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LONDON UNIVERSITIES PURCHASING CONSORTIUM

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CORPORATE GREENHOUSE GAS INVENTORY

Reporting Period: August 2022 - July 2023

Executive Summary

The London Universities Purchasing Consortium (LUPC) is a professional buying organization that supports universities, colleges, and other public sector institutions across London by providing cost-effective procurement solutions. By leveraging the collective purchasing power of its members, LUPC helps institutions reduce costs, ensure compliance, and achieve sustainable procurement goals.

This report provides a comprehensive account of LUPC's carbon footprint arising from its operations, covering the period 1st Aug 2022 - 31st July 2023.

This carbon footprint has been calculated in line with the Greenhouse Gas (GHG) Protocol covering Scope 1, 2, and 3 emissions.

The total carbon footprint for LUPC for the period 1st Aug 2022 - 31st July 2023 under the market-based approach was 75.38 tCO_2e. The majority (57.15 tCO_2e) of these emissions were associated with LUPC's Scope 3 purchased goods and services. The emissions categorised by Scope are listed in Table 1.

Table 1: Emissions by Scope under the market-based approach for LUPC

Emissions Source	Emissions (tCO_2e)
Scope 1	2.20
Scope 2 (market-based)	0.04
Scope 3	73.14
Total (market-based)	75.38

By undertaking this exercise, MyCarbon has described the key areas LUPC can focus on to reduce emissions. Priority should be given to addressing Scope 3 purchased goods and services. Specifically, LUPC should engage to seek supplier-specific carbon footprints from office rental and service charges, membership benefits suppliers, and consider event or campaign specific carbon footprinting exercises. As most of these purchases are services rather than products, LUPC could seek emissions intensity data (e.g $kgCO_2e$ / £ spent) from suppliers to improve the accuracy of associated emissions.

MyCarbon recommends LUPC to implement a data governance exercise and establish an annual GHG reporting process. This will facilitate ongoing monitoring

of emissions, ensure they remain minimal, and align with best practices for sustainability reporting.

Quality Assurance

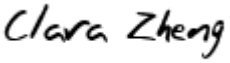
Client:	London Universities Purchasing Consortium
Date:	17/10/2024
Reporting Period:	1st Aug 2022- 31st July 2023

The accuracy of this GHG assessment is directly related to the quality of the data provided by the client.

Primary data representative of activities occurred during the reporting period is used where available. In certain circumstances, secondary data in the form of estimates, extrapolations and/or industry averages is used where primary data is not available.

Assessments based largely on secondary data should only be viewed as an estimate of GHG emissions impact, and actual emissions may vary significantly. It is expected that all clients should aim to improve the proportion of primary data over time.

A Greenhouse Gas inventory produced by MyCarbon, an inventory service provided by Carbon Green Ltd.

James Cuomo *Senior Carbon Consultant, MyCarbon*		17/10/2024
Clara Zheng *Junior Carbon Consultant, MyCarbon*		17/10/2024
Dr. Toby Green *Co-Founder & Director MyCarbon*		17/10/2024

If LUPC are satisfied with the above information and the data provided is representative of authentic client activities within the reporting period, please sign below:

Client Representative Name:	Email:
Mags Shapiro - Responsible Procurement Lead	m.shapiro@lupc.ac.uk

Contents

1 Introduction

This is a greenhouse gas (GHG) inventory report for LUPC for 1st Aug 2022- 31st July 2023, produced by MyCarbon.

The London Universities Purchasing Consortium (LUPC), a non-profit consortium serving universities, colleges, and public sector institutions across London, is dedicated to promoting sustainability and responsible procurement.

This report follows the five main reporting principals as outlined by ISO 14064-1:

- **Transparency:** Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.
- **Relevance:** Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company
- **Accuracy:** Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.
- **Consistency:** Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series
- **Completeness:** Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.

LUPC has compiled a GHG inventory report for 1st Aug 2022- 31st July 2023 to better understand their carbon footprint. The corporate organisational boundaries for the inventory were defined according to the requirements of clause 4.1 of the ISO 14064-1 standard. The operational approach was used for the consolidation of corporate GHG emissions.

This report presents the findings of this exercise. The report follows the ISO 14064-1 standard entitled Specification with Guidance at the Organisation Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals.

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FINDINGS & RECOMMENDATIONS

2 Findings

2.1 Summary of All Emissions

The emissions for LUPC under the location- and market-based approaches for the period 1st Aug 2022- 31st July 2023 were 76.44 and 75.38 tCO_2e, respectively. LUPC's total emission by Scope, under the location- and market-based approaches, are listed in Table 2.

