MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 1, Annex 3.3: Sulphur Hexafluoride Report

September 2024
Rev: F01

MOR001-FLO-CON-ENV-RPT-0057
MRCNS-J3303-RPS-10025

PINS Reference: EN020028
APFP Regulations: 5(2)(a)
Document reference: F1.3.3

Document status					
Version	Purpose of document	Approved by	Date	Approved by	Date
F01	For issue	AS	September 2024	IM	September 2024

Prepared by:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd

Prepared for:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd

Contents

Glossary

Term	Meaning
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Morecambe Offshore Windfarm: Generation Assets	The offshore generation assets and associated activities for the Morecambe Offshore Windfarm.
Morecambe Offshore Windfarm: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morecambe Offshore Windfarm to the National Grid.
Morecambe OWL	Morecambe Offshore Windfarm Limited is a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra)and Flotation Energy Ltd.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds.
Morgan Offshore Wind Project: Generation Assets	The offshore generation assets and associated activities for the Morgan Offshore Wind Project.
Morgan Offshore Wind Project: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morgan Offshore Wind Project to the National Grid.
Morgan OWL	Morgan Offshore Wind Limited is a joint venture between bp Alternative Energy investments Ltd. and Energie Baden-Württemberg AG (EnBW).
National Policy Statements (NPS)	The current National Policy Statements published by the Department for Energy Security & Net Zero in 2023.
Offshore export cables	The cables which would bring electricity from the Generation Assets to the landfall.
Offshore export cable corridor	The corridor within which the offshore export cables will be located.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of Mean High Water Springs. Comprising the offshore export cables from Mean High Water Springs to the transition joint bays, onshore export cables, onshore substations and 400 kV grid connection cables , and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation/biodiversity benefit are excluded from this area.
Onshore substations	The onshore substations will include a substation for the Morgan Offshore Wind Project: Transmission Assets and a substation for the Morecambe Offshore Windfarm: Transmission Assets. These will each comprise a compound containing the electrical components for transforming the power supplied from the generation assets to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.

Term	Meaning
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above)

Acronyms

Acronym	Meaning
AIS	Air Insulated Switchgear
CO_2	Carbon Dioxide
EnBW	Energie Baden-Württemberg AG
ESQCR	The Electricity Safety, Quality and Continuity Regulations 2002
EU	European Union
F-gas	Fluorinated gas
GIS	Gas Insulated Switchgear
NPS	National Policy Statement
OEM	Original Equipment Manufacturer
PEIR	Preliminary Environmental Information Report
SF_6	Sulphur Hexafluoride
UK	United Kingdom

1 Sulphur Hexafluoride report

1.1 Introduction

1.1.1 Overview

1.1.1.1 This Sulphur hexafluoride report has been prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as 'the Transmission Assets').

1.1.1.2 Morgan Offshore Wind Limited (Morgan OWL), a joint venture between bp Alternative Energy Investments Ltd (bp) and Energie Baden-Württemberg AG (EnBW), is developing the Morgan Offshore Wind Project. The Morgan Offshore Wind Project is a proposed wind farm in the east Irish Sea.

1.1.1.3 Morecambe Offshore Windfarm Ltd (Morecambe OWL), a joint venture between Cobra Instalaciones y Servicios, S.A. (Cobra) and Flotation Energy Ltd, is developing the Morecambe Offshore Windfarm, also located in the east Irish Sea.

1.1.1.4 Morgan OWL and Morecambe OWL (the Applicants), being in agreement with the output from the Holistic Network Design Review (HNDR), are jointly seeking a single consent for transmission assets comprising shared offshore export cable corridors to landfall and shared onshore export cable corridors to onshore substation(s), and onward connection to the National Grid at Penwortham, Lancashire.

1.1.1.5 This document has been produced in accordance with the National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5) and outlines the Applicant's approach to managing the use of Sulphur Hexafluoride (SF_6) across the Transmission Assets.

