023]

Institute for Public Policy Research (IPPR) (2024). A Second Wind: maximising the economic opportunity for UK wind manufacturing. Available at: [redacted] [Accessed 4 July 2024]

Intergovernmental Panel on Climate Change (IPPC) (2023). Climate Change 2023 Synthesis Report Summary for Policymakers. Available at: [redacted] [Accessed 14 October 2023]

International Renewable Energy Agency (IRENA) (2021). Renewable Power Generation Costs in 2021. Available at: [redacted] [Accessed 14 October 2023]

London School of Economics (LSE) (2022). What are stranded assets? Available at: [redacted] [Accessed 14 October 2023]

National Grid (2023). Onshore vs offshore wind energy: what's the difference? Available at: [redacted] [Accessed 7 July 2023]

National Grid (2024). Transmission Entry Capacity (TEC) Register. Available at: [redacted] [Accessed 10 July 2024]

National Energy System Operator (2024a). Strategic Spatial Energy Plan Draft Methodology. Available at: [redacted] [Accessed 04 March 2025]

National Energy System Operator (2024b). Centralised Strategic Network Plan (CSNP) High-level methodology principles. Available at: [redacted] [Accessed 04 March 2025]

National Energy System Operator (2024c). The Transitional CSNP2 (tCSNP2) Refresh methodology. Available at: [redacted] [Accessed 04 March 2025]

North Fall Offshore Wind Farm (2023) Preliminary Environmental Information Report. Chapter 33 Climate Change. Available at: [redacted] [Accessed 14 October 2023]
Offshore Wind Champion (2023). The Independent Report of the Offshore Wind Champion. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1148888/independent-report-of-the-offshore-wind-champion.pdf [Accessed 14 October 2023]
Ofgem (2022a). Offshore Transmission Network Review: Decision on asset classification. Available at: https://www.ofgem.gov.uk/sites/default/files/2022-10/OTNR_asset_classification_decision_191022_Final%20%281%29.pdf [Accessed 14 October 2023]
Ofgem (2022b). Decision on the initial findings of our Electricity Transmission Network Planning Review. Available at: https://www.ofgem.gov.uk/sites/default/files/2022-11/Decision%20on%20the%20initial%20findings%20of%20our%20Electricity%20Transmission%20Network%20Planning%20Review%20%28002%29.pdf [Accessed 14 October 2023]
Renewable UK (2023). Wind Energy. [Online] Available at [redacted] [Accessed 11 July 2024]
SSE Renewables (2021). Greater Gabbard Offshore Windfarm. Available at: [redacted]- [redacted]/ [Accessed 11 September 2023]
The Crown Estate (2017). Offshore wind extension projects 2017. Available at: [redacted] [Accessed 7 July 2023]
The Planning Act 2008. Available at: https://www.legislation.gov.uk/ukpga/2008/29/contents [Accessed 7 July 2023]

HARNESSING THE POWER OF NORTH SEA WIND

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