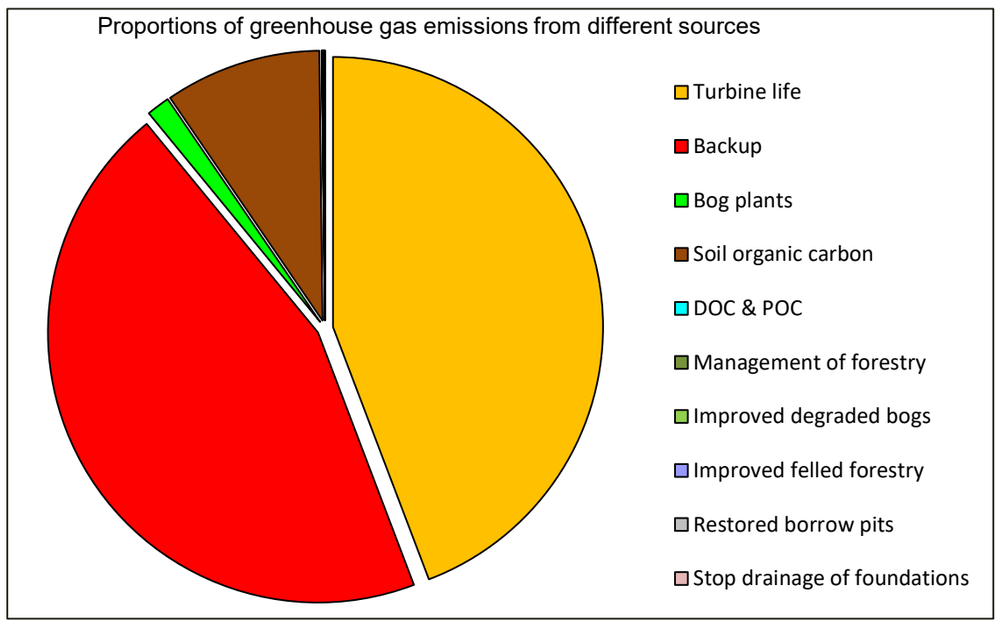
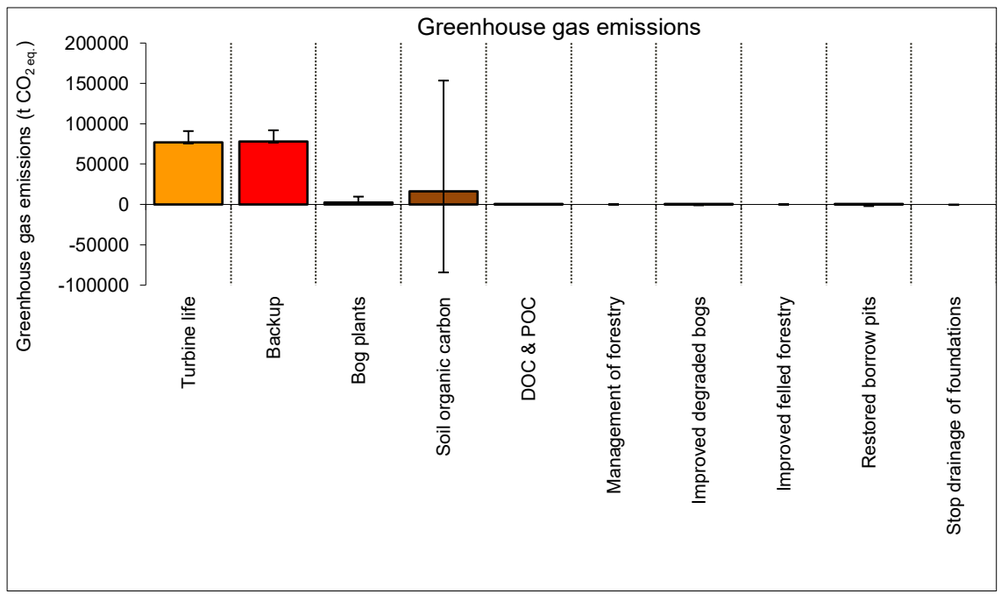
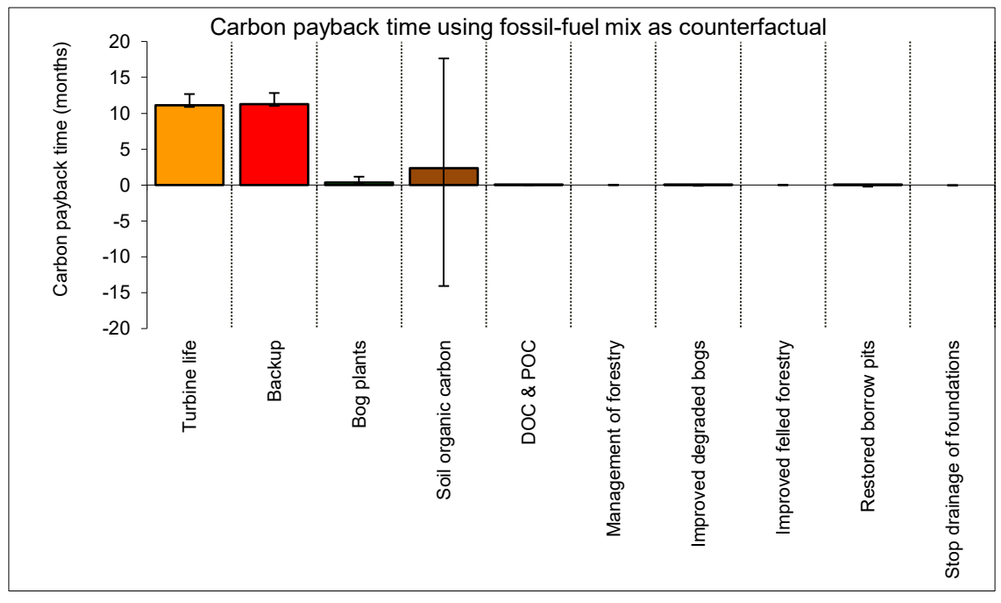
	Exp.	*Min.*	*Max.*
1. Windfarm CO_2 emission saving over…			
…coal-fired electricity generation (tCO_2 yr^{-1})	185107	163635	239962
…grid-mix of electricity generation (tCO_2 yr^{-1})	40561	35856	52581
…fossil fuel - mix of electricity generation (tCO_2 yr^{-1})	83053	73419	107665
Energy output from windfarm over lifetime (MWh)	9794030	8657946	12696394
Total CO_2 losses due to wind farm (t CO_2 eq.)			
