

MoorLIFE 2020 Project:

D5 Carbon Audit Update Report 2020

April 2021

(LIFE14 NAT/UK/000070)



Prepared by – Paul Titterton

The Moorland Centre, Edale, Hope Valley, Derbyshire, S33 7ZA, UK

T – 01629 816511

E – moors@peakdistrict.gov.uk

W – www.moorsforthefuture.org.uk

Suggested citation: Titterton, P., Benson, J., Thorpe, K., & Crouch, T. (2021) Carbon Audit Update Report 2020. Moors for the Future Partnership, Edale.

Page 2

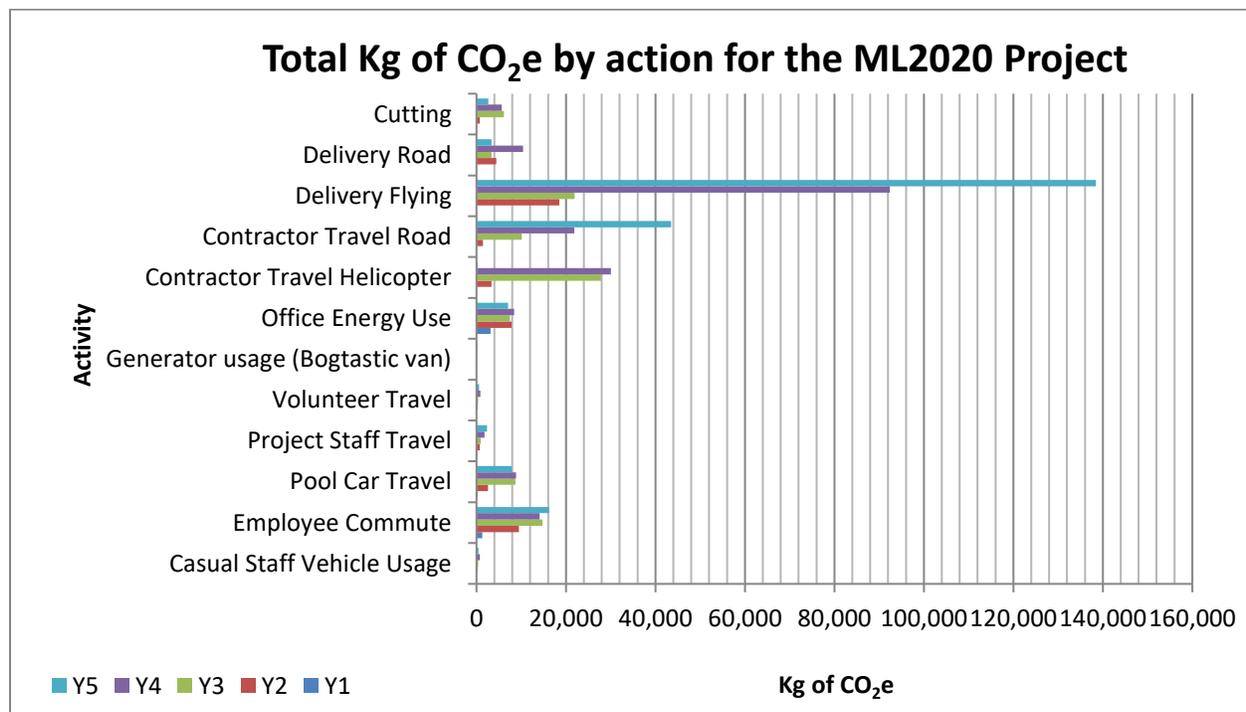
N:\Projects\MoorLIFE 2020\Science\Reports\D5

Highlights

- As part of the MoorLIFE 2020 project, action D5, Moors for the Future Partnership will monitor the carbon footprint of the project, with the aim of monitoring our carbon expenditure to identify where carbon savings can be made.
- This carbon audit builds upon the original MoorLIFE carbon audit, by including additional activities (e.g. office energy use) that are both directly controlled by Moors for the Future Partnership (scope 1 and 2 activities), and indirectly controlled (scope 3).
- Including the travel figures for our associated beneficiaries (National Trust, Pennine Prospects, RSPB), total carbon dioxide equivalents (CO₂e) produced in year 1 of the project was 4,833 kg CO₂e.
- 48,230 kg of CO₂e was emitted during year 2 of the MoorLIFE 2020 project.
- 101,330 kg of CO₂e was emitted during year 3 of the MoorLIFE 2020 project.
- 120,640 kg of CO₂e was emitted during year 4 of the MoorLIFE 2020 project.
- 225,179 kg of CO₂e was emitted during year 5 of the MoorLIFE 2020 project.
- The activities that contributed the most kg of CO₂e in year 5 were contractor travel – road and deliveries – flying.

