Climate Change and Life Cycle Analysis

1. Carbon footprint analysis

The central purpose of renewable energy projects is to reduce greenhouse gas emissions. This can only be achieved by connecting generation to demand in such a way that renewable energy replaces fossil fuel generation. The available onward grid transmission capacity between the grid connection point and the main centre of demand in London and the south east is therefore a key consideration.

A carbon footprint life cycle analysis provides a quantitative assessment of the extent to which this purpose is achieved and international standards, such as ISO 14040, provide a recognised method of assessment. The introduction to the standard makes clear that a full life cycle analysis considers the entire range of environmental impacts including human health and broad ecological consequences.

In the case of offshore wind projects, however, a more limited analysis is typically performed which aims to quantify only the net effect on CO_2 emissions over the life cycle of the installation. Whilst this is only a limited assessment, it provides a working method for the comparison of alternatives.

It would appear that climate change legislation now requires such a comparison to be made so that the most favourable alternative can be identified, and then selected. This analysis should therefore be carried out for the Proposed Development, taking into account the grid capacity available to the project at Norwich Main or at Walpole, and showing separately the onshore and offshore outcomes.

Assessment of the benefits of each option can then be compared with their relative onshore impacts.

2. Methodology

During the Norfolk Boreas examination the ExA requested a life cycle analysis under Rule 17 as follows: “In support of the ‘zero net carbon’ Climate Change Act 2008 (2050 Target Amended) Order 2019 made on 26 June 2019, the Applicant to provide a carbon footprint for the Proposed Development, separately providing carbon assessments for onshore and offshore facilities.”

This analysis was submitted to the examination in August 2020 and a similar analysis was issued for the Vanguard re-determination in December 2021 (EN010087-002432 and EN010079-004452).

These two analyses seem to have assumed that sufficient onward grid transmission capacity would always be available from Necton, through Norwich Main, towards Bramford, to accommodate the combined output of the two projects (3600 MW), with no allowance for curtailment or constraint.

The gross electrical output of each wind farm was simply multiplied by the number of hours in the year, an average annual load factor of 58.4%, and an availability factor of 90% “based on the ability of the wind farm, as a whole to generate power, given appropriate weather and grid conditions”.

The average annual load factor of 58.4% is relatively high when compared with historical data. The availability factor of 90% is also high, and perhaps represents only an allowance for maintenance, transmission losses, and the progressive degradation of turbine efficiency over the project lifetime.

Where a comparison is made between two alternative grid connection schemes, an additional factor should be introduced specifically to allow for the probability of curtailment and constraint.

There does not appear to have been any carbon footprint analysis carried out for Hornsea Three.