2. Losses due to turbine life (eg. manufacture, construction, decomissioning)	76923	75522	90938
3. Losses due to backup	77999	76606	91927
4. Losses due to reduced carbon fixing potential	2420	2153	9703
5. Losses from soil organic matter	16277	-84216	153505
6. Losses due to DOC & POC leaching	23	0	130
7. Losses due to felling forestry	0	0	0
Total losses of carbon dioxide	173643	70065	346203
8. Total CO_2 gains due to improvement of site (t CO_2 eq.)			
8a. Change in emissions due to improvement of degraded bogs	202	0	-1043
8b. Change in emissions due to improvement of felled forestry	0	0	0
8c. Change in emissions due to restoration of peat from borrow pits	111	0	-2018
8d. Change in emissions due to removal of drainage from foundations & hardstanding	0	0	-658
Total change in emissions due to improvements	312	0	-3719

RESULTS	*Exp.*	*Min.*	*Max.*
Net emissions of carbon dioxide (t $CO_{2\ eq.}$)	**173955**	**66346**	**346203**
Carbon Payback Time			
…coal-fired electricity generation (years)	0.9	0.28	2.1
…grid-mix of electricity generation (years)	4.3	1.3	9.7
…fossil fuel - mix of electricity generation (years)	**2.1**	**0.62**	**4.7**
Ratio of soil carbon loss to gain by restoration (TARGET ratio (Natural Resources Wales) < 1.0)	**52.2**	**No gains!**	**No gains!**
Ratio of CO_2 eq. emissions to power generation (g / kWh) (TARGET ratio by 2030 (electricity generation) < 50 g /kWh)	**18**	**5**	**40**







Input data	Expected values Enter expected value here	Record source of data	Possible range of values Enter minimum value here	Record source of data	Enter maximum value here	Record source of data
Windfarm characteristics						
Dimensions						
No. of turbines	15	EIAR Ch3	15	EIAR Ch3	15	EIAR Ch3
Lifetime of windfarm (years)	50	EIAR Ch3	50	EIAR Ch3	50	EIAR Ch3
Performance						
Power rating of turbines (turbine capacity) (MW)	5.6	EIAR Ch3	5.5	EIAR Ch3	6.6	EIAR Ch3
Capacity factor	Direct input of capacity fa		Direct input of capacity fa		Direct input of capacity fa	
Enter estimated capacity factor (percentage efficiency)	26.62	EIAR Ch1	24.0	EIAR Ch1	29.3	EIAR Ch1
Backup						
Extra capacity required for backup (%)	5	Carbon Calculator Guidance Doc	5	Carbon Calculator Guidance Doc	5	Carbon Calculator Guidance Doc
Additional emissions due to reduced thermal efficiency of the reserve generation (%)	10	Fixed	10	Fixed	10	Fixed
Carbon dioxide emissions from turbine life - (eg. manufacture, construction, decommissioning)	Calculate wrt installed cap		Calculate wrt installed cap		Calculate wrt installed cap	
Characteristics of peatland before windfarm development						
Type of peatland	Acid b	EIAR Ch5 Met Office Weather Data EIAR Ch10	Acid b	EIAR Ch5 Met Office Weather Data EIAR Ch10	Acid b	EIAR Ch5 Met Office Weather Data EIAR Ch10
Average annual air temperature at site (^{o}C)	8.5		8		12	
Average depth of peat at site (m)	0.37		0.00		5.80	
C Content of dry peat (% by weight)	55.5	Birnie R.V., Clayton P., Hulme P.D., Robertson, R.A., Sloane B.D., and S.A.Ward. (1991). Scottish peat resources and their energy potential. Department of Energy	19	Birnie R.V., Clayton P., Hulme P.D., Robertson, R.A., Sloane B.D., and S.A.Ward. (1991). Scottish peat resources and their energy potential. Department of Energy	65	Birnie R.V., Clayton P., Hulme P.D., Robertson, R.A., Sloane B.D., and S.A.Ward. (1991). Scottish peat resources and their energy potential. Department of Energy
Average extent of drainage around drainage features at site (m)	10.00	Windfarm Carbon	2.00	Windfarm Carbon	6.00	Windfarm Carbon
Average water table depth at site (m)	0.20	Standard Values from Windfarm Carbon Calculator Web Tool User Guidance	0.10	Standard Values from Windfarm Carbon Calculator Web Tool User Guidance	1.00	Standard Values from Windfarm Carbon Calculator Web Tool User Guidance
