



Awel y Môr Offshore Wind Farm

Note on Substation Building Heights

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1 Introduction and Summary

- 1 This note has been produced in response to the Examining Authority's (ExA's) action from Issue Specific Hearing 3 (ISH3) for the Applicant to consider providing a maximum building height if the AyM onshore substation (OnSS) uses Air Insulated Switchgear (AIS):

"Requirement 7 of the dDCO

To review Requirement 7(2)(a) in respect of whether it is necessary to include maximum building heights for the proposed AIS option as has been done for the GIS option."

- 2 The maximum design scenario (MDS) used within the environmental impact assessment (EIA) for height sensitive topics (LVIA and Archaeology and Cultural Heritage) is based upon the maximum height of the tallest building associated with the substation, which is the main Gas Insulated Switchgear (GIS) substation building (15 m). This parameter is included in the draft Development Consent Order (dDCO) to ensure the MDS is not exceeded by the buildings constructed as part the onshore substation.
- 3 For an AIS substation design, the tallest buildings are typically the reactive compensation (or Static Var Compensator (SVC)) buildings, which are needed to provide reactive compensation. For recent offshore windfarm projects, manufacturers are standardising with taller reactive compensation equipment within these buildings. The other substation buildings (the control building and workshops) will be lower than the reactive compensation buildings.
- 4 In order to provide greater clarity and certainty to interested parties regarding the maximum heights of all OnSS buildings the Applicant has added a maximum above Ordnance Datum (AoD) which equates to a building height of 7.5 m to Requirement 7(2) of the dDCO for the reactive compensation buildings within both AIS and GIS substations options and a lower maximum for all other buildings (excluding enclosures) which equates to 6.5 m.

- 5 Securing a maximum height of 7.5 m for the reactive compensation buildings (and 6.5 m for all other buildings) does not affect the maximum parameters used for the LVIA and heritage assessment and so the findings of these assessments are unaffected. This is explained in more detail in Section 3.

2 DCO Drafting

6 The Applicant has added the following wording (in red) to Requirement 7(2) of the dDCO:

(a) *In relation to Work No. 31A—*

(b) *if air insulated switchgear is installed—*

(i) the highest part of any reactive compensation building must not exceed 41.675m above Ordnance Datum and the highest part of any other building must not exceed 40.675m above Ordnance Datum;

(ii) the highest part of any external electrical equipment or enclosure, excluding lightning rods, must not exceed 46.675m above Ordnance Datum;

(iii) the total area of the fenced compound (excluding its accesses) must not exceed 50,000m²;

(iv) the total number of lightning rods within the fenced compound area must not exceed 12 and the height of any lightning rod must not exceed 52.2m above Ordnance Datum;

(c) *if gas insulated switchgear is installed—*

(i) the highest part of any reactive compensation building must not exceed 42.475m above Ordnance Datum and subject to subparagraph (ii) the highest part of any other building must not exceed 41.475m above Ordnance Datum;

(ii) the highest part of the main GIS building must not exceed 49.975m above Ordnance Datum;

(iii) the highest part of any external electrical equipment or enclosure, excluding lightning rods, must not exceed 47.475m above Ordnance Datum;

(iv) the total area of the fenced compound (excluding its accesses) must not exceed 30,000m²; and

(v) the total number of lightning rods within the fenced compound area must not exceed 12 and the height of any lightning rod must not exceed 53m above Ordnance Datum.

In this paragraph 'reactive compensation building' means the building housing electrical compensation equipment for Work No 31A.

- 7 The word 'enclosure' has been added to 2(b)(iii) as it was unintentionally omitted from the dDCO.