Graphical representation

A graph showing total kg of CO₂e emitted delivering ML2020 split by activity to date



Executive summary

Moors for the Future Partnership and our associated beneficiaries are undertaking a carbon audit of all actions (A1 – F1) associated with the MoorLIFE 2020 project. The carbon audit for MoorLIFE 2020 aims to expand on the carbon audit undertaken by Maskill *et al* (2015) in the original MoorLIFE project by expanding the number of activities included. The activities are split into scope 1 and 2, which are defined as any activities controlled directly by Moors for the Future Partnership, and scope 3 activities which are not directly controlled by Moors for the Future Partnership.

Office energy use was only calculated for Moors for the Future Partnership's primary office base (Moorland Centre). Additional offices were not included because it was deemed too difficult and time consuming for this project to work out the split in energy used by Moors for the Future Partnership and other teams working at these offices.

The activities associated with scope 1, 2 and 3 were calculated using the methodology set out in D5 Carbon audit guide (2016) produced by Benson, Crouch, Thorpe and Walker. Greenhouse gas emission data for our partner organisations (National Trust, RSPB and Pennine Prospects) was not included in the D5 update report 2016, because the data was unavailable at the time of writing. With the additional year 1 data included, it is possible to determine that 4,833 kg of CO₂e (carbon dioxide equivalents) was used to deliver year 1 of the ML2020 project. This has increased to 225,179 kg of CO₂e emitted during year 5 of the MoorLIFE2020 project.

The primary activities that contribute to total greenhouse gas emissions in year 5 of the project are:

- Employee commute – 16,226 kg of CO₂e
- Deliveries - flying – 138,414 kg of CO₂e
- Contractor travel – road –43,490 kg of CO₂e

The primary reason for this is that since year 1 the amount of conservation works and staff working on ML2020 has significantly increased, and therefore the number and scale of operations have increased, which in turn increases the amount of CO₂e emitted.

As part of the MoorLIFE 2020 project, Moors for the Future Partnership and our associated beneficiaries are committed to reducing our carbon footprint through the following:

- Siting lift points as close to the working area as possible, where possible

- Specifying local helicopter take-off sites and the right helicopters for the job
- Accurately specifying areas using desk-based GIS and helicopter-mounted GPS
- Car sharing / use of public transport when and where logistically possible
- Purchase or lease of vehicles with the lowest CO₂/ km emissions (e.g. hybrid vehicles)

Contents

- Highlights 3
- Graphical representation 3
- Executive summary 4
- List of figures 7
- List of tables 7
- 1. Introduction 8
- 2. Methodology 10
 - 2.1. Conservation work and travel 10
 - 2.2. Assumptions 10
- 3. Results 11
 - 3.1. MoorLIFE 2020 11
 - 3.2. Travel 12
 - 3.3 Energy usage 13
 - 3.4 Contractor travel 14
 - 3.5 Deliveries of materials 15
 - 3.6. Cutting 16
 - 3.7 Associated beneficiaries CO₂e contributions 16
 - 3.8 Total carbon emissions 16
- 4. Impacts 17
- 5. Conclusion 18
- 6. References 19
- Appendix 1 – Assumptions made 20

List of figures

Figure 1 - Total kg CO ₂ e expenditure per annum by the MoorLIFE2020 project	12
Figure 2 - Total kg of CO ₂ e for staff travel activities for all years	12
Figure 3 - Kg of CO ₂ e produced by different energy sources.....	13
Figure 4 - Total kg of CO ₂ e for all contractor travel	15
Figure 5 - Total kg of CO ₂ e for all deliveries for all years of the project	15

List of tables

Table 1 - Activity and scope reported on in the MoorLIFE 2020 Carbon Audit	8
Table 2 - Total CO ₂ e for all partners by activity per annum.....	11
Table 3 - Outside scope emissions released from the Bogtastic Van	14
Table 4 - Total kg of CO ₂ e for cutting of all habitats for all years	16
Table 5 - Total CO ₂ e contributions by associated beneficiaries for year 5 of the ML2020 project and the highest contributing activities.....	16

1. Introduction

As part of the MoorLIFE 2020 (ML2020) project action D5, a carbon audit will be undertaken for all greenhouse gas (GHG) emissions (e.g. carbon dioxide (CO₂), methane (CH₄) & nitrous oxide (N₂O)) used in delivering the project. As specified by Defra (2017), the different GHG emissions are then converted into carbon dioxide equivalents (CO₂e), allowing comparison between the different types of GHG emissions and a total emissions figure to be calculated (OECD Statistics, 2013).

