PUBLICATION - FACTSHEET

Carbon calculator for wind farms on Scottish peatlands: factsheet

Published: **20 Nov 2018**

Directorate: Energy and Climate Change Directorate

Part of: Energy, Environment and climate change

Information on the carbon calculator we developed for determining the carbon impact of wind farm developments in Scotland.

Access the carbon calculator tool here .

Background to the tool

The carbon calculator is our tool to support the process of determining wind farm developments in Scotland. The tool's purpose is to assess, in a comprehensive and consistent way, the carbon impact of wind farm developments. This is done by comparing the carbon costs of wind farm developments with the carbon savings attributable to the wind farm. The tool and supporting guidance material remain the property of the Scottish Government.

The online carbon calculator

This latest version of the carbon calculator is a web-based application and central database, where all the data entered in the carbon calculator is stored in a structured manner. This web-based tool replaces all earlier versions of the Excel-based carbon calculator. We commissioned it in response to feedback from stakeholders concerning previous versions of the tool, under the guidance of a steering group with membership including Scottish Government, Scottish Environment Protection Agency (SEPA), Scottish

Natural Heritage (SNH) and Forestry Research. Stakeholder engagement and feedback via workshops, in the final stages of the tool's development, helped to further inform the final design. Any queries regarding its use and functionality should be directed in the first instance to the Energy Consents Unit.

The web tool incorporates high-level automated checking, detailed user guidance (within the tool), cells for identification of data sources and relevant data calculations and modifications required to the calculation method, at this time.

The improved ease of use will reduce the burden on developers as a consequence of the increased user-friendliness and the more sophisticated entry checking and guidance. The expectation is that this will reduce the number of resubmissions. The improved quality of submissions will reduce the validation work required. It will allow developers to submit carbon assessments and conduct initial carbon assessment screening tests on their proposed developments online in a self-service manner. It will allow an aggregated picture to be made of assessments (initial applications and re-applications) across Scotland.

Development of the carbon calculator

Originally published in 2008 with research report, Calculating carbon savings from wind farms on Scottish peat lands: a new approach (Nayak et al, 2008), the calculator has been refined on the basis of feedback and further research (Nayak et al., 2010 and Smith et al., 2011) to be an even more effective tool. Version 2 of the calculator launched in June 2011. The calculator was subsequently revised to include multiple regions for forestry and construction. The last version of the Excel spreadsheet tool was 2.9.0.

Deployment and protocols for use

The web-based version of the carbon calculator has been available since 29 June 2016 to support the carbon assessment of wind farm developments. The initial release was referenced as C-CalcWebV1.0 and will continue to be referred to as the 'carbon calculator'. This web–based version of the carbon calculator superseded all previous Excel based versions of the tool, and should be used for all appropriate applications which previously would have used the Excel based tool. Any major updates and revisions of the tool (V2.0, V3.0 etc) will be undertaken on an annual basis, with only absolutely necessary interim 'minor' patches (V1.1, V1.2 etc) being undertaken otherwise.

All new applications to the Energy Consents Unit should use the web-based tool or may be subject to rejection. All applications submitted and received using the carbon calculator may be subject to audit by the Scottish Environment Protection Agency. This is to ensure, as far as possible, that the carbon calculator continues to be used appropriately. If an audit highlights any issues, these will be raised with the applicant by SEPA such that they may be addressed.

Carbon Calculator v1.6.1
Castlebanny Location: 52.423791 -7.133972
Springfield Renewables Ltd.