Under both the location- and market- based approaches, Scope 3 was the largest source of emissions at 73.14 tCO_2e, contributing to 95.68% and 97.02% of overall emissions respectively. Purchased goods and services was the primary contributor within Scope 3 (57.15 tCO_2e, 78.14%), where office rental and service charge produced 12.62 tCO_2e (22.08%) of Scope 3 emissions.

The Scope 1 and 2 (location-based) emissions were 2.20 tCO_2e (2.88%) and 1.10 tCO_2e (1.43%) respectively. In contrast, Scope 1 and 2 (market-based) emissions were 2.20 tCO_2e (2.92%) and 0.04 tCO_2e (0.05%) respectively.

Table 2: Emissions by Scope using location- and market-based approaches

Emissions Source	Emissions (tCO_2e)	% of Total Emissions
Scope 1	2.20	2.88
Scope 2 (location-based)	1.10	1.43
Scope 3	73.14	95.68
Total	76.44	100

Emissions Source	Emissions (tCO_2e)	% of Total Emissions
Scope 1	2.20	2.92
Scope 2 (market-based)	0.04	0.05
Scope 3	73.14	97.03
Total	75.38	100

2.2 Scope 1 Emissions

The Scope 1 emissions by source for LUPC are listed in Table 3.

LUPC used 12,036.93 kWh of natural gas in the reporting period, resulting in emissions of 2.20 tCO_2e. This was the only source of Scope 1 emissions.

Table 3: Scope 1 emissions by source

Emissions Source	Emissions (tCO_2e)
Natural gas	2.20
Total	2.20

2.3 Scope 2 Emissions

The Scope 2 location- and market-based emissions for LUPC are listed Table 4. The only source of LUPC's Scope 2 emissions was electricity used in the office (5,296.20 kWh).

LUPC's location-based Scope 2 emissions were 1.10 tCO_2e. LUPC's office's electricity provider procures mostly renewable energy, and the market-based emission factor was sourced from the supplier [1]. This includes emissions related to transmission and distribution losses, resulting in emissions of 0.04 tCO_2e.

Table 4: Scope 2 location- and market-based emissions by source

Emissions Source	Emissions (tCO_2e)
Electricity (location)	1.10
Total	1.10

Emissions Source	Emissions (tCO_2e)
Electricity (market)	0.04
Total	0.04

2.4 Scope 3 Emissions

The Scope 3 emissions for LUPC are listed by category in Table 5. Purchased goods and services was the primary contributor, responsible for 78.14% of total Scope 3 emissions, generating 57.15 tCO_2e.

Costs associated with purchasing and retirement of carbon credits were excluded as these transactions do not directly generate emissions, but rather represent financial mechanisms for offsetting existing emissions elsewhere in the supply chain or operational footprint.

As instructed by LUPC, the costs associated with COUP expenditure were divided by 2 to reflect the portion attributable to them.

Table 5: Scope 3 emissions by category

Emissions Category	Emissions (tCO_2e)	% of Scope 3 Emissions
Purchased goods and services	57.15	78.14
Fuel and energy related activities	0.36	0.50
Waste generated in operations	1.26	1.73
Business travel	5.05	6.90
Employee commuting	9.31	12.73
Total	73.14	100

2.5 Hotspot Analysis

2.5.1 Purchased Goods and Services

The top ten highest emitting purchased goods and services are listed in Table 6. The 'other' category represents all other purchased goods and services not inside the top ten. A full list by source can be found in Table 9, within the appendix.

Office rental and service charge was the primary contributor (12.62 tCO_2e), responsible for 22.08% of purchased goods and services emissions. The second highest source of emissions was from members benefits/subs (4.60 tCO_2e, or 8.05%). The third highest source of emissions was from rates (4.53 tCO_2e, or 7.92%).

LUPC supports procurement of other organisations, thus its business model inherently generates relatively low carbon emissions. LUPC's carbon footprint is primarily driven by office rental and service charges, which were calculated using a spend-based approach. Using this approach, emissions are calculated based on the amount spent on a product or service and multiplying this by the appropriate emissions factor. Therefore, the services which LUPC spends the most on (in this instance, office rental and service charges) is likely to have the greatest carbon footprint associated.

As most of LUPC's purchases are services rather than products, LUPC could seek emissions intensity data (e.g $kgCO_2e$ / £ spent) from suppliers to improve the accuracy of associated emissions.

