

## 5. Climate Change

### Non-Technical Summary

- 5.1. The predicted future climatic baseline conditions are highly unlikely to affect the operation of the Proposed Development.
- 5.2. The Proposed Development will have a positive effect on carbon savings, and a positive effect when considered cumulatively with UK-wide renewable energy deployment.
- 5.3. No additional significant effects to those already identified within the 2019 Supplementary Information (SI) Report will occur as a result of climate change during the operational phase the Proposed Development.
- 5.4. As such, the effect of the Proposed Development on climate change is not significant.

### Introduction

- 5.5. This Chapter of the Environmental Impact Assessment (EIA) addresses the potential effects of Lochluichart Wind Farm Extension II, five turbines up to 149.9 m to tip (the Proposed Development) on climate change. It supplements Chapter 5: Climate Change of the 2019 Supplementary Environmental Information (SI) Report, which supported the application for five turbines up to 133 m to tip (the Original Scheme), and should be read in conjunction with it.
- 5.6. The candidate turbine has changed since the 2019 SI Report and is now the Nordex N133 4.8 MW. It is noted that the turbine dimensions will vary depending on final turbine selected. The key changes relevant to this Chapter are:
  - Operational lifetime of the Proposed Development increased from 25 to 40 years;
  - Installed capacity of the Proposed Development increased from 18 to 24 MW; and
  - Tip height increased from 133 m to 149.9 m.
- 5.7. Key conclusions of the 2019 SI Report in terms of climate change are as follows:
  - The Original Scheme will not significantly influence climate change;
  - The Original Scheme will have a positive cumulative effect with regards to reduction in
    - carbon emissions when considering the UK-wide electricity generation mix;
    - In regards to carbon balance, the Original Scheme layout has been designed to minimise
      - disturbance to peat and carbon losses by avoiding deep peat where possible, and through
        - the proposed construction approach, for example the use of floating tracks; and
    - The effect of the Original Scheme on climate change is not significant in terms of the EIA Regulations.

### **Legislation, Policy and Guidance**

- 5.8. Digest of United Kingdom Energy Statistics (DUKES) 2020 updates the DUKES (2019) which details that renewable electricity represented 37.1% of total UK generation in 2019, with onshore wind's overall share of capacity increasing to 13.3% of all generators overall, up 2% on 2018.
- 5.9. Following the Committee on Climate Change (CCC) recommendation, the Climate Change Act (Emissions Reduction Targets) (Scotland) Act 2019 was amended to set a new target to cut Scottish greenhouse gas emissions to net zero by 2045, five years ahead of the target date set for the whole of the UK, with interim targets now set to cut emissions by 75% and 90% by 2030 and 2040 respectively (in relation to 1990 levels) .
- 5.10. In 2020, the CCC published their 2020 report to UK Parliament, assessing progress in reducing UK emissions over the past year. The report highlights that although a limited number of steps have been taken over the past year to support the transition to a net-zero economy and improve the UK's resilience to the impacts of climate change, much remains to be done. The report indicates that reaching net zero emissions in the UK will require all energy to be delivered to consumers in zero-carbon form, i.e., renewables and nuclear, bioenergy and fossil fuels combined with carbon capture and storage.
- 5.11. No other change to Climate Change policy or guidance had occurred since the 2019 SI Report was submitted.

### **Assessment Methodology and Significance Criteria**

- 5.12. The methodology outlined in the 2019 SI Report remains valid and appropriate and for this EIA.

### **Assessment Limitations**

- 5.13. The assessment limitations remain unchanged to those set out in the 2019 SI Report however, are included again for ease of reference.
- 5.14. The climate change projections are based on global models for a range of GHG emissions scenarios and generally consider regional responses to climate change rather than local responses. This is based on best scientific knowledge at this time and judgements on datasets and future socioeconomic drivers.
- 5.15. Downscaling adds another level of uncertainty. There may be more detail, but the uncertainty of the science may be higher. As understanding of the climate system and ability to model it improves it is likely that future projections will be refined.
- 5.16. The probabilities presented and the estimated ranges are based on a set of modelling, statistical and dataset choices with expert judgement playing an important role. However, as some potential influences on future climate are not yet known some choices may change as the science develops.
- 5.17. Specifically, in relation to wind, the UKCP18 Wind Fact sheet states that local variations due to the land surface are hard to model, particularly in very exposed or sheltered locations. This can be particularly relevant in high wind speed situations where local gusts can result from small scale weather events such as thunderstorms.

### Responses and Consultation

- 5.18. A Scoping Report was submitted in September 2020. No responses relating to climate change were received.
- 5.19. No responses directly relating to climate change were received to the 2019 SI Report.

### Baseline Conditions

- 5.20. There is no change to the baseline conditions as presented in the 2019 SI Report.

### Assessment of Potential Effects

- 5.21. The following assessment areas are considered in terms of the Proposed Development:
  - The influence of the Proposed Development on climate change; and
  - A summary of effects on environmental receptors sensitive to climate change.