Core input data

Input data	Expected value	Minimum value	Maximum value	Source of data
Windfarm characteristics				
Dimensions				
No. of turbines	21	21	21	X
Duration of consent (years)	35	35	35	X
Performance				
Power rating of 1 turbine (MW)	5	5	6	X
Capacity factor	32.2	32.1	32.3	x
Backup				
Fraction of output to backup (%)	5	5	5	X
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	x
Average annual air temperature at site (°C)	9.9	9.8	10	x
Average depth of peat at site (m)	0	0	0	x
C Content of dry peat (% by weight)	62	61	63	x
Average extent of drainage around drainage features at site (m)	5	1	10	x
Average water table depth at site (m)	0.9	0.8	1	x
Dry soil bulk density (g cm^{-3})	0.3	0.2	0.3	x
Characteristics of bog plants				
Time required for regeneration of bog plants after restoration (years)	2	2	3	x
Carbon accumulation due to C fixation by bog plants in undrained peats (tC ha^{-1} yr^{-1})	0.25	0.24	0.26	x
Forestry Plantation Characteristics				
Area of forestry plantation to be felled (ha)	82.88	80	83	x
Average rate of carbon sequestration in timber (tC ha^{-1} yr^{-1})	3.6	3.5	3.7	x
Counterfactual emission factors				
Coal-fired plant emission factor (t CO2 MWh^{-1})	0.92	0.92	0.92	
Grid-mix emission factor (t CO2 MWh^{-1})	0.25358	0.25358	0.25358	
Fossil fuel-mix emission factor (t CO2 MWh^{-1})	0.45	0.45	0.45	
Borrow pits				
Number of borrow pits	3	3	3	x
Average length of pits (m)	155	155	155	x
Average width of pits (m)	123	123	123	x
Average depth of peat removed from pit (m)	0	0	0	x
Access tracks				

Input data	Expected value	Minimum value	Maximum value	Source of data
Total length of access track (m)	22500	22300	22700	X
Existing track length (m)	11400	11300	11500	x
Length of access track that is floating road (m)	0	0	0	x
Floating road width (m)	5	5	5.5	x
Floating road depth (m)	0	0	0	x
Length of floating road that is drained (m)	0	0	0	x
Average depth of drains associated with floating roads (m)	0	0	0	x
Length of access track that is excavated road (m)	11100	11000	11200	x
Excavated road width (m)	5.5	5	5.5	x
Average depth of peat excavated for road (m)	0	0	0	x
Length of access track that is rock filled road (m)	0	0	0	X
Rock filled road width (m)	5	5	5.5	X
Rock filled road depth (m)	0	0	0	x
Length of rock filled road that is drained (m)	0	0	0	x
Average depth of drains associated with rock filled roads (m)	0	0	0	x
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	X
Average depth of peat cut for cable trenches (m)	0	0	0	X
Additional peat excavated (not already accounted for above)				
Volume of additional peat excavated (m^3)	0	0	0	X
Area of additional peat excavated (m^2)	0	0	0	X
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	X
Water table depth in degraded bog before improvement (m)	0	0	0	X
Water table depth in degraded bog after improvement (m)	0	0	0	X
Time required for hydrology and habitat of bog to return to its previous state on improvement (years)	10	10	20	X
Period of time when effectiveness of the improvement in degraded bog can be guaranteed (years)	25	20	30	X
Improvement of felled plantation land				
Area of felled plantation to be improved (ha)	0	0	0	X
Water table depth in felled area before improvement (m)	0	0	0	X
Water table depth in felled area after improvement (m)	0	0	0	X

Input data	Expected value	Minimum value	Maximum value	Source of data
Time required for hydrology and habitat of felled plantation to return to its previous state on improvement (years)	2	2	2	X
Period of time when effectiveness of the improvement in felled plantation can be guaranteed (years)	2	2	2	X
Restoration of peat removed from borrow pits				
Area of borrow pits to be restored (ha)	0	0	0	X
Depth of water table in borrow pit before restoration with respect to the restored surface (m)	0	0	0	X
Depth of water table in borrow pit after restoration with respect to the restored surface (m)	0	0	0	X
Time required for hydrology and habitat of borrow pit to return to its previous state on restoration (years)	2	1	2	X
Period of time when effectiveness of the restoration of peat removed from borrow pits can be guaranteed (years)	2	2	2	X
Early removal of drainage from foundations and hardstanding				
Water table depth around foundations and hardstanding before restoration (m)	0	0	0	X
Water table depth around foundations and hardstanding after restoration (m)	0	0	0	X
Time to completion of backfilling, removal of any surface drains, and full restoration of the hydrology (years)	1	0.5	1.5	X
Restoration of site after decomissioning				
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?	n/a	n/a	n/a	X
Will you attempt to block all artificial ditches and facilitate rewetting?	n/a	n/a	n/a	X
Will the habitat of the site be restored on decommissioning?	Yes	Yes	Yes	
Will you control grazing on degraded areas?	n/a	n/a	n/a	X
Will you manage areas to favour reintroduction of species	n/a	n/a	n/a	X
Methodology				
Choice of methodology for calculating emission factors	Site specific (required for planning applications)			