Table 6: Purchased goods and services

Emissions Category	Emissions (tCO_2e)	% of Total Emissions
Office rental and service charge	12.62	22.08
Members benefits/subs	4.60	8.05
Rates	4.53	7.92
Electronic watch	3.47	6.07
COUP expenditure	2.61	4.57
Accountancy	2.61	4.57
IT services	2.52	4.40
Insurance	2.48	4.34
IT hardware	2.23	3.89
RP – staff costs	2.08	3.63
Others	17.41	30.46
Total	57.15	100

2.5.2 Business Travel

Figure 1 is a pie chart segmenting the sources of business travel emissions by percentage. The largest source of emissions was the "other" category, which includes all spend-based travel emissions (1.97 tCO_2e, 39.07%). The second and third largest sources of emissions was flights (1.19 tCO_2e, 23.66%) and train travel (0.83 tCO_2e, 16.45%). The smallest source of emissions was car travel (0.30 tCO_2e, 5.94%).

Currently, the majority of business travel emissions are calculated based on the spend-based approach. LUPC should limit its reliance on spend-based data by recording the start and end destinations of all travel, ensuring a greater level of accuracy for the associated emissions.

For business travel emissions not calculated using the spend-based approach, emissions associated with flights was the greatest source. Aeroplanes consume more fuel per passenger/kilometre than train and car travel, and emit gases at high

altitudes, amplifying their environmental impact. Therefore, LUPC should try to replace flights with other modes of transport where possible.

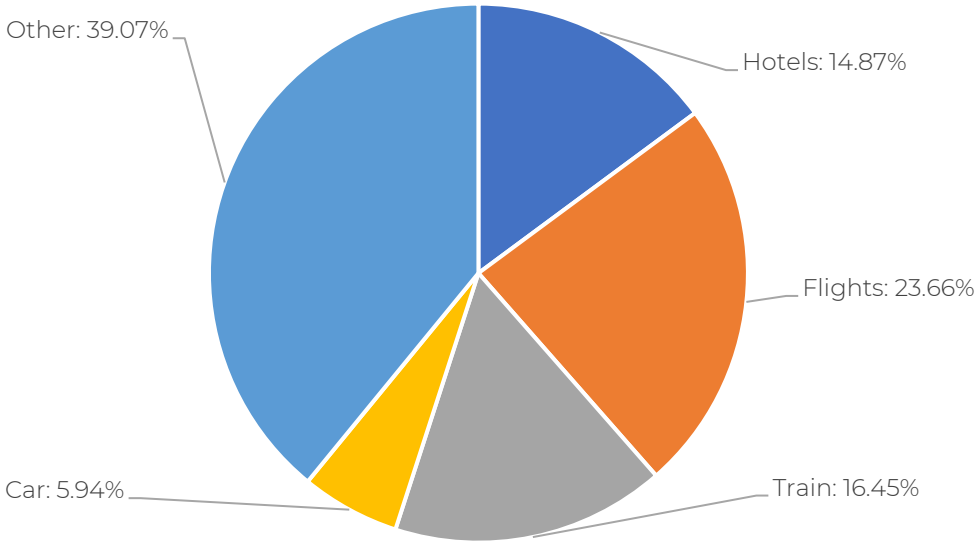

Figure 1: Business travel by emissions source

2.5.3 Employee Commuting

Figure 2 is a pie chart segmenting the sources of employee commuting emissions by percentage. The largest source of emissions was the homeworking category (6.50 tCO_2e, 69.76%). The second and third largest sources of emissions was train travel (1.88 tCO_2e, 20.22%) and motorbike travel (0.45 tCO_2e, 4.88%). The smallest source of emissions was bus travel (0.03 tCO_2e, 0.36%).

Homeworking includes electricity associated with office equipment, as well as energy used for heating. Since most employees at LUPC only commute once per week, emissions associated with homeworking was the highest. LUPC should continue to encourage its employees to use carbon efficient modes of transport for commuting (e.g. tube, trains).