1.1.2 Sulphur Hexafluoride

1.1.2.1 SF_6 is a synthetic, odourless gas that is used in the electricity industry to keep networks running safety and reliably. It is highly stable, non-toxic, non-flammable and electronegative, which means it will not form other compounds that will alter its state or effectiveness.

1.1.2.2 SF_6 is one of the most potent greenhouse gases. Its high atmospheric stability and ability to trap infrared radiation means it is far more potent at warming the earth's atmosphere than Carbon dioxide (CO_2) over longer periods of time.

1.1.2.3 SF_6 is primarily used in electricity transmission and distribution. Medium and high-voltage electrical equipment contains SF_6 to insulate the live electrical parts and to switch the flow of electrical current on and off. The same equipment is also used in the transmission and distribution of renewable energy.

1.1.2.4 Electrical equipment is designed to avoid the release of this gas into the atmosphere; however, leaks can occur over its lifecycle as a result of faults. SF_6 can also be released during the equipment's manufacture, installation, maintenance or decommissioning.

1.1.2.5 The energy industry is striving to reduce the use of SF_6, for example National Grid has an ambition to reduce SF_6 emissions by 50% by 2030 and remove all SF_6 from electricity assets by 2050[1]. Solutions to replace SF_6 with greenhouse gas free alternatives are currently being developed by electrical transmission equipment manufacturers, however, currently there are limited options commercially available for the higher voltage levels required for the Transmission Assets.

1.1.3 Policy and legislation

1.1.3.1 National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5) requires the Applicants to:

"…At the design phase of the process consider carefully whether the proposed development could be reconceived to avoid the use of SF_6-reliant assets (paragraph 2.9.61).

Where the development cannot be so conceived, the applicant must provide evidence of their reasoning on this point. Such evidence will include, for instance an explanation of the alternatives considered and a case why these alternatives are technically infeasible or require bespoke components that are grossly disproportionate in terms of cost (paragraph 2.9.62).

In particular, an accounting of the cost differential between the SF_6-reliant assets and the appropriate SF_6-free alternative should be provided (paragraph 2.9.63).

Where applicants, having followed the above procedure, do propose to put new SF_6- reliant assets onto the electricity system, they should design a plan for the monitoring and control of fugitive SF_6 emissions consistent with the Fluorinated gas (F-gas) Regulations and its successors." (paragraph 2.9.64).

1.2 Approach to SF_6

1.2.1 What is SF_6 used for

1.2.1.1 SF_6 is typically used in the switchgear in an offshore wind farm and its transmission assets which protects electrical equipment against overloads and short-circuits and makes it possible to supply electricity reliability and without interruption. Switchgear forms part of onshore substations.

1.2.2 Use of SF_6 in the Transmission Assets

Morgan Onshore Substation

1.2.2.1 During the initial design phase of the Transmission Assets, both Air Insulated Switchgear (AIS), which is SF_6-free, and Gas Insulated Switchgear (GIS), which currently SF_6-reliant, were considered for both onshore substations.

[1] National Grid PLC (2020) National Grid Responsible Business Charter.

1.2.2.2 Since the publication of the Preliminary Environmental Information Report (PEIR) and further route refinement and site selection, Morgan OWL has made a commitment to gas insulated switchgear (GIS) technology only to reduce the overall permanent infrastructure area.

1.2.2.3 The current assumed worst-case scenario is that the GIS technology to be used for onshore substations will be SF_6-reliant. This is because there are a number of challenges associated with using SF_6-free switchgear on the Transmission Assets:

- Limited commercial availability of SF_6-free assets available for the higher voltage levels the Transmission Asset swill operate at.
- The readiness of technology, with solutions unlikely to be available at the scale required for the Transmission Assets in time to be deployed during construction.
- Due to uncertainty around costs of SF_6-free equipment, as a novel technology, there is the possibility that the increased cost could be prohibitive to the successful delivery of the Transmission Assets.