Construction input data

Input data	Expected value	Minimum value	Maximum value	Source of data
Castlebanny				
Number of turbines in this area	21	21	21	Drawings
Turbine foundations				
Depth of hole dug when constructing foundations (m)	0.00001	0.00001	0.00001	Drawings
Aproximate geometric shape of whole dug when constructing foundations	Circular	Circular	Circular	Drawings
Diameter at bottom	30	25	30	
Diameter at surface	26	22	30	
Hardstanding				
Depth of hole dug when constructing hardstanding (m)	0.00001	0.00001	0.00001	Drawings
Aproximate geometric shape of whole dug when constructing hardstanding	Rectangular	Rectangular	Rectangular	Drawings
Length at surface	130	100	130	
Width at surface	60	50	60	
Length at bottom	130	100	130	
Width at bottom	60	50	60	
Piling				
Is piling used?	No	No	No	Drawings
Volume of Concrete				
Volume of concrete used (m^3) in the entire area	671	670	672	Drawings

Payback Time and CO_2 emissions • [redacted]

1. Windfarm CO2 emission saving over...	Exp.	Min.	Max.
...coal-fired electricity generation (t CO2 / yr)	272,482	271,635	327,993
...grid-mix of electricity generation (t CO2 / yr)	75,104	74,871	90,405
...fossil fuel-mix of electricity generation (t CO2 / yr)	133,279	132,865	160,432
Energy output from windfarm over lifetime (MWh)	10,366,146	10,333,953	12,478,007

Total CO2 losses due to wind farm (tCO2 eq.)	Exp.	Min.	Max.
2. Losses due to turbine life (eg. manufacture, construction, decomissioning)	88,500	88,500	108,122
3. Losses due to backup	72,434	72,434	86,921
4. Lossess due to reduced carbon fixing potential	1,587	841	2,354
5. Losses from soil organic matter	-25,554	-25,912	-19,841
6. Losses due to DOC & POC leaching	0	0	0
7. Losses due to felling forestry	38,291	35,934	39,412
Total losses of carbon dioxide	175,258	171,797	216,968

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	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	0	0	0
8d. Change in emissions due to removal of drainage from foundations & hardstanding	0	0	0
Total change in emissions due to improvements	0	0	0

RESULTS	Exp.	Min.	Max.
Net emissions of carbon dioxide (t CO2 eq.)	175,258	171,797	216,968
Carbon Payback Time			
...coal-fired electricity generation (years)	0.6	0.5	0.8
...grid-mix of electricity generation (years)	2.3	1.9	2.9
...fossil fuel-mix of electricity generation (years)	1.3	1.1	1.6

1. Windfarm CO_2 emission saving • [redacted]

MENU

Emissions due to turbine life
The carbon payback time of the windfarm due to turbine life (eg. manufacture, construction, decomissioning) is calculated by comparing the emissions due to turbine life with carbon-savings achieved by the windfarm while displacing electricity generated from coal-fired capacity or grid-mix.

Capacity factor calculated from forestry data

Area name	Value type	Capacity factor (%)	Wind speed ratio	Average site windspeed (m/s)	Annual theoretical energy output (MW / turbine yr)

Capacity factor - Direct input

	Exp.	Min.	Max.
Capacity factor (%)	32.2	32.1	32.3

	Exp.	Min.	Max.
Annual energy output from windfarm (MW/yr)			
RESULTS			
Emissions saving over coal-fired electricity ge...	272,482	271,635	327,993
Emissions saving over grid-mix of electricity g...	75,104	74,871	90,405
Emissions saving over fossil fuel - mix of elect...	133,279	132,865	160,432

4. Loss of CO_2 fixing potential • [redacted]

Emissions due to loss of bog plants
Annual C fixation by the site is calculated by multiplying area of the windfarm by the annual C accumulation due to bog plant fixation.