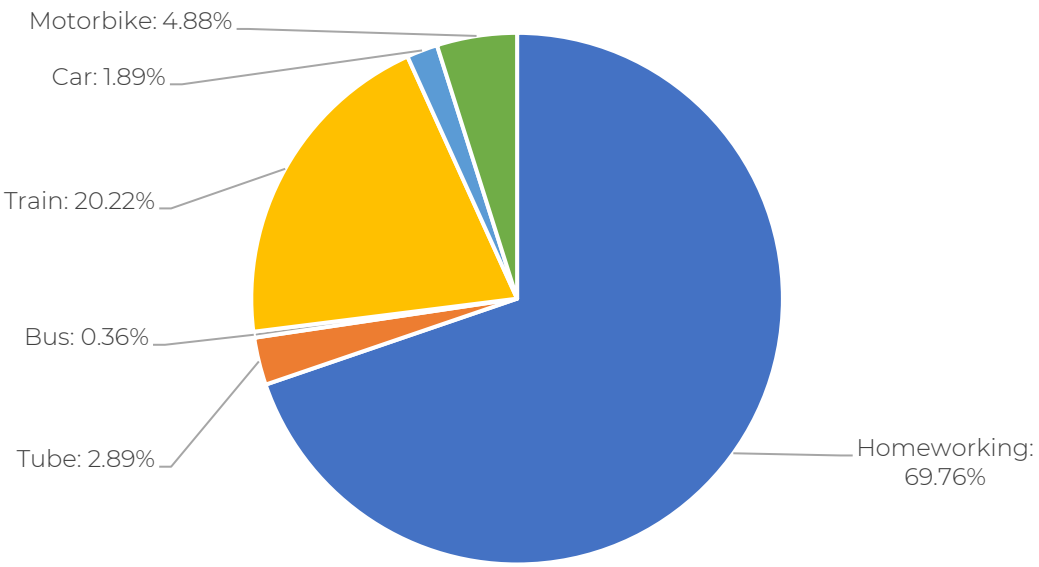

Figure 2: Employee commuting by emissions source

3 Recommendations

LUPC has begun their sustainability journey, through conducting a GHG inventory report for 1st Aug 2022 - 31st July 2023. Following the completion of this report, MyCarbon has made the following recommendations, listed in Table 7.

In addition to the comprehensive GHG inventory report outlined, MyCarbon remains committed to supporting LUPC in their sustainability journey. This includes conducting a tailored workshop offering in-depth training on the methodologies used in this report, equipping LUPC with the knowledge and tools necessary to conduct future GHG inventories independently. Future suggestions include a variety of services that LUPC can easily incorporate into their sustainability efforts. These include:

Table 7: Key recommendations and justifications

Recommendation	Description & Justification
Data governance	Improves quality of activity data to calculate a more accurate carbon footprint and identify additional opportunities for emissions reduction.
Net Zero Strategy	Provides a comprehensive strategy to reduce emissions and achieve net-zero emission by 2050 at the latest, helping to future-proof LUPC.
Science-based Targets Submission	Validation of reduction targets to ensure they are in line with the Paris Agreement goals.

Data Governance

Improvements in data quality will lead to a more accurate representation of LUPC's emissions profile. Currently, most of the business travel is tracked based on expenditure. However, by recording travels based on their origin and destination to calculate mileage, a more accurate carbon footprint can be generated, enabling the identification of additional opportunities for emissions reduction.

Overall, LUPC requires extra assistance in improving the quality of activity data used to calculate their corporate carbon footprint. Implementing a consistent and improved data collection strategy across all business operations will reduce the resources needed to get precise and reliable data, hence expediting the reporting

process. MyCarbon recommends implementing a Data Governance exercise to improve the accuracy and efficiency of data collection.

Net-Zero Strategy and Science Based Target Initiative (SBTi) Submission

Now LUPC has obtained a comprehensive GHG inventory, MyCarbon recommends developing a net-zero strategy. With this new inventory as a baseline, MyCarbon can model the required reductions for LUPC to achieve net-zero emissions in the coming decades, ensuring the business remains future-proof. This strategy will involve mapping various emissions reduction methods and assessing their impact on LUPC's future emissions.

Following the establishment of net-zero targets, LUPC may choose to submit these targets to the SBTi. SBTi validation will confirm that the targets align with the latest climate science needed to meet the Paris Agreement goals, thereby enhancing their credibility and demonstrating a strong commitment to sustainability. MyCarbon will provide full support throughout the SBTi submission process to ensure that LUPC's targets meet all necessary criteria.

