

Technical Appendix 14.1 Carbon Balance Input Data

Core input data

Input data	Expected value	Minimum value	Maximum value	Source of data
Windfarm characteristics				
Dimensions				
No. of turbines	9	9	9	Chapter 14 Table 14.3
Duration of consent (years)	50	50	50	Chapter 14 Table 14.3
Performance				
Power rating of 1 turbine (MW)	6	5.6	6.6	Chapter 14 Table 14.3
Capacity factor	31.16	23.13	39.2	Chapter 14 Table 14.3
Backup				
Fraction of output to backup (%)	5	5	5	Chapter 14 Table 14.3
Additional emissions due to reduced thermal efficiency of the reserve generation (%)	10	10	10	Fixed
Total CO2 emission from turbine life (tCO2 MW ⁻¹) (eg. manufacture, construction, decommissioning)	Calculate wrt installed capacity	Calculate wrt installed capacity	Calculate wrt installed capacity	
Characteristics of peatland before windfarm development				
Type of peatland	Acid bog	Acid bog	Acid bog	Chapter 14 Table 14.3
Average annual air temperature at site (°C)	8.01	4.35	11.73	Chapter 14 Table 14.3
Average depth of peat at site (m)	0.8	0.73	0.86	Chapter 14 Table 14.3
C Content of dry peat (% by weight)	55	49	62	Chapter 14 Table 14.3
Average extent of drainage around drainage features at site (m)	5	3	10	Chapter 14 Table 14.3
Average water table depth at site (m)	0.3	0.28	0.32	Chapter 14 Table 14.3

Input data	Expected value	Minimum value	Maximum value	Source of data
Dry soil bulk density (g cm ⁻³)	0.25	0.2	0.3	Chapter 14 Table 14.3
Characteristics of bog plants				
Time required for regeneration of bog plants after restoration (years)	7	5	10	Chapter 14 Table 14.3
Carbon accumulation due to C fixation by bog plants in undrained peats (tC ha ⁻¹ yr ⁻¹)	0.25	0.12	0.31	Chapter 14 Table 14.3
Forestry Plantation Characteristics				
Area of forestry plantation to be felled (ha)	57.1	51.4	62.8	Chapter 14 Table 14.3
Average rate of carbon sequestration in timber (tC ha ⁻¹ yr ⁻¹)	3.6	3.59	3.61	Chapter 14 Table 14.3
Counterfactual emission factors				
Coal-fired plant emission factor (t CO ₂ MWh ⁻¹)	0.92	0.92	0.92	
Grid-mix emission factor (t CO ₂ MWh ⁻¹)	0.25358	0.25358	0.25358	
Fossil fuel-mix emission factor (t CO ₂ MWh ⁻¹)	0.45	0.45	0.45	
Borrow pits				
Number of borrow pits	2	2	2	Chapter 14 Table 14.3
Average length of pits (m)	115	80	150	Chapter 14 Table 14.3
Average width of pits (m)	75	50	100	Chapter 14 Table 14.3
Average depth of peat removed from pit (m)	0.17	0.15	0.19	Chapter 14 Table 14.3
Foundations and hard-standing area associated with each turbine				
Average length of turbine foundations (m)	28	22	33	Chapter 14 Table 14.3
Average width of turbine foundations (m)	28	22	33	Chapter 14 Table 14.3
Average depth of peat removed from turbine foundations(m)	0.62	0.54	0.7	Chapter 14 Table 14.3
Average length of hard-standing (m)	56	54	59	Chapter 14 Table 14.3
Average width of hard-standing (m)	36	34	39	Chapter 14 Table 14.3

