

Appendix 14.2 Carbon Calculator Outputs

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Payback Time

Payback Time

Payback Time - ChartsInput Data

1. Windfarm CO2 emission saving over... 2. CO2 loss due to turbine life 3. CO2 loss due to backup 4. Loss of CO2 fixing potential 5. Loss of soil CO2 (a,b) 5. Loss of soil CO2 (c,d,e) 6. CO2 loss by DOC & POC loss 7. Forestry CO2 loss 8. CO2 gain - site improvement

1. Windfarm CO2 emission saving over...	Exp.	Min.	Max.
...coal-fired electricity generation (t CO2 / yr)	216,252	191,167	280,336
...grid-mix of electricity generation (t CO2 / yr)	59,606	52,692	77,269
...fossil fuel-mix of electricity generation (t CO2 / yr)	105,776	93,506	137,121
Energy output from windfarm over lifetime (MWh)	11,752,836	10,389,535	15,235,672

Total CO2 losses due to wind farm (tCO2 eq.)	Exp.	Min.	Max.
2. Losses due to turbine life (eg. manufacture, construction, decommissioning)	89,708	87,632	106,921
3. Losses due to backup	99,338	97,565	117,077
4. Losses due to reduced carbon fixing potential	3,065	1,068	5,053
5. Losses from soil organic matter	81,173	40,420	146,384
6. Losses due to DOC & POC leaching	7	2	12
7. Losses due to felling forestry	0	0	0
Total losses of carbon dioxide	273,292	226,686	375,448

8. Total CO2 gains due to improvement of site (t CO2 eq.)	Exp.	Min.	Max.
8a. Change in emissions due to improvement of degraded bogs	-7,193	-5,994	-8,392
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	-6,228	-4,671	-7,266
8d. Change in emissions due to removal of drainage from foundations & hardstanding	0	0	0
Total change in emissions due to improvements	-13,421	-10,665	-15,658

RESULTS	Exp.	Min.	Max.
Net emissions of carbon dioxide (t CO2 eq.)	259,871	211,028	364,782
Carbon Payback Time			
...coal-fired electricity generation (years)	1.2	0.8	1.9
...grid-mix of electricity generation (years)	4.4	2.7	6.9
...fossil fuel-mix of electricity generation (years)	2.5	1.5	3.9
Ratio of soil carbon loss to gain by restoration (not used in Scottish applications)	6.05	2.58	13.73
Ratio of CO2 eq. emissions to power generation (g/kWh) (for info. only)	22.11	13.85	35.11

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