1.2.2.4 Despite the limitations, the Applicants are actively consulting with Original Equipment Manufacturers (OEMs) and designers of all switchgear to explore the use of SF_6-free switchgear. Where opportunities arise, the Applicants will complete an evaluation during the detailed design phase, post-consent, to assess if these are suitable for use on the Transmission Assets.

Morecambe Onshore Substation

1.2.2.5 Gas Insulated Switchgear (GIS) and Air Insulated Switchgear (AIS) substation design options remain under consideration at this stage by Morecambe OWL (further detail can be found in Chapter 3 Project Description of the Environmental Statement (document reference F.1.4)).

1.2.2.6 AIS technology is SF_6 free and the worst case for GIS is as described above for Morgan OWL

1.2.3 Cost differential

1.2.3.1 SF_6-free equipment is an emerging market for OEMs and as a novel technology SF_6-free equipment is currently more expensive than traditional SF_6-reliant equipment. However, the market continues to develop, and therefore, until the project-specific offers from tenders are available, post-consent, it is not possible to foresee what the cost differential will be.

1.3 SF_6 control

1.3.1 Overview

A.1.1.1 Assuming a worst-case scenario where the Transmission Assets installs SF_6-reliant assets, the control of SF_6 gas will be in line with the following regulations and standards:

- EU Regulation No.517/2014 (Retained) and the UK Fluorinated Greenhouse Gases Regulations 2015 working with fluorinated gases.
- BS EN 62271-4:2013 High-voltage switchgear and control gear. Handling procedures of sulphur hexafluoride (SF_6) gas and its mixtures.
- Energy Networks Association 2013 ER G69 Guidance on working with sulphur hexafluoride.
- BS EN 60376:2018 Specification of technical grade sulphur hexafluoride (SF_6) for use in electrical equipment.
- BS EN IC 60480:2019 Guidelines for the checking and treatment of sulphur hexafluoride (SF6) taken from electrical equipment and specification for is re-use.
- The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR).
- Health and Safety Executive guidance document HSG230 – keeping electrical switchgear safe.

1.3.2 Equipment operation and maintenance

1.3.2.1 As is standard for the operation of GIS, to prevent leaks (and hence minimise risk of damaging the environment), all equipment will be maintained in line with OEM's instructions. Only personnel trained and competent under EU Regulation No.517/2014 (Retained) and the UK Fluorinated Greenhouse Gases Regulations 2015, will be allowed to operate and maintain equipment containing SF_6.

1.3.2.2 In the rare event of a leak occurring, automatic monitoring systems will be used to identify the leak. Any leaks will be repaired as soon as reasonably practicable after discovery. In line with the above regulations and guidance, appropriate safe systems of work will be used to ensure employees are protected from the hazards associated with this type of work.

1.3.2.3 To avoid a risk to public health, only trained and competent persons will be permitted to access areas where equipment containing SF_6 is located. These areas will be secured in such a way as to prevent unauthorised access in compliance with the ESQCR Regulations 2002.

1.3.3 Records and auditing

1.3.3.1 Locations that have equipment containing SF_6 will hold a register, recording the equipment containing and the quantity of SF_6 used. The location SF_6 register will also keep records of any leaks and repairs including the amount of SF_6 used during the operational life. Any repairs or leaks will be managed to ensure equipment leakage rates remain under the maximum rates per year, in accordance with relevant regulations as outlined above. Leakage rates per year will be linked to the gas volume contained in equipment as stated by the OEM.

1.3.4 Disposal and end of life plan

1.3.4.1 During the decommissioning phase of the Transmission Assets, any SF_6 will be removed in accordance with the legislation and best practice measure in place at the time. This is likely to include re-using SF_6 where possible and where it is not re-usable it will be recovered and either recycled or destroyed by licensed companies. During decommissioning, gas will be recovered from equipment by trained and competent personnel.