The aim of this document is to report the full kg of CO₂e figures used to deliver:

- Year 1 (1st October 2015 – 31st March 2016)
- Year 2 (1st April 2016 – 31st March 2017)
- Year 3 (1st April 2017 – 31st March 2018)
- Year 4 (1st April 2018 – 31st March 2019)
- Year 5 (1st April 2019 – 31st March 2020)

ML2020 is being delivered in partnership with a number of organisations, therefore emissions for our associated beneficiaries: National Trust (NT), RSPB and Pennine Prospects (PP) are also reported on, along with any contractor travel associated with delivering the conservation works.

The different activities included within the carbon audit are identified in Table 1, along with the group or 'scope' of emission the activities relates to. Scope 1 and 2 activities relate to those actions which are controlled directly by Moors for the Future Partnership (MFFP) (e.g. driving works vehicles), whereas scope 3 activities are activities which are indirectly controlled by MFFP (contractors and partners' travel) (Carbon Trust, 2017).

Table 1 - Activity and scope reported on in the MoorLIFE 2020 Carbon Audit

Activity	Scope
Works vehicles use	1 and 3
Project staff commute	3
Contractor travel	3
Volunteer travel	3
Flying	3
Deliveries	3
Office energy use (Moorland Centre only)	2

Adapted from Benson, Crouch, Thorpe, Walker 2016

Since the original MoorLIFE carbon audit, the number of activities covered within the carbon audit has been expanded to produce a more comprehensive audit. The original audit can however still be used as a

guide for expected outcomes associated with the ML2020 carbon audit. Maskill *et al* (2015) identified that those activities involving helicopters and the delivery of materials produced the most carbon emissions.

An overview of the carbon released by partner is presented for our associated beneficiaries (see section 3.8). This is not intended for direct comparison due to the different work areas and requirements of the sites our associated beneficiaries work on. It has been included to allow our associated beneficiaries to put measures in place to reduce their carbon footprint, where applicable.

2. Methodology

2.1. Conservation work and travel

The methodology used to calculate the carbon emission figures for all actions (office energy usage, travel and conservation work activities (e.g. brash spreading)) is set out in the D5 update report 2016, produced by Benson, Crouch, Thorpe and Walker, which can be found at <https://www.moorsforthefuture.org.uk/our-work/our-projects/moorlife2020/moorlife2020-research-and-monitoring/carbon-audit>. As the methodology for these activities has not changed in the intervening period it will not be included in this report.

2.2. Assumptions

A number of assumptions were made when calculating the GHG emissions figure. A full list of the assumptions made is presented in Appendix 1 of this report.

3. Results

3.1. MoorLIFE 2020

In total ML2020 emitted 225,179 kg of CO₂e during year 5 of the project (see Table 2 below). This represents a 15% increase in the amount of CO₂e emitted between years 4 and 5 (see Figure 1 below). The primary reason for this increase is that the amount of conservation work undertaken increased, as forecasted. The reason that total kg of CO₂e are significantly lower in year 1 for all activities is because this is a preparatory year, which meant that not all members of staff was working on the project and not all activities (e.g. travel, deliveries road) was undertaken in this year.

Figure 1 also identifies that the kg of CO₂e has increased per annum, again this is due to the increases in work delivered across all actions and in addition to this, the number of employees has increased since the project began.

Table 2 - Total CO₂e for all partners by activity per annum

Activity	Scope	Year 1	Year 2	Year 3	Year 4	Year 5	Total
		kg of CO ₂ e					
Casual Staff Vehicle Usage	3	21	165	383	689	450	1,708
Employee Commute	3	1,316	9,511	14,776	14,067	16,226	55,896
Pool Car Travel	1 + 3	222	2,591	8,708	8,830	7,892	28,244
Project Staff Travel	3	167	751	924	1,768	2,388	6,004
Volunteer Travel	3	0	191	341	839	558	1,930
Generator Usage (Bogtastic Van)	2	0	0	53	113	165	331
Office Energy Use	2	3,106	7,809	7,451	8,436	7,069	33,871
Contractor Travel Helicopter	3	0	3,379	27,867	30,014	229	61,489
Contractor Travel Road	3	0	1,414	10,151	23,145	43,490	76,932
Delivery Flying	3	0	18,483	21,944	22,463	138,414	271,205
Delivery Road	3	0	3,204	3,600	4,731	3,390	23,862
Cutting	3	0	733	5,131	5,546	2,643	15,162
Total CO₂e		4,833	48,230	101,330	120,640	225,179	576,634