	Exp.	Min.	Max.
Area where carbon accumulation by bog plants is lost (ha)	46.78	25.82	64.99
Total loss of carbon accumulation up to time of restoration (tCO2 eq./ha)	34	33	36
RESULTS			
Total loss of carbon fixation by plants at the site (t CO2)	1587	841	2354
Additional CO2 payback time of windfarm due to loss of CO2 fixing potential			
...coal-fired electricity generation (months)	0	0	0
...grid-mix of electricity generation (months)	0	0	0
...fossil fuel - mix of electricity generation (months)	0	0	0

2. CO_2 loss due to turbine life • [redacted]

MENU

Emissions due to turbine life
The carbon payback time of the windfarm due to turbine life (eg. manufacture, construction, decomissioning) is calculated by comparing the emissions due to turbine life with carbon-savings achieved by the windfarm while displacing electricity generated from coal-fired capacity or grid-mix.

Calculation of emissions with relation to installed capacity

	Exp.	Min.	Max.
Emissions due to turbine frome energy output (t CO2)	4204	4204	5139
Emissions due to cement used in construction (t CO2)	212	212	212

Direct input of emissions due to turbine life

	Exp.	Min.	Max.
Emissions due to turbine life (tCO2/windfarm)			

RESULTS

	Exp.	Min.	Max.
Losses due to turbine life (manufacture, construction, etc.) (t CO2)	88500	88500	108122
Additional CO2 payback time of windfarm due to turbine life			
...coal-fired electricity generation (months)	4	4	4
...grid-mix of electricity generation (months)	14	14	14
...fossil fuel - mix of electricity generation (months)	8	8	8

3. CO_2 loss due to backup • [redacted]

MENU

Emissions due to backup power generation
CO2 loss due to back up is calculated from the extra capacity required for backup of the windfarm given in the input data.

Wind generated electricity is inherently variable, providing unique challenges to the electricity generating industry for provision of a supply to meet consumer demand (Netz, 2004). Backup power is required to accompany wind generation to stabilise the supply to the consumer. This backup power will usually be obtained from a fossil fuel source. At a high level of wind power penetration in the overall generating mix, and with current grid management techniques, the capacity for fossil fuel backup may become strained because it is being used to balance the fluctuating consumer demand with a variable and highly unpredictable output from wind turbines (White, 2007). The Carbon Trust (Carbon Trust/DTI, 2004) concluded that increasing levels of intermittent generation do not present major technical issues at the percentages of renewables expected by 2010 and 2020, but the UK renewables target at the time of that report was only 20%. When national reliance on wind power is low (less than ~20%), the additional fossil fuel generated power requirement can be considered to be insignificant and may be obtained from within the spare generating capacity of other power sectors (Dale et al, 2004). However, as the national supply from wind power increases above 20%, without improvements in grid management techniques, emissions due to backup power generation may become more significant. The extra capacity needed for backup power generation is currently estimated to be 5% of the rated capacity of the wind plant if wind power contributes more than 20% to the national grid (Dale et al 2004). Moving towards the SG target of 50% electricity generation from renewable sources, more short-term capacity may be required in terms of pumped-storage hydro-generated power, or a better mix of offshore and onshore wind generating capacity. Grid management techniques are anticipated to reduce this extra capacity, with improved demand side management, smart meters, grid reinforcement and other developments. However, given current grid management techniques, it is suggested that 5% extra capacity should be assumed for backup power generation if wind power contributes more than 20% to the national grid. At lower contributions, the extra capacity required for backup should be assumed to be zero. These assumptions should be revisited as technology improves.

Assumption: Backup assumed to be by fossil-fuel-mix of electricity generation. Note that hydroelectricity may also be used for backup, so this assumption may make the value for backup generation too high. These assumptions should be revisited as technology develops.

	Exp.	Min.	Max.
Reserve energy (MWh/yr)	45,990	45,990	55,188
Annual emissions due to backup from fossil fuel-mix of electricity generati...	2,070	2,070	2,483
RESULTS			
Total emissions due to backup from fossil fuel-mix of electricity generatio...	72,434	72,434	86,921

5. Loss of soil CO_2 (a, b) • [redacted]

MENU

Emissions due to loss of soil organic carbon
Loss of C stored in peatland is estimated from % site lost by peat removal (table 5a), CO2 loss from removed peat (table 5b), % site affected by drainage (table 5c), and the CO2 loss from drained peat (table 5d).