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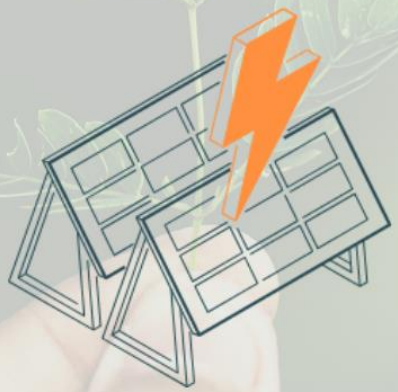
METHODOLOGY



4 Methodology

4.1 Identified Emissions and Exclusions

The emissions that were determined to be relevant within the organizational boundary are listed in Table 8. As costs associated with transportation of goods were impossible to separate from the nominal ledger, emissions related to upstream transportation and distribution are included in purchased goods and services.

Table 8: Emissions sources included in the organisational boundary.

Scope	Category		Emission Source	Included
1			Stationary combustion	Yes
			Company vehicles	No
			Fugitive emissions	No
			Refrigerants	No
2			Electricity usage	Yes
			Heating	No
			Cooling	No
3	1	Upstream	Purchased goods and services	Yes
	2		Capital goods	No
	3		Fuel and energy related activities	Yes
	4		Upstream transportation and distribution	No
	5		Waste generated in operations	Yes
	6		Business travel	Yes
	7		Employee commuting	Yes
	8		Upstream leased assets	No

3	9	Downstream	Downstream transportation and distribution	No
	10		Processing of sold products	No
	11		Use of sold products	No
	12		End of life treatment of sold products	No
	13		Downstream leased assets	No
	14		Franchises	No
	15		Investments	No

4.2 Organisational Boundaries

The GHG Protocol Corporate Standard outlines two approaches for consolidating GHG data—the equity share approach and the operational control approach—through organizational boundaries. These are boundaries that determine the operations owned or controlled by the reporting company, depending on the consolidation approach taken. In some cases, it may be possible to apply these approaches directly to emissions/removals associated with sequestered atmospheric carbon.

The GHG inventory report covers all Scope 1, 2, and 3 emissions for LUPC using the operational control approach. Details of each building included within the organisational boundary of this report are listed below:

Shropshire House,

1 Capper Street,

London,

WC1E 6JA

4.3 Emission Factors

The methodologies used to collect and assess the emissions data varied throughout the inventory. The primary methodology used was multiplying GHG activity data by appropriate GHG emission factors. All methodologies were selected based on their ability to provide accurate and consistent results. The use of activity data and

emission factors was feasible due to the availability of both accurate activity data and emission factors from reputable organisations.

MyCarbon uses the latest figures from DEFRA and peer reviewed literature for all common emission factors listed in Table 10 in the appendix [2] [3].

4.4 Calculating Emissions from Electricity Consumption

There are two methods for calculating emissions from electricity consumption: the location-based and market-based methods. The location-based method is used to calculate emissions based on the emissions intensity of the local grid area where the electricity usage occurs. The market-based method calculates emissions on the basis that the company has chosen to purchase renewable electricity.

The market-based emission factor was sourced from the supplier. This includes emissions related to transmission and distribution losses. Both location- and market-based emissions were calculated and reported in this study.

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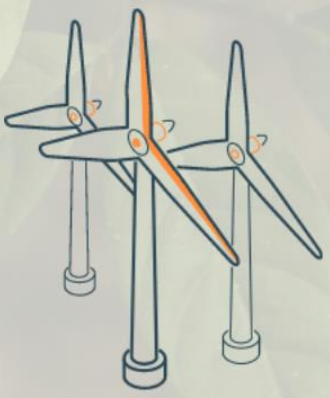
APPENDICES



5 Appendices

5.1 References

[1] OPUS energy, “Fuel Mix Disclosure,” [Online]. Available: https://www.opusenergy.com/fuel-mix-disclosure/. [Accessed 25 Sept 2024].

[2] DEFRA, “Greenhouse Gas Reporting: Conversion Factors 2023”, 2023. [Online]. Available: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023.

[3] DEFRA, “UK and England's carbon footprint to 2021,” 2021. [Online]. Available: https://www.gov.uk/government/statistics/uks-carbon-footprint.