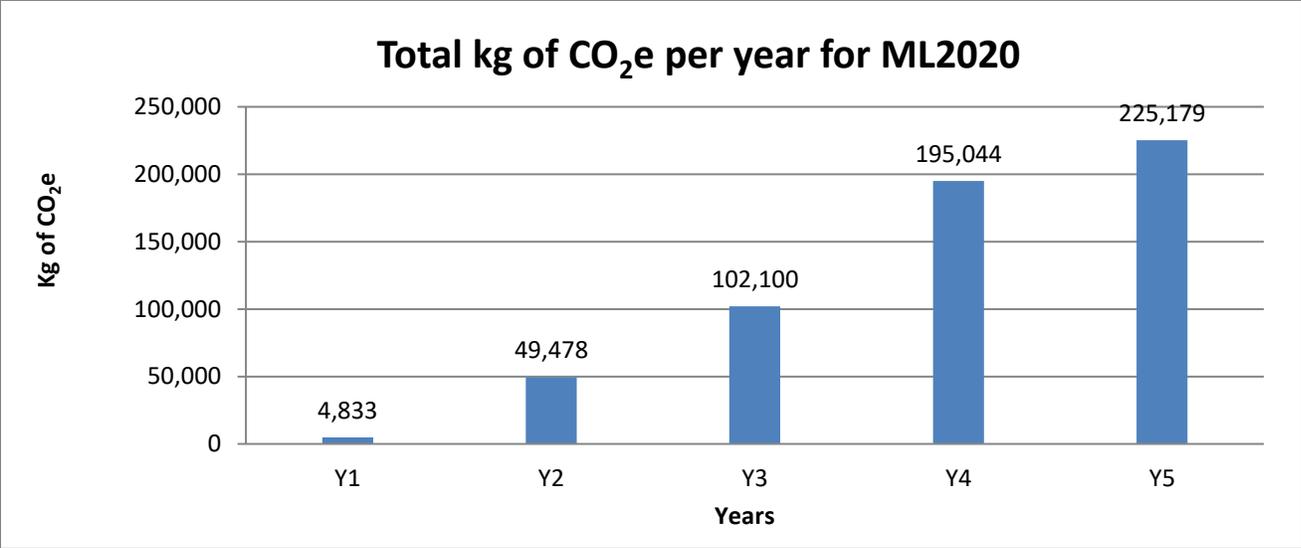


Figure 1 - Total kg CO₂e expenditure per annum by the MoorLIFE2020 project

3.2. Travel

Figure 2 below shows that the total kg of CO₂e produced by staff members directly involved with ML2020 indicates a gradually increase year on year. This is because as forecasted the amount of work undertaken on all action codes has increased each year. The largest contribution to staff travel is employee commute, which has the largest contributing factors every year with 16,226 kg of CO₂e in year 5, an increase of 2,159 kg of CO₂e from year 4. The lowest contribution was from casual staff travel with a total contribution of 450 kg of CO₂e per year in year 5, this represents a decrease on the previous year’s figure of 240 kg of CO₂e.

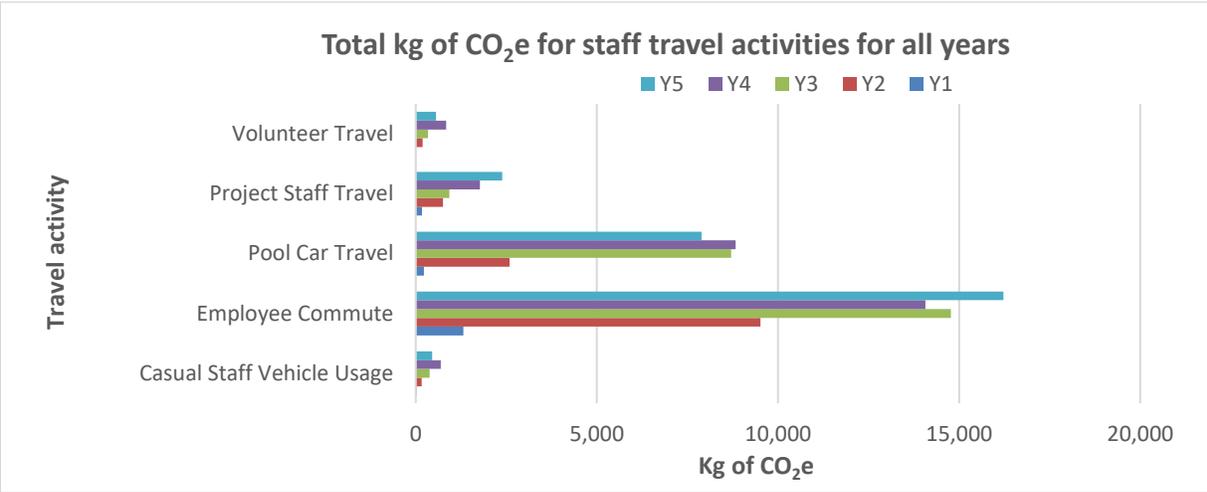


Figure 2 - Total kg of CO₂e for staff travel activities for all years

The travel figures in year 5 has been impacted upon by the Covid-19 pandemic, as all associated beneficiaries were under a national lockdown for 2 weeks at the end of March 2020. Whilst it is impossible to know what impact this has had on the use of pool cars and project staff travel, the impact can be quantified for employee commute. This is because the national lockdown meant staff members were either working from home or on furlough, meaning that they did not commute for these two weeks causing the amount of GHG emissions to be reduced by 643 kg of CO₂e.