Dry soil bulk density (g cm^{-3})	0.25	Windfarm Carbon Calculator Web Tool, User Guidance	0.09	Windfarm Carbon Calculator Web Tool, User Guidance	0.25	Windfarm Carbon Calculator Web Tool, User Guidance
Characteristics of bog plants						
Time required for regeneration of bog plants after restoration (years)	10	Conservative values	10	Conservative values	20	Conservative values
Carbon accumulation due to C fixation by bog plants in undrained peats (tC ha^{-1} yr^{-1})	0.25	NatureScot Guidance	0.12	NatureScot Guidance	0.31	NatureScot Guidance
Forestry Plantation Characteristics						
Method used to calculate CO_2 loss from forest felling	Enter simple data		Enter simple data		Enter simple data	
Area of forestry plantation to be felled (ha)	0	n/a	0	n/a	0	n/a
Average rate of carbon sequestration in timber (tC ha-1 yr-1)	3.60	n/a	0.00	n/a	0.00	n/a
Counterfactual emission factors						
To update counterfactual emission factors from the web — Click here (not yet operational)						
Coal-fired plant emission factor (t CO_2 MWh^{-1})	0.945	Fixed	0.945	Fixed	0.945	Fixed
Grid-mix emission factor (t CO_2 MWh^{-1})	0.20707	Fixed	0.20707	Fixed	0.20707	Fixed
Fossil fuel-mix emission factor (t CO_2 MWh^{-1})	0.424	Fixed	0.424	Fixed	0.424	Fixed
Borrow pits						
Number of borrow pits	5	EIAR Ch3	5	EIAR Ch3	5	EIAR Ch3
Average length of pits (m)	147.5	EIAR Ch3	172	EIAR Ch3	244	EIAR Ch3
Average width of pits (m)	68.7	EIAR Ch3	210	EIAR Ch3	327	EIAR Ch3
Average depth of peat removed from pit (m)	0.20	EIAR Ch10	0.27	EIAR Ch10	0.27	EIAR Ch10
Foundations and hard-standing area associated with each turbine						

Method used to calculate CO_2 loss from foundations and hard-standing	Enter detailed information		Enter detailed information		Enter detailed information	
Please enter construction data in sheet: Construction input data	See Construction Input Data		See Construction Input Data		See Construction Input Data	
Average depth of peat removed from turbine foundations (m)	See Construction Input Data		See Construction Input Data		See Construction Input Data	
Average depth of peat removed from hard-standing (m)	See Construction Input Data		See Construction Input Data		See Construction Input Data	
Access tracks						
Total length of access track (m)	21440	EIAR Ch3	16171	EIAR Ch3	16191	EIAR Ch3
Existing track length (m)	13550	EIAR Ch3	13550	EIAR Ch3	13550	EIAR Ch3
Length of access track that is floating road (m)	0	EIAR Ch3	2001	EIAR Ch3	2003	EIAR Ch3
Floating road width (m)	5	EIAR Ch3	5.5	EIAR Ch3	5	EIAR Ch3
Floating road depth (m)	0.00	n/a	0.63	n/a	0.63	n/a
Length of floating road that is drained (m)	0	EIAR Ch3	0	EIAR Ch3	1500	EIAR Ch3
Average depth of drains associated with floating roads (m)	0.00	EIAR Ch3	0	EIAR Ch3	0	EIAR Ch3
Length of access track that is excavated road (m)	7890	EIAR Ch3	12534	EIAR Ch3	12554	EIAR Ch3
Excavated road width (m)	5.5	EIAR Ch3	5.5	EIAR Ch3	5.5	EIAR Ch3
Average depth of peat excavated for road (m)	0.36	EIAR Ch10	0.36	EIAR Ch10	0.36	EIAR Ch10
Length of access track that is rock filled road (m)	0	No rock filled road proposed	0	No rock filled road proposed	0	No rock filled road proposed
Rock filled road width (m)	5	EIAR Ch3	5	EIAR Ch3	5	EIAR Ch3
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)	0.00		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)	1742	n/a	0	n/a	0	n/a
Average depth of peat cut for cable trenches (m)	0.29	n/a	0.00	n/a	0.00	n/a
Additional peat excavated (not already accounted for above)						
Volume of additional peat excavated (m^3)	1430	EIAR Ch10, TA 10.1	191460	EIAR Ch10, TA 10.1	191460	EIAR Ch10, TA 10.1
Area of additional peat excavated (m^2)	10214.0	EIAR Ch10, TA 10.1	426366.0	EIAR Ch10, TA 10.1	426366.0	EIAR Ch10, TA 10.1
Peat Landslide Hazard						
