Morecambe Offshore Windfarm: Generation Assets

Examination Documents

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Sulphur Hexafluoride Report

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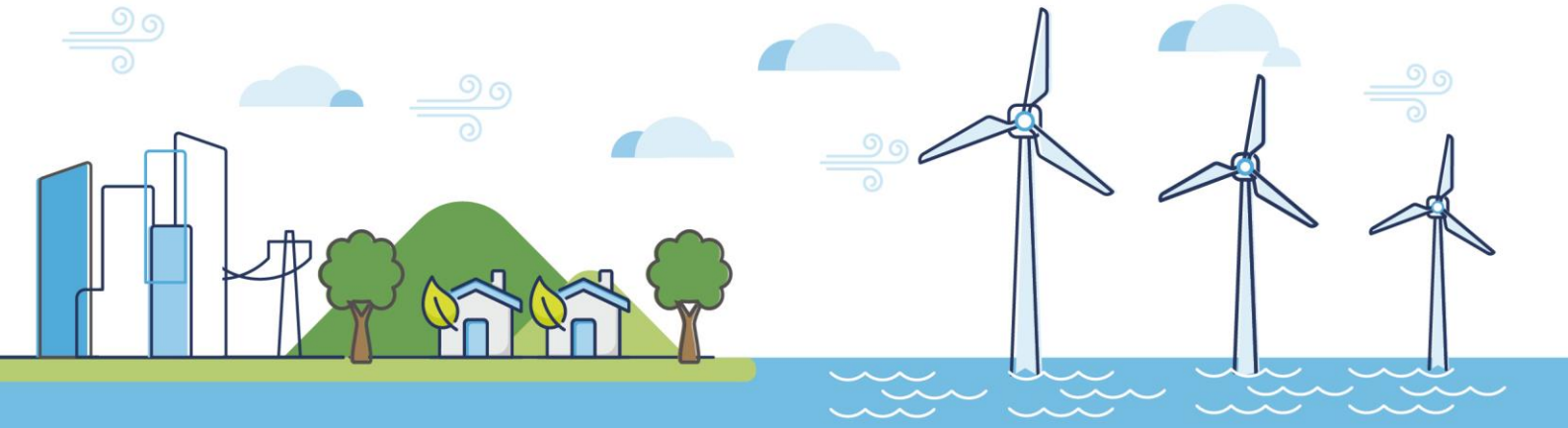

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Contents

Glossary of Acronyms

AIS	Air Insulated Switchgear
CO_2	Carbon dioxide
GIS	Gas Insulated Switchgear
OEM	Original Equipment Manufacturers
OFTO	Offshore Transmission Owner
OSP	Offshore Substation Platform
SF_6	Sulphur Hexafluoride
WTG	Wind Turbine Generator

Glossary of Terminology

Applicant	Morecambe Offshore Windfarm Ltd
Agreement for Lease (AfL)	Agreements under which seabed rights are awarded following the completion of The Crown Estate tender process.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) for certain topics. The EPP provides a mechanism to agree the information required to be submitted to the Planning Inspectorate as part of the Development Consent Order application. This function of the EPP helps Applicants to provide sufficient information in their application, so that the Examining Authority can recommend to the Secretary of State whether or not to accept the application for examination and whether an appropriate assessment is required.
Generation Assets (the Project)	Generation assets associated with the Morecambe Offshore Windfarm. This is infrastructure in connection with electricity production, namely the fixed foundation wind turbine generators (WTGs), inter-array cables, offshore substation platform(s) (OSP(s)) and possible platform link cables to connect OSP(s).
Inter-array cables	Cables which link the WTGs to each other and the OSP(s).
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The transmission assets for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400kV cables and associated grid connection infrastructure such as circuit breaker infrastructure. Also referred to in this chapter as the Transmission Assets, for ease of reading.
Offshore substation platform(s)	A fixed structure located within the windfarm site, containing electrical equipment to aggregate the power from the WTGs and convert it into a more suitable form for export to shore.
Platform link cable	An electrical cable which links one or more OSP(s).
Windfarm site	The area within which the WTGs, inter-array cables, OSP(s) and platform link cables will be present.

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1 Introduction

1.1 Overview

1. The Morecambe Offshore Windfarm Generation Assets project (hereafter referred to as “the Project”) is located approximately 30km offshore from the Lancashire coast in the Eastern Irish Sea. The offshore infrastructure will comprise up to 35 fixed bottom wind turbine generators (WTGs), inter-array cabling, up to two offshore substation platform(s) (OSP(s)) and platform link cables between the OSP(s).

2. This document has been produced in accordance with the National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5).The Applicant considers that EN-5 may be considered as ‘relevant national policy’ for the purposes of 104(2)(a) of the PA2008. If, however, it was not considered to be “development of the description to which the application relates”, then the Applicant considers it would be an ‘other matter’ for the purposes of section 104(2)(d) of the PA2008. In either case, whether EN-5 applies by virtue of 104(2)(a) or 104(2)(d), the Applicant considers that the Secretary of State must have regard to EN-5.

3. This document outlines the Applicant’s approach to managing the use of Sulphur Hexafluoride (SF_6) as part of the Project.

1.2 Sulphur Hexafluoride (SF_6)

4. 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.

5. 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.

6. 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.

7. 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.

8. 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. 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 Project.

2 Policy and legislation

9. EN-5 requires the Applicant 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)"

3 Approach to SF_6

3.1 Use of SF_6

10. Within an offshore windfarm, SF_6 is typically used in the switchgear which protects electrical equipment against overloads and short-circuits to ensure realiability of electricity supply. Switchgear will form part of the WTGs and the OSP(s) installed as part of the Project.

3.2 Use of SF_6 on the Project

11. The current assumed worst-case scenario is that WTGs and the OSP(s) installed as part of the Project will use SF_6-reliant Gas Insulated Switchgear (GIS) technology. It is considered not commercially favourable or as practical to use Air Insulated Switchgear (AIS) offshore due to the limited electrical clearances.

12. Despite the limitations, the Applicant is actively consulting with the Original Equipment Manufacturers (OEMs) and designers of all project switchgear (in WTGs and the OSP(s)) to explore the use of SF_6-free switchgear. Where opportunities arise the Applicant will complete an evaluation during the detailed design phase, post-consent, to assess if these are suitable for use on the Project.

3.3 Cost differential

13. SF_6-free equipment is is an emerging technology and market for OEMs and is therefore currently more expensive than traditional SF_6-reliant equipment. However, the market is growing, 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.

4 SF_6 control

4.1 Overview

14. Assuming a worst-case scenario where the Project 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 (SF_6) 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.

4.2 Equipment operation and maintenance

15. As is standard for the operation of GIS technology to prevent leaks (and hence minimise risk of impact to 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.

16. In the highly unlikely 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 detection. In line with the above regulations and guidance, appropriate safe systems of work will be implemented to ensure workers are protected from the hazards associated with this type of work. Emissions monitoring and control measures will be compliant with the F-gas Regulation and/or its successors.

17. 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. Areas will be secured to prevent unauthorised access in compliance with Project and Offshore Transmission Owner (OFTO) High Voltage Safety Rules and any relevant legislation.

4.3 Records and auditing

18. Locations that have equipment containing SF_6 will hold a register, recording the equipment containing 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.

4.4 Disposal and end of life plan

19. During the decommissioning phase of the Project 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. A Decommissioning Programme will be developed and implemented during the decommissioning phase.