3.3 Energy usage

Figure 3 below shows that the two main sources of scope 2 activities are office energy usage and the generator on the Bogtastic van. These are classed as source 2 emissions because it involves the production of energy using electricity, water, gas etc. Office energy use is the biggest producer within this category with 7,069 kg of CO₂e generated in year 5, a decrease of 1,367 kg of CO₂e on year 4 figures, see below. Some of these decrease can be attributed to the Covid-19 pandemic preventing employees working from the office, but it is difficult to know exactly what impact Covid-19 has had on office energy usage. Overall, the kg of CO₂e generated remains consistent at approximately 7000 kg of CO₂e generated each year, except year 1.

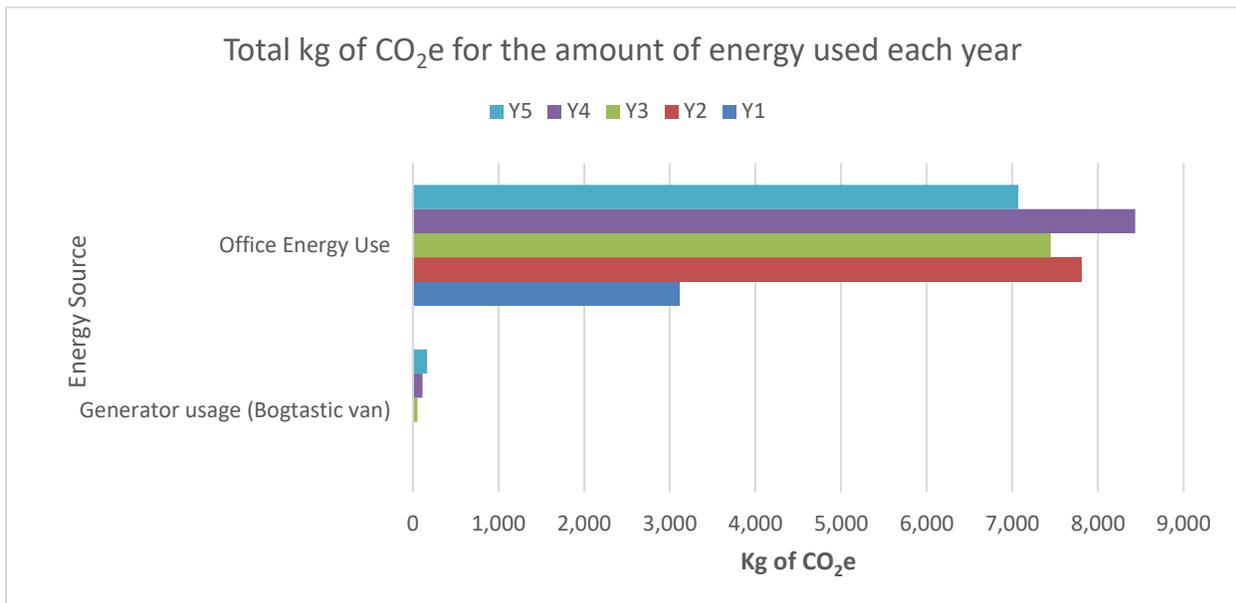


Figure 3 - Kg of CO₂e produced by different energy sources

In accordance with government guidelines for reporting GHG emissions produced from fuels (*Defra, 2017*), the petrol used in the Bogtastic van generator is not included within the final carbon audit figures presented in section 3.8 Total carbon , as they are classed as outside the scope of the carbon audit. This is because it uses petrol purchased from the forecourt which is blended with biofuels (*Defra, 2017*), and if a fuels source includes biofuels then it is counted as net 0 since the fuel source absorbs some carbon during its production (*Defra, 2014*). The reason the emissions in year 3 are significantly lower than future years, is because we received the Bogtastic van partway through year 3.

Table 3 - Outside scope emissions released from the Bogtastic Van

Year	Emissions (kg of CO ₂ e)
1	We did not have the Bogtastic Van in this year
2	We did not have the Bogtastic Van in this year
3	1.65
4	5.23
5	4.04

3.4 Contractor travel

Figure 4 below identifies that the total kg of CO₂e increased from 0 in year 1 to 43,490 and 229 kg of CO₂e for contractor travel – road and contractor travel – helicopters (respectively). The reason there is 0 kg of CO₂e in year 1 for both attributes, is that this was a preparatory year and no conservation activities were undertaken.