Input data	Expected value	Minimum value	Maximum value	Source of data
Average depth of peat removed from hard-standing (m)	0.51	0.46	0.56	Chapter 14 Table 14.3
Volume of concrete used in construction of the ENTIRE windfarm				
Volume of concrete (m ³)	5400	4860	5940	Chapter 14 Table 14.3
Access tracks				
Total length of access track (m)	10014	10012	10016	Chapter 14 Table 14.3
Existing track length (m)	0	0	0	Chapter 14 Table 14.3
Length of access track that is floating road (m)	674	673	675	Chapter 14 Table 14.3
Floating road width (m)	6	6	6	Chapter 14 Table 14.3
Floating road depth (m)	0.8	0.79	0.81	Chapter 14 Table 14.3
Length of floating road that is drained (m)	674	673	675	Chapter 14 Table 14.3
Average depth of drains associated with floating roads (m)	0.8	0.8	0.8	Chapter 14 Table 14.3
Length of access track that is excavated road (m)	9340	9339	9341	Chapter 14 Table 14.3
Excavated road width (m)	10.58	8.58	11.58	Chapter 14 Table 14.3
Average depth of peat excavated for road (m)	0.45	0.39	0.51	Chapter 14 Table 14.3
Length of access track that is rock filled road (m)	0	0	0	
Rock filled road width (m)	0	0	0	
Rock filled road depth (m)	0	0	0	
Length of rock filled road that is drained (m)	0	0	0	
Average depth of drains associated with rock filled roads (m)	0	0	0	
Cable trenches				
Length of any cable trench on peat that does not follow access tracks and is lined with a permeable medium (eg. sand) (m)	0	0	0	Chapter 14 Table 14.3
Average depth of peat cut for cable trenches (m)	0	0	0	
Additional peat excavated (not already accounted for above)				

Input data	Expected value	Minimum value	Maximum value	Source of data
Volume of additional peat excavated (m ³)	3652	2023	5580	Chapter 14 Table 14.3
Area of additional peat excavated (m ²)	11606	10806	12768	Chapter 14 Table 14.3
Peat Landslide Hazard				
Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments	negligible	negligible	negligible	Fixed
Improvement of C sequestration at site by blocking drains, restoration of habitat etc				
Improvement of degraded bog				
Area of degraded bog to be improved (ha)	0	0	0	Chapter 14 Table 14.3
Water table depth in degraded bog before improvement (m)	0	0	0	
Water table depth in degraded bog after improvement (m)	0	0	0	
Time required for hydrology and habitat of bog to return to its previous state on improvement (years)	0	0	0	
Period of time when effectiveness of the improvement in degraded bog can be guaranteed (years)	0	0	0	
Improvement of felled plantation land				
Area of felled plantation to be improved (ha)	0	0	0	Chapter 14 Table 14.3
Water table depth in felled area before improvement (m)	0	0	0	
Water table depth in felled area after improvement (m)	0	0	0	
Time required for hydrology and habitat of felled plantation to return to its previous state on improvement (years)	0	0	0	
Period of time when effectiveness of the improvement in felled plantation can be guaranteed (years)	0	0	0	
Restoration of peat removed from borrow pits				
Area of borrow pits to be restored (ha)	0	0	0	Chapter 14 Table 14.3
Depth of water table in borrow pit before restoration with respect to the restored surface (m)	0	0	0	
Depth of water table in borrow pit after restoration with respect to the restored surface (m)	0	0	0	
Time required for hydrology and habitat of borrow pit to return to its previous state on restoration (years)	0	0	0	
Period of time when effectiveness of the restoration of peat removed from borrow pits can be guaranteed (years)	0	0	0	

Input data	Expected value	Minimum value	Maximum value	Source of data
Early removal of drainage from foundations and hardstanding				
Water table depth around foundations and hardstanding before restoration (m)	0.3	0.28	0.32	Chapter 14 Table 14.3
Water table depth around foundations and hardstanding after restoration (m)	0.2	0.19	0.21	Chapter 14 Table 14.3
Time to completion of backfilling, removal of any surface drains, and full restoration of the hydrology (years)	3	2	5	Chapter 14 Table 14.3
Restoration of site after decommissioning				
Will the hydrology of the site be restored on decommissioning?	Yes	Yes	Yes	
Will you attempt to block any gullies that have formed due to the windfarm?	Yes	Yes	Yes	Chapter 14 Table 14.3
Will you attempt to block all artificial ditches and facilitate rewetting?	Yes	Yes	Yes	Chapter 14 Table 14.3
Will the habitat of the site be restored on decommissioning?	No	No	No	
Will you control grazing on degraded areas?	No	No	No	Chapter 14 Table 14.3
Will you manage areas to favour reintroduction of species	No	No	No	Chapter 14 Table 14.3
Methodology				
Choice of methodology for calculating emission factors	Site specific (required for planning applications)			

Forestry input data

N/A

Construction input data

N/A