



Energy for
generations

Derrybrien Wind Farm Project

Gort Windfarms Ltd.

Remedial Environmental Impact Assessment Report Chapter 12-Air & Climate Appendices

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Appendix 12.1 Carbon emission calculations including the Peat Slide

Appendix 12.1: Estimated carbon payback time (including peat slide event)

Payback Time and CO ₂ emissions • 07WD-YVHM-4CJQ v14			
1. Windfarm CO ₂ emission saving over...	Exp.	Min.	Max.
...coal-fired electricity generation (t CO ₂ / yr)	112,688	110,290	115,085
...grid-mix of electricity generation (t CO ₂ / yr)	31,060	30,399	31,721
...fossil fuel-mix of electricity generation (t CO ₂ / yr)	55,119	53,946	56,292
Energy output from windfarm over lifetime (MWh)	4,287,035	4,195,821	4,378,248
Total CO ₂ losses due to wind farm (tCO ₂ eq.)	Exp.	Min.	Max.
2. Losses due to turbine life (eg. manufacture, construction, decommissioning)	33,314	33,156	33,472
3. Losses due to backup	20,523	0	41,046
4. Losses due to reduced carbon fixing potential	3,078	1,009	7,575
5. Losses from soil organic matter	97,502	9,716	265,817
6. Losses due to DOC & POC leaching	0	0	2
7. Losses due to felling forestry	73,392	64,681	86,754
Total losses of carbon dioxide	227,809	108,562	434,666
8. Total CO ₂ gains due to improvement of site (t CO ₂ eq.)	Exp.	Min.	Max.
8a. Change in emissions due to improvement of degraded bogs	0	0	0
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	-122	0	-432
8d. Change in emissions due to removal of drainage from foundations & hardstanding	0	0	0
Total change in emissions due to improvements	-122	0	-432
RESULTS	Exp.	Min.	Max.
Net emissions of carbon dioxide (t CO ₂ eq.)	227,688	108,130	434,666
Carbon Payback Time			
...coal-fired electricity generation (years)	2.0	0.9	3.9
...grid-mix of electricity generation (years)	7.3	3.4	14.3
...fossil fuel-mix of electricity generation (years)	4.1	1.9	8.1
Ratio of soil carbon loss to gain by restoration (not used in Scottish applications)	801.57	22.48	No gains!
Ratio of CO ₂ eq. emissions to power generation (g/kWh) (for info. only)	53.11	24.70	103.59

Appendix 12.2 Carbon emission calculations excluding the Peat Slide

Appendix 12.2: Estimated carbon payback time (excluding the peat slide)

Payback Time and CO₂ emissions • 07WD-YVHM-4CJQ v19

1. Windfarm CO ₂ emission saving over...	Exp.	Min.	Max.
...coal-fired electricity generation (t CO ₂ / yr)	112,688	110,290	115,085
...grid-mix of electricity generation (t CO ₂ / yr)	31,060	30,399	31,721
...fossil fuel-mix of electricity generation (t CO ₂ / yr)	55,119	53,946	56,292
Energy output from windfarm over lifetime (MWh)	4,287,035	4,195,821	4,378,248
Total CO ₂ losses due to wind farm (tCO ₂ eq.)	Exp.	Min.	Max.
2. Losses due to turbine life (eg. manufacture, construction, decommissioning)	33,314	33,156	33,472
3. Losses due to backup	20,523	0	41,046
4. Losses due to reduced carbon fixing potential	1,996	575	5,358
5. Losses from soil organic matter	28,600	-1,526	115,075
6. Losses due to DOC & POC leaching	0	0	2
7. Losses due to felling forestry	70,818	62,448	83,366
Total losses of carbon dioxide	155,250	94,652	278,319
8. Total CO ₂ gains due to improvement of site (t CO ₂ eq.)	Exp.	Min.	Max.
8a. Change in emissions due to improvement of degraded bogs	0	0	0
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	-122	0	-432
8d. Change in emissions due to removal of drainage from foundations & hardstanding	0	0	0
Total change in emissions due to improvements	-122	0	-432
RESULTS	Exp.	Min.	Max.
Net emissions of carbon dioxide (t CO ₂ eq.)	155,129	94,220	278,319
Carbon Payback Time			
...coal-fired electricity generation (years)	1.4	0.8	2.5
...grid-mix of electricity generation (years)	5.0	3.0	9.2
...fossil fuel-mix of electricity generation (years)	2.8	1.7	5.2
Ratio of soil carbon loss to gain by restoration (not used in Scottish applications)	235.13	-3.53	No gains!
Ratio of CO ₂ eq. emissions to power generation (g/kWh) (for info. only)	36.19	21.52	66.33

Appendix 12.3 Figures at A3, A2, A1 and A0

See Vol 2 Section 3