Generally contractor travel – helicopter is always higher than contractor travel – road this is because of the amount of carbon used in aviation fuel when compared to motor vehicle fuel. However, in year 5, there was only one contractor travel journey taken by helicopter, which explains why the trend is reversed in this year.

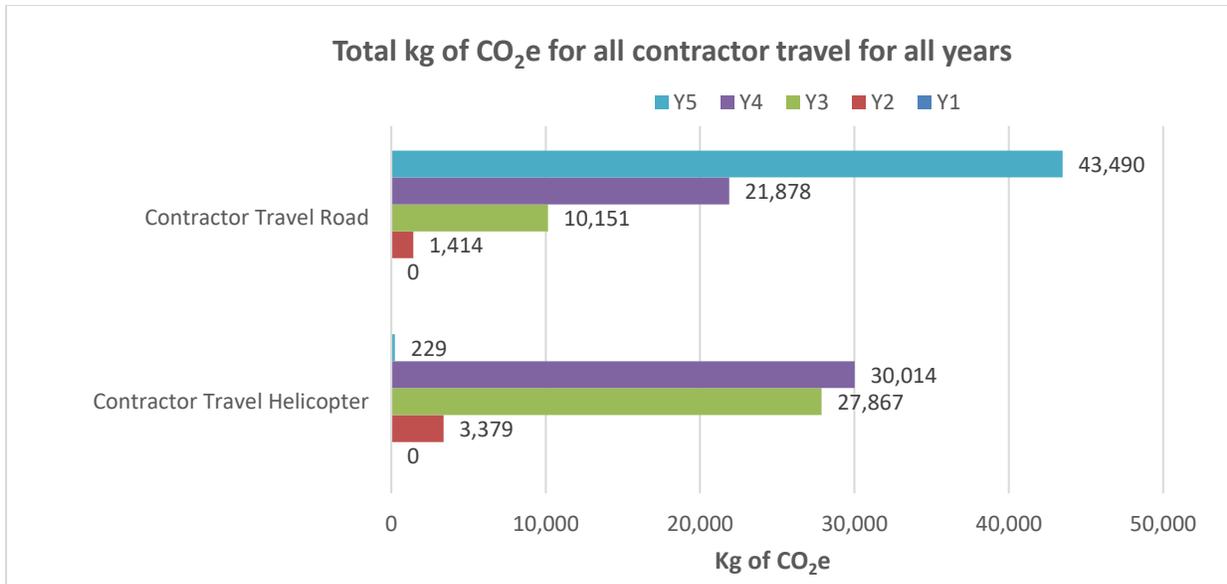


Figure 4 - Total kg of CO₂e for all contractor travel

3.5 Deliveries of materials

Figure 5 - below identifies that the amount of material delivered by road peaks in year 4 with 10,422 kg of CO₂e with the other years staying constant around the 4000 kg of CO₂e. This peak is due to a peak in the type of activity and the materials used to deliver it in year four, (e.g. three times as much brash being delivered compared to year 5). Whereas the materials delivered by helicopter has increased year on year, which is a direct result of the amount / type of works delivered as part of the project (e.g. 3 times as many stone dams were installed in year 5 compared to year 4).