5. Loss of soil C02

	Exp.	Min.	Max.
CO2 loss from removed peat (t CO2 equiv.)	-25553....	-19840....	-25911....
CO2 loss from drained peat (t CO2 equiv.)	0	0	0
RESULTS			
Total CO2 loss from peat (removed + drained) (t CO2 e...	-25553....	-25911....	-19840....
Additional CO2 payback time of windfarm due to loss ...			
...coal-fired electricity generation (months)	-1.13	-1.14	-0.73
...grid-mix of electricity generation (months)	-4.08	-4.15	-2.63
...fossil fuel - mix of electricity generation (months)	-2.3	-2.34	-1.48

CO_2 loss from removed peats
If peat is treated in such a way that it is permanently restored, so that less than 100% of the C is lost to the atmosphere, a lower percentage can be entered in cell C10.

5b. CO2 loss from removed peat

	Exp.	Min.	Max.
CO2 loss from removed peat (t CO2)	1.21	0.51	1.24
CO2 loss from undrained peat left in situ (t CO2)	25555.19	19841.13	25913.00
RESULTS			
CO2 loss atributable to peat removal only (t CO2)	-25553....	-19840....	-25911....

Volume of Peat Removed
% site lost by peat removal is estimated from peat removed in borrow pits, turbine foundations, hard-standing and access tracks. If peat is removed for any other reason, this must be added in as additional peat excavated in the core input data entry.

5a. Volume of peat removed

	Exp.	Min.	Max.
Peat removed from borrow pits			
Area of land lost in borrow pits (m2)	57195	57195	57195
Volume of peat removed from borrow pits (m3)	0	0	0
Peat removed from turbine foundations			
Area of land lost in foundation (m2)	12952.79	9120.83	14844.03
Volume of peat removed from foundation area (m3)	0.13	0.09	0.15
Peat removed from hard-standing			
Area of land lost in hard-standing (m2)	163800	105000	163800
Volume of peat removed from hard-standing area (m3)	1.64	1.05	1.64
Peat removed from access tracks			
Area of land lost in floating roads (m2)	0	0	0
Volume of peat removed from floating roads (m3)	0	0	0
Area of land lost in excavated roads (m2)	61050	55000	61600
Volume of peat removed from excavated roads (m3)	0	0	0
Area of land lost in rock-filled roads (m2)	0	0	0
Volume of peat removed from rock-filled roads (m3)	0	0	0
Total area of land lost in access tracks (m2)	61050	55000	61600
Total volume of peat removed due to access tracks (m3)	0	0	0
RESULTS			
Total area of land lost due to windfarm construction (m2)	294997.79	226315.83	297439.03
Total volume of peat removed due to windfarm constructio...	1.77	1.14	1.79

6. CO_2 loss by DOC & POC loss • [redacted]

Emissions due to loss of DOC and POC
Note, CO2 losses from DOC and POC are calculated using a simple approach derived from generic estimates of the percentage of the total CO2 loss that is due to DOC or POC leaching.

No POC losses for bare soil included yet. If extensive areas of bare soil is present at site need modified calculation (Birnie et al, 1991)

	Exp.	Min.	Max.
Gross CO2 loss from restored drained land (t CO2)	0.00	0.00	0.00
Gross CH4 loss from restored drained land (t CO2 equiv.)	0.00	0.00	0.00
Gross CO2 loss from improved land (t CO2)	0.00	0.00	0.00
Gross CH4 loss from improved land (t CO2 equiv.)	0.00	0.00	0.00
Total gaseous loss of C (t C)	0.00	0.00	0.00
Total C loss as DOC (t C)	0.00	0.00	0.00
Total C loss as POC (t C)	0.00	0.00	0.00
RESULTS			
Total CO2 loss due to DOC leaching (t CO2)	0.00	0.00	0.00
Total CO2 loss due to POC leaching (t CO2)	0.00	0.00	0.00
Total CO2 loss due to DOC & POC leaching (t CO2)	0.00	0.00	0.00
Additional CO2 payback time of windfarm due to DOC & POC			
...coal-fired electricity generation (months)	0	0	0
...grid-mix of electricity generation (months)	0	0	0
...fossil fuel - mix of electricity generation (months)	0	0	0

