Partners in UK offshore wind

MONA OFFSHORE WIND PROJECT

Environmental Statement

Volume 5, Annex 3.2: Sulphur Hexafluoride Report

Document Number: MOCNS-J3303-RPS-10066

Document Reference: F5.3.2

APFP Regulations: 5(2)(a)

February 2024

F01

Image of an offshore wind farm

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
F01	Application	Mona Offshore Wind Ltd	Mona Offshore Wind Ltd	Mona Offshore Wind Ltd	Feb 2024

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Contents

Glossary

Term	Meaning
Applicant	Mona Offshore Wind Limited.
Bodelwyddan National Grid Substation	This is the Point of Interconnection selected by the National Grid for the Mona Offshore Wind Project.
Mona Offshore Wind Project	The Mona Offshore Wind Project is comprised of both the generation assets and offshore and onshore transmission assets and associated activities.
National Policy Statement (NPS)	The current National Policy Statements published by the Department for Energy Security & Net Zero in 2023.
Offshore Substation Platform (OSP)	The offshore substation platforms located within the Mona Array Area will transform the electricity generated by the wind turbines to a higher voltage allowing the power to be efficiently transmitted to shore.
Point of Interconnection	The point of connection at which a project is connected to the grid. For the Mona Offshore Wind Project, this is the Bodelwyddan National Grid Substation.
Wind turbines	The wind turbine generators, including the tower, nacelle and rotor.

Acronyms

Acronym	Description
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
SF_6	Sulphur Hexafluoride
UK	United Kingdom

1 SULPHUR HEXAFLUORIDE REPORT

1.1 Introduction

1.1.1 Overview

1.1.1.1 Mona Offshore Wind Limited (the Applicant), a joint venture of bp Alternative Energy Investments Ltd (hereafter referred to as bp) and Baden-Württemberg AG (hereafter referred to as EnBW) is developing the Mona Offshore Wind Project.

1.1.1.2 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 Mona Offshore Wind Project.

1.1.2 Sulphur Hexafluoride (SF_6)

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 Mona Offshore Wind Project.

1.1.3 Policy and legislation

1.1.3.1 NPS for Electricity Networks Infrastructure (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

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

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 Mona Offshore Wind Project approach to SF_6

1.2.1 What is SF_6 used for

1.2.1.1 Across an offshore wind farm, SF_6 is typically used in the switchgear which protects electrical equipment against overloads and short-circuits and makes it possible to supply electricity reliability and without interruption. Switchgear will form part of the wind turbines, offshore substation platforms and the onshore substation installed as part of the Mona Offshore Wind Project.

1.2.2 Use of SF_6 on Mona Offshore Wind Project

1.2.2.1 During the initial design phase of the Mona Offshore Wind Project both Air Insulated Switchgear (AIS), which is SF_6-free, and Gas Insulated Switchgear (GIS), which currently SF_6-reliant, were considered for the onshore substation. However, during the iterative site selection process AIS was discounted (further detail can be found in Chapter 4 Site selection and consideration of alternatives of the Environmental Statement (application ref F.1.4)).

1.2.2.2 The wind turbines and offshore substation platforms installed as part of the Mona Offshore Wind Project will use GIS technology, as it is not possible to use AIS offshore due to the limited electrical clearances (i.e. AIS takes up considerably more space than GIS and there is not adequate space to install AIS equipment within the offshore structures).

1.2.2.3 The current assumed worst-case scenario is that the GIS technology to be used as part of the wind turbines, offshore substation platforms and onshore substation will be SF_6-reliant. This is because there are a number of challenges associated with using SF_6-free switchgear on the Mona Offshore Wind Project:

- Limited commercial availability of SF_6-free assets available for the higher voltage levels the Mona Offshore Wind Project will operate at.
- The readiness of technology, with solutions unlikely to be available at the scale required for the Mona Offshore Wind Project 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 Mona Offshore Wind Project.

1.2.2.4 Despite the limitations, the Applicant is actively consulting with Original Equipment Manufacturers (OEMs) and designers of all project switchgear (in wind turbines, offshore substation platforms and the onshore substation) 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 Mona Offshore Wind Project.

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

1.3.1.1 Assuming a worst-case scenario where the Mona Offshore Wind 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 (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 Mona Offshore Wind 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.