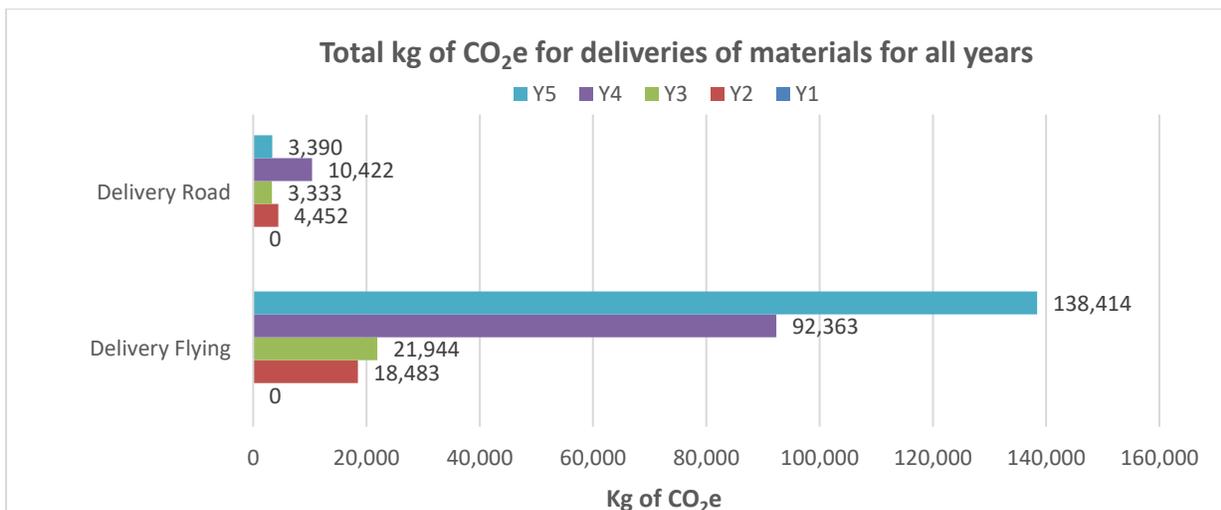


Figure 5 - Total kg of CO₂e for all deliveries for all years of the project

3.6. Cutting

The amount of cutting - all types (e.g. Molinia, heather) shows a year on year increase up until year 4, then in year 5 it decreases to 2,643 kg of CO₂e , see Table 4 below. This is because the majority of cutting had been completed in previous years.

Table 4 - Total kg of CO₂e for cutting of all habitats for all years

	Year 1	Year 2	Year 3	Year 4	Year 5
Cutting	0	733	5,131	5,546	2,643

3.7 Associated beneficiaries CO₂e contributions

Table 5 below identifies the split by partners and has been included to allow our associated beneficiaries to identify where they can reduce the amount of carbon used on the project.

Table 5 - Total CO₂e contributions by associated beneficiaries for year 5 of the ML2020 project and the highest contributing activities

Partner	Year 5 total kg of CO ₂ e	Highest contributing activities towards the total
MFFP	194,478	Deliveries – flying and contractor travel - road
NT	26,138	Deliveries – flying and employee commute
PP	188	Employee commute and project staff travel
RSPB	4,375	Deliveries – flying and pool car travel

3.8 Total carbon emissions

When looking at the total GHG emissions for entire project, we can see that 576,634 Kg of CO₂e have been emitted to date. Which is the equivalent of a family car driving 1,449,195 miles. The majority (70%) of those emissions came in years 4 and 5. This coincides with when MFFP has had their two biggest delivery seasons in its history.

4. Impacts

Research undertaken by Worrall *et al.* (2011) identifies that restoration of state 2 (bare peat) (MFFP, 2012) active blanket bog sites produces a significant overall positive carbon benefit; it is therefore expected that the ML2020 work will be carbon neutral. Despite this, MFFP and our associated beneficiaries are committed to reducing the carbon footprint associated with the project through a number of key areas.

Applying the outcome of the carbon audit data indicates that the greatest saving could be achieved in areas relating to staff travel / employee commute, as this contributes the most to total GHG emissions in 3 out of the 5 years and includes actions such as:

- Car sharing / use of public transport when and where logistically possible.
- Purchase or lease of vehicles with the lowest CO₂/ km emissions (e.g. hybrid vehicles).
- Optimise/ reduce number of meetings - use of remote meeting facilities / telephone and video conferences.
- Work from home days.

Additionally the greatest individual carbon emissions are in relation to helicopter journeys, therefore undertaking actions such as those identified below will also help reduce our carbon footprint.

- Specifying local helicopter take-off sites and the right helicopters for the job, where appropriate.
- Accurately specifying areas using desk-based GIS and helicopter-mounted GPS.
- Siting lift points as close to the working area as possible.

5. Conclusion

This report utilises the methodology presented by Benson, Crouch, Thorpe and Walker (2016) to calculate the kg of CO₂e used in all years of the project for MFFP, NT, RSPB Pennine Prospects. With the additional year 1 figures included, it is possible to determine that **4,833 kg of CO₂e** was used to deliver year 1 of the ML2020 project. As expected this increased, to **225,179 kg of CO₂e** in year 5 due to a number of factors including:

- Significant on-site conservation works undertaken.
- Longer timescales being monitored in subsequent years, as year 1 was not a full year.
- Additional staff resource required to deliver the ML2020 project.

Analysis of the data indicates that the 3 largest contributors to total kg CO₂e emitted to deliver the project are:

- Employee commute – **16,226 kg of CO₂e**.
- Deliveries - Helicopters – **138,414 kg of CO₂e**.
- Contractor Travel Road – **43,490 kg of CO₂e**.

Whilst operations involving flying were expected to contribute a significant amount of kg of CO₂e based upon the findings of the original MoorLIFE carbon audit, employee commute was not expected to be such a significant contribution. This could be due to a number of factors including, a significant increase in the number of staff delivering the project especially compared to the original MoorLIFE project.

With employee commute contributing a significant share to the total kg of CO₂e emitted for each year of the project, it suggests that implementing / encouraging staff to undertake the following measures, see below, would have the greatest impact in reducing the carbon footprint of ML2020:

- Car sharing / use of public transport when and where logistically possible.
- Optimise/ reduce number of meetings - use of remote meeting facilities/telephone and video conferences.
- Purchase or lease of vehicles with the lowest CO₂/ km emissions (e.g. hybrid vehicles).