Weblink: Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments	negligible					
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)	6.93	EIAR Ch5	6.93	EIAR Ch5	6.93	EIAR Ch5
Water table depth in degraded bog before improvement (m)	0.10	Windfarm Carbon Calculator Web Tool, User Guidance	0.10	Windfarm Carbon Calculator Web Tool, User Guidance	0.50	Windfarm Carbon Calculator Web Tool, User Guidance
Water table depth in degraded bog after improvement (m)	0.09	Windfarm Carbon Calculator Web Tool, User Guidance	0.09	Windfarm Carbon Calculator Web Tool, User Guidance	0.40	Windfarm Carbon Calculator Web Tool, User Guidance
Time required for hydrology and habitat of bog to return to its previous state on improvement (years)	10	Conservative values	5	Conservative values	15	Conservative values
Period of time when effectiveness of the improvement in degraded bog can be guaranteed (years)	40	Duration of consent	5	Duration of consent	15	Duration of consent
Improvement of felled plantation land						
Area of felled plantation to be improved (ha)	0	n/a	0	n/a	0	n/a
Water table depth in felled area before improvement (m)	0.00		0.00		0.00	
Water table depth in felled area after improvement (m)	0.00		0.00		0.00	
Time required for hydrology and habitat of felled plantation to return to its previous state on improvement (years)	10		2		2	
Period of time when effectiveness of the improvement in felled plantation can be guaranteed (years)	40		40		40	
Restoration of peat removed from borrow pits						
Area of borrow pits to be restored (ha)	3.8	EIAR Ch3	24	EIAR Ch3	24	EIAR Ch3
Depth of water table in borrow pit before restoration with respect to the restored surface (m)	0.10	Windfarm Carbon Calculator Web Tool, User Guidance	0.10	Windfarm Carbon Calculator Web Tool, User Guidance	0.30	Windfarm Carbon Calculator Web Tool, User Guidance
Depth of water table in borrow pit after restoration with respect to the restored surface (m)	0.09	Windfarm Carbon Calculator Web Tool, User Guidance	0.05	Windfarm Carbon Calculator Web Tool, User Guidance	0.25	Windfarm Carbon Calculator Web Tool, User Guidance

Time required for hydrology and habitat of borrow pit to return to its previous state on restoration (years)	10	Conservative estimates.	10	Conservative estimates.	20	Conservative estimates.
Period of time when effectiveness of the restoration of peat removed from borrow pits can be guaranteed (years)	40	Duration of consent	20	Duration of consent	25	Duration of consent
Early removal of drainage from foundations and hardstanding						
Water table depth around foundations and hardstanding before restoration (m)	0.00	Windfarm Carbon Calculator Web Tool, User Guidance	0.20	Windfarm Carbon Calculator Web Tool, User Guidance	0.30	Windfarm Carbon Calculator Web Tool, User Guidance
Water table depth around foundations and hardstanding after restoration (m)	0.00	Windfarm Carbon Calculator Web Tool, User Guidance	0.00	Windfarm Carbon Calculator Web Tool, User Guidance	0.20	Windfarm Carbon Calculator Web Tool, User Guidance
Time to completion of backfilling, removal of any surface drains, and full restoration of the hydrology (years)	2	EIAR Ch3	3	EIAR Ch3	3	EIAR Ch3
Restoration of site after decomissioning						
Will the hydrology of the site be restored on decommissioning?	No		Np0		No	
Will you attempt to block any gullies that have formed due to the windfarm?	No	EIAR Ch3	Yes	EIAR Ch3	Yes	EIAR Ch3
Will you attempt to block all artificial ditches and facilitate rewetting?	Yes	EIAR Ch3	No	EIAR Ch3	No	EIAR Ch3
Will the habitat of the site be restored on decommissioning?	Yes		No		No	
Will you control grazing on degraded areas?	Yes	EIAR Ch3	No	EIAR Ch3	No	EIAR Ch3
Will you manage areas to favour reintroduction of species	Yes	EIAR Ch3	No	EIAR Ch3	No	EIAR Ch3