3 Substation Building Heights

- 8 If the AyM OnSS is constructed using GIS, the main GIS building height will be a maximum of 15 m as set out in Table 14 of Environmental Statement (ES) Volume 3, Chapter 1: Onshore Project Description (APP-062). This maximum height is set in draft Development Consent Order (dDCO) Requirement 7 which states that the highest part of any building must not exceed 49.975 m Above Ordnance Datum (AOD). This is calculated as 15 m maximum building height plus an additional platform height of 0.8 m applied to the finished ground level (34.175 m AOD) as set out in paragraphs 141 and 142 of Environmental Statement (ES) Volume 3, Chapter 2: Landscape and Visual Impact Assessment (LVIA) (AS-029). This parameter was included in the dDCO to ensure the MDS is not exceeded by the OnSS buildings constructed.
- 9 The MDS used within ES Volume 3, Chapter 2: LVIA (AS-029) and Chapter 8: Onshore Archaeology and Cultural Heritage (APP-069) undertaken as part of the EIA is based upon the maximum height of the main GIS substation building, as a result the LVIA and heritage setting assessment have assumed this as the 'worst-case' OnSS building height. The only other assessment where substation building height is a relevant consideration is the assessment for noise where an AIS design is assumed as a worst case (AIS locates noise generating switchgear outside a building envelope with lower building heights to afford less noise screening) as set out in Table 48 of ES Volume 3, Chapter 10: Noise and Vibration (APP-071). For the AIS substation option, no maximum building heights were included in the Application documents or dDCO as the detailed design of the substation has not been undertaken and flexibility is required over the final building heights. The ES and Design Principles Document (REP5-020) included the following indicative building heights for both the GIS and AIS options. These are all lower than the GIS Building used in the LVIA/heritage MDS maximum parameters used within the EIA.
- ▲ 2 x Static Var Compensator buildings: 55 m x 14 m x 5 m
 - ▲ 1 x Control building: 50 m x 20 m x 5 m
 - ▲ 2 x Storage/ backup power units: 15 m x 10 m x 4 m (possibly in the form of containers)
 - ▲ 2 x Workshops: 15 m x 10 m x 4 m (possibly in the form of containers)

- 10 The proposed dDCO wording would limit the maximum height of the tallest AIS buildings (the reactive compensator/SVC) to 7.5 m, which is higher than the indicative values provided within the ES and Design Principles document (REP5-020). A reactive compensator/SVC consists of stacks of compensation equipment (power electronics modules), which are housed in a building for protection from the external environment. Inside the building, the separation distance between the equipment and the building (walls and roof) is defined by the voltage level of the equipment. As a result the building height is dependent upon the equipment height and the voltage of that equipment, with different manufacturers' equipment having different heights and overall dimensions.
- 11 In several older offshore wind farm OnSSs (including Galloper and East Anglia 1) the reactive compensator/SVC equipment has been arranged in shorter stacks across a larger area, creating a shorter building with a larger footprint. However more recently (for example on RWE's Triton Knoll project), manufacturers are standardising with taller stacks over a reduced area. The reactive compensator/SVC installed at Triton Knoll is 7.4 m high. This is reflected in other recent DCO applications such as East Anglia 2, East Anglia 1 North and Sheringham and Dudgeon Extension where the reactive compensation building heights are between 12 m and 14 m.



Figure 1: Example SVC solutions - Triton Knoll reactive compensator/SVC with the temporary crane beam in place during construction.

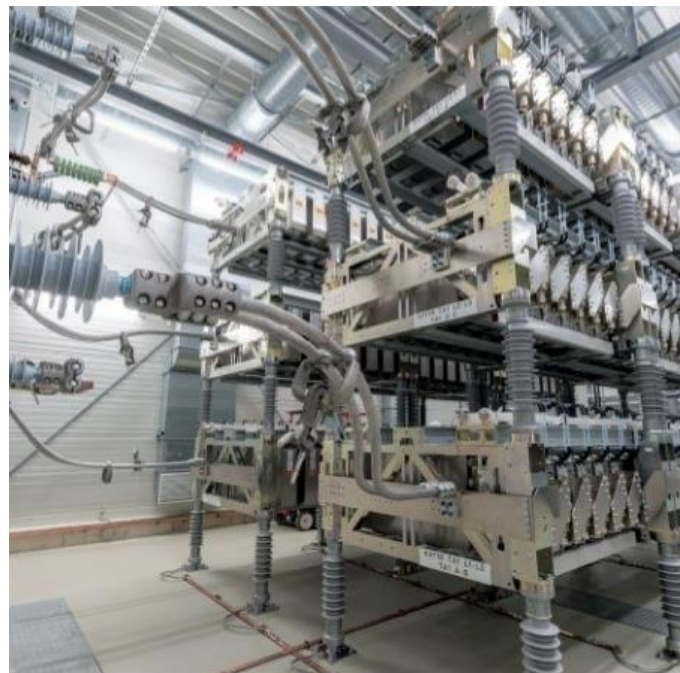


Figure 2: Another typical reactive compensator/SVC arrangement currently available from suppliers.

12 Mindful of this factor, the Applicant considers it necessary for the maximum height of the reactive compensator buildings/SVC as controlled within the dDCO to be greater than the indicative value presented in the application. Given the above experience on recent projects, and considering the project in question, the Applicant is confident that a maximum height of 7.5 m is a realistic maximum, and as identified in Section 1 of this note, does not impact the worst case scenarios assessed within the ES for any topic.



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