Whilst the largest individual GHG emissions are produced from helicopter use, other ways to reduce the emissions would be to:

- Specify local helicopter take-off sites and the right helicopters for the job.
- Accurately specify areas using desk-based GIS and helicopter-mounted GPS.
- Siting lift points as close to the working area as possible.

In total the project has emitted **576,634 Kg** of CO₂e to date, which is the equivalent of a family car driving 1,449,195 miles. The majority (70%) of the emissions were recorded in years 4 and 5.

6. References

Benson, J., Crouch, T., Thorpe, K., and Walker, J.S. (2016) MoorLIFE 2020: D5 Update Report 2016: A guide to the project carbon audit processes and protocols, including a presentation of Year 1 project audit figures

Carbon Trust. (2017). What are scope 3 emission [online]. Carbon Trust. Available at <https://www.carbontrust.com/resources/fags/services/scope-3-indirect-carbon-emissions/>. Last accessed 22/04/2021

Defra. (2014). UK Greenhouse Gas Conversion Factors Common Queries about the Greenhouse Gas Conversion Tool [online]. UK Government. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/300955/pb14075-ghg-common-queries-140401.pdf. Last accessed 22/04/2021

Defra. (2017). Government emission conversion factors for greenhouse gas company reporting [online]. UK Government. Available at <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting> . Last accessed 22/04/2021

Maskill, R., Sunter, K., Buckler, M., Wittram, B., King, L and Walker, J.S. (2015) MoorLIFE: A carbon audit of the project: Final report.

Moors for the future partnership. (2012) Land management guidance [online]. Moors for the future partnership. Available at <http://www.moorsforthefuture.org.uk/blanket-bog-land-management-guidance>

OECD. (2013). Glossary of terms [online] OECD. Available at <https://stats.oecd.org/glossary/detail.asp?ID=285> .Last accessed 01/082017

Worrall, F., Rowson, J.G., Evans, M.G., Pawson, R., Daniels, S. and Bonn, A. (2011) Carbon fluxes from eroding peatlands – the carbon benefit of revegetation following wildfire. Earth Surface Processes and Landforms 36, 11, 1487 – 1498

Appendix 1 – Assumptions made

Conservation works

1. For helicopter flights from base to site it is assumed that a straight line is flown. Fuel consumption multiplied by km flown.
2. Stone wagons are 100 % laden if delivering 20 tonnes.
3. Tractor and trailer uses 0.24 litres of diesel per km.
4. Heather Cutting – Cutting tractor travels 12.5 m per bag / bale and collecting vehicles travel 50 m per bag on average. Assume one cutting tractor and one collecting tractor per job.

Helicopter works

1. Helicopter base to site flights – Assumed that a straight line is flown from base to site. Fuel consumption multiplied by km flown.
2. Helicopter Fuel is calculated as Aviation Turbine Fuel – Scope 1 as there is no option on Scope 3
3. MoorLIFE carbon audit did not include flights from base to site eg. AH flying from Devon to Glossop. ML2020 audit includes these journeys and also the ground crew journeys.

Travel

1. All notes for individual entries are noted on the relevant spreadsheet using the comments function.

Commute

1. A commute is defined either as a person's journey from home to base or home to a meeting point (where there may be an onward journey to site).
2. The estimation does not take account of holidays.
3. If an employee walks / cycles / car shares to work then the total number of days worked on ML2020 is reduced to take account of this change.
4. If an employee only undertakes, on average 0.25 days or less than this on ML2020 then the figure is rounded down to 0 and they are excluded from the calculation.
5. The number of weeks worked on ML2020 is dependent on when the employee started, and only includes full weeks, if an employee started mid-week, this week is discounted, to take account of any inductions they would be required to take.
6. Only full weeks are taken account of, therefore if a person started part-way through a week, this is not included within the calculation.

7. If an employee commutes to two bases regularly, the commute to the second base (e.g. Aldern house) is included as a separate entry.

Pool Cars

1. We are only interested in number of miles, not the number of people within the car.

Working from home

1. It is better to use an accurate figure is included within the calculations, but if this isn't possible then an estimate is fine, because days spent working from home can be ad-hoc.

Volunteer Travel

1. Only those volunteers that submit a travel claims are captured within the data, if they do not submit a travel claim we cannot prove the journey for audit purposes.

Office Energy Use

1. We are not expecting co-beneficiaries to report on office energy use.
2. As it is difficult to calculate the weekly energy usage for ML2020, the campsite electricity figure for February 2017 has not been separated out from total energy usage.