7. Forestry CO_2 loss • [redacted]

MENU

CO_2 loss from forests - calculation using detailed management information
Forest carbon calculator (Perks et al, 2009)

Total potential carbon squestration loss due to felling of forestry for the wind ...
Total emissions due to cleared land (t CO2)
Emissions due to harvesting operations (t CO2)
Fossil fuel equivalent saving from use of felled forestry as biofuel (t CO2)
Fossil fuel equivalent saving from use of replanted forestry as biofuel (t CO2)
RESULTS
Total carbon loss associated with forest management(t CO2)

Emissions due to forest felling - calculation using simple management data
Emissions due to forestry felling are calculated from the reduced carbon sequestered per crop rotation. If the forestry was due to be removed before the planned development, this C loss is not attributable to the wind farm and so the area of forestry to be felled should be entered as zero.

	Exp.	Min.	Max.
Area of forestry plantation to be felled (ha)	82.88	80	83
Carbon sequestered (t C ha-1 yr-1)	3.6	3.5	3.7
Lifetime of windfarm (years)	35	35	35
Carbon sequestered over the lifetime of the windfarm (t C ha-1)	126	122.5	129.5
RESULTS			
Total carbon loss due to felling of forestry (t CO2)	38290.91	35933.66	39411.52
Additional CO2 payback time of windfarm due to management of forestry			
...coal-fired electricity generation (months)	1.69	1.59	1.44
...grid-mix of electricity generation (months)	6.12	5.76	5.23
...fossil fuel - mix of electricity generation (months)	3.45	3.25	2.95

8. CO_2 gain - site improvement • [redacted]

Gains due to site improvement

Note, CO2 losses are calculated using two approaches: IPCC default methodology and more site specific equations derived for this project. The IPCC methodology is included because it is the established approach, although it contains no site detail. The new equations have been thoroughly tested against experimental data (see Nayak et al, 2008 - Final report).

Degraded Bog

	Exp.	Min.	Max.
1. Description of site			
Area to be improved (ha)	0	0	0
Depth of peat above water table before improvement (m)	0	0	0
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	15	20	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from improved land (t CO2 equiv.)	0	0	0
Total GHG emissions from improved land (t CO2 eqiv.)	0	0	0
3. Losses without improvement			
Improved period (years)	15	20	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from unimproved land (t CO2 equiv.)	0	0	0
Total GHG emissions from unimproved land (t CO2 eqiv.)	0	0	0
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equi...	0	0	0

Felled Forestry

	Exp.	Min.	Max.
1. Description of site			
Area to be improved (ha)	0	0	0
Depth of peat above water table before improvement (m)	0	0	0
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	0	0	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from improved land (t CO2 equiv.)	0	0	0
Total GHG emissions from improved land (t CO2 eqiv.)	0	0	0
3. Losses without improvement			
Improved period (years)	0	0	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from unimproved land (t CO2 equiv.)	0	0	0
Total GHG emissions from unimproved land (t CO2 eqiv.)	0	0	0
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equi...	0	0	0

Borrow Pits

	Exp.	Min.	Max.
1. Description of site			
Area to be improved (ha)	0	0	0
Depth of peat above water table before improvement (m)	0	0	0
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	0	1	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from improved land (t CO2 equiv.)	0	0	0
Total GHG emissions from improved land (t CO2 eqiv.)	0	0	0
3. Losses without improvement			
Improved period (years)	0	1	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from unimproved land (t CO2 equiv.)	0	0	0
Total GHG emissions from unimproved land (t CO2 eqiv.)	0	0	0
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equi...	0	0	0

Foundations & Hardstanding

	Exp.	Min.	Max.
1. Description of site			
Area to be improved (ha)	0	0	0
Depth of peat above water table before improvement (m)	0	0	0
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	34	34.5	33.5
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from improved land (t CO2 equiv.)	0	0	0
Total GHG emissions from improved land (t CO2 eqiv.)	0	0	0
3. Losses without improvement			
Improved period (years)	34	34.5	33.5
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.498	0.498	0.499
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbone dioxide emissions (t CO2 ha-...	0.508	0.482	0.535
CO2 emissions from unimproved land (t CO2 equiv.)	0	0	0
Total GHG emissions from unimproved land (t CO2 eqiv.)	0	0	0
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equi...	0	0	0