#### Influence of the Proposed Development to Climate Change

##### Carbon Saving

- 5.22. The carbon budget has been recalculated based on the Proposed Development, taking into consideration the increased tip height of the turbines, increased capacity and extended operational period.
- 5.23. The Proposed Development has an anticipated installed capacity of up to 24 MW.
- 5.24. Based on the average capacity factor, 26.2%, it is expected the Proposed Development would result in the production of 55,083 MWh annually, equating to 2,203,315 MWh throughout the operational life of the Proposed Development.
- 5.25. The carbon savings for the Proposed Development have been recalculated (as per Appendix 5.A) and are presented in Table 5.1 below.

**Table 5.1: Carbon Savings for the Proposed Development (Expected Scenario)**

<b>Fuel Source</b>	<b>Estimated Minimum CO<sub>2</sub> saving (tCO<sub>2</sub>yr<sup>-1</sup>)</b>	<b>Estimated Maximum CO<sub>2</sub> saving (tCO<sub>2</sub>yr<sup>-1</sup>)</b>
Coal fired electricity generation	50,657	50,696
Grid mix electricity generation	13,963	13,973
Fossil fuel mix electricity generation	24,778	24,797

##### Carbon Losses

5.26. The Carbon Losses have been recalculated for the Proposed Development for the purposes of this EIA, and are provided in Table 5.2. The Carbon Calculator is included as Appendix 5.A of the EIA.

**Table 5.2: Carbon Losses for the Proposed Development (Expected Scenario)**

Losses	t CO2 Equivalent (total for wind farm lifetime)
Losses due to turbine life (e.g., manufacture, construction, decommissioning)	20,789
Losses due to back-up	18,922
Losses due to reduced carbon fixing potential	208
Losses from soil organic matter	8,226
Losses due to Dissolved Organic Carbon (DOC) and Particulate Organic Carbon (POC) leaching	3
Losses due to felling forestry	1077
<b>TOTAL LOSSES</b>	<b>49,225</b>

Payback Period

5.27. The payback period has been recalculated using the updated carbon costs and carbon gains associated with the Proposed Development.

5.28. The estimated payback period for the Proposed Development is 2.6 years compared to grid-mix electricity generation. The estimated payback period for the Proposed Development is 1.5 years in relation to fossil fuel mix and 0.7 years in relation to coal-fired electricity generation. Table 5.3 below goes into further detail regarding the carbon payback period for the Proposed Development.

**Table 5.3: Payback in years for each scenario used in the Carbon Calculator**

Compared to:	Expected Scenario	Best Case Scenario	Worst Case Scenario
Coal fired electricity generation	0.9	0.9	1.0
Grid-mix electricity generation	3.4	3.4	3.5
Fossil fuel-mix of electricity generation	1.9	1.9	2.0

- 5.29. This payback period for the Proposed Development remains a negligible, positive environmental effect that is not significant under the EIA Regulations.

Effects on Environmental Receptors Sensitive to Climate Change

- 5.30. No change based on Proposed Development as detailed in the SI.

**Assessment of Cumulative Effects**

- 5.31. The increase in tip height will increase the Proposed Development's installed capacity from 18 MW to 24 MW, which will increase the contribution to Scotland and the UK's carbon reduction targets.

- 5.32. The installed capacity of the Proposed Development will present a major, positive, environmental effect in cumulation with other UK renewable energy generation, contributing to the UK's legally binding emissions reduction targets and considered to be a fundamental change in the climate effects of UK energy supply.

**Mitigation Measure and Residual Effects**

- 5.33. This Chapter identified that no significant adverse effects on climate change are anticipated and therefore no mitigation is required under the EIA Regulations or recommended as best practice.

- 5.34. An iterative design approach was taken for the Proposed Development to avoid siting infrastructure in deep peat where possible to minimise disturbance of peat soils and associated carbon losses. Further micro-siting will be informed by detailed pre-construction ground investigations.

- 5.35. The proposed reuses of the excavated peat are in line with the Scottish Renewables and SEPA Guidance, and all excavated peat will suitably be reused on-site. The proposed reuses include the reinstatement of access track verges, cut and fill embankment slopes, reinstatement of turbine hardstandings, reinstatement of borrow pits and general landscape fill. No additional treatment of the peat is anticipated to be required, although methods to encourage regeneration of vegetation cover are likely to be required in some areas due to use of catotelmic peat to provide the top layer of reinstatement where there is a deficit of acrotelmic peat.

**Summary**

- 5.36. The assessment of vulnerability of the Proposed Development to climate change and the corresponding carbon calculations have been updated in light of changes to Development and updates to UKCP18.

- 5.37. Following this, there has been no change of conclusions from the 2019 SI Report. The Proposed Development will not significantly influence climate change receptors however, will have a positive cumulative effect with regards to reduction in carbon emissions when considering the UK-wide electricity generation mix.

- 5.38. As such, the Proposed Development will not have a significant effect on climate change in terms of the EIA Regulations.

## References

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