5.2 Purchased Goods and Services

Table 9: Full list of purchased goods and services

Emissions Category	Emissions (tCO_2e)	% of Total Emissions
Office rental and service charge	12.62	22.08
Members benefits/subs	4.60	8.05
Rates	4.53	7.92
Electronic watch	3.47	6.07
COUP expenditure	2.61	4.57
Accountancy	2.61	4.57
IT services	2.52	4.40
Insurance	2.48	4.34
IT hardware	2.23	3.89
RP – staff costs	2.08	3.63
Landline Telephone/Mobile/Broadband	1.63	2.86
eTendering	1.44	2.53
Spend Analysis	1.34	2.34
Agency fees	1.33	2.32
Miscellaneous	1.22	2.13
Internal Audit	1.16	2.02
HEC Contracts	0.92	1.61
Website and CRM	0.92	1.60
Social Events	0.84	1.47
Subscriptions - Professional	0.68	1.19
RP – External consultancy	0.68	1.19

Legal and Professional Fees	0.64	1.12
HR Services	0.56	0.98
External Audit	0.56	0.98
Linked Costs	0.55	0.96
Staff Training	0.48	0.84
Cleaning	0.42	0.74
Room Hire – including catering	0.38	0.66
Printing, Photocopying, Postage & Stationery	0.24	0.41
RP – Other costs	0.22	0.39
Bank Charges	0.22	0.38
Members Training	0.21	0.38
Consultancy/Procurement Support	0.14	0.25
General Marketing	0.13	0.23
Water use	0.13	0.22
Subsistence	0.12	0.22
Annual Report	0.11	0.18
Repairs and Maintenance	0.09	0.15
Entertainment	0.05	0.09
Total	57.15	100

5.3 Emission Factors

Table 10: Emissions factors used in this assessment

Category	Emission Factors	Units	Reference
Natural gas	0.18	$kgCO_2e$/kWh (Gross CV)	(DEFRA, 2023)
Electricity (UK, market-based)	0.039	$kgCO_2e$/kWh	Supplier specific [1]
Bus	0.08	$kgCO_2e$/passenger.km	(DEFRA, 2023)
Car (large)	0.23	$kgCO_2e$/km	(DEFRA, 2023)
Car (average)	0.17	$kgCO_2e$/km	(DEFRA, 2023)
Train	0.04	$kgCO_2e$/passenger.km	(DEFRA, 2023)
Motorbike (medium)	0.10	$kgCO_2e$/km	(DEFRA, 2023)
International flights	0.02	$kgCO_2e$/passenger.km	(DEFRA, 2023)
Domestic flights	0.27	$kgCO_2e$/passenger.km	(DEFRA, 2023)
Other travel	1.87	$kgCO_2e$/GBP	(DEFRA, 2021)
Accommodation	0.32	$kgCO_2e$/GBP	(DEFRA, 2021)
Accountancy	0.13	$kgCO_2e$/GBP	(DEFRA, 2021)
Agency fees	0.11	$kgCO_2e$/GBP	(DEFRA, 2021)
Annual Report	0.15	$kgCO_2e$/GBP	(DEFRA, 2021)
Bank Charges	0.11	$kgCO_2e$/GBP	(DEFRA, 2021)
Cleaning	0.06	$kgCO_2e$/GBP	(DEFRA, 2021)
Consultancy/Procurement Support	0.14	$kgCO_2e$/GBP	(DEFRA, 2021)
COUP expenditure	0.32	$kgCO_2e$/GBP	(DEFRA, 2021)
Electronics Watch	0.15	$kgCO_2e$/GBP	(DEFRA, 2021)
Entertainment	0.29	$kgCO_2e$/GBP	(DEFRA, 2021)

eTendering	0.14	$kgCO_2e/GBP$	(DEFRA, 2021)
External Audit	0.13	$kgCO_2e/GBP$	(DEFRA, 2021)
General Marketing	0.11	$kgCO_2e/GBP$	(DEFRA, 2021)
HEC Contracts	0.188	$kgCO_2e/GBP$	(DEFRA, 2021)
HR Services	0.15	$kgCO_2e/GBP$	(DEFRA, 2021)
Insurance	0.31	$kgCO_2e/GBP$	(DEFRA, 2021)
Internal Audit	0.13	$kgCO_2e/GBP$	(DEFRA, 2021)
IT Hardware	0.37	$kgCO_2e/GBP$	(DEFRA, 2021)
IT Services	0.14	$kgCO_2e/GBP$	(DEFRA, 2021)
Landline Telephone/Mobile/Braodband	0.1	$kgCO_2e/GBP$	(DEFRA, 2021)
Legal and Professional Fees	0.06	$kgCO_2e/GBP$	(DEFRA, 2021)
Linked Costs	0.17	$kgCO_2e/GBP$	(DEFRA, 2021)
Members benefits/subs	0.20	$kgCO_2e/GBP$	(DEFRA, 2021)
Members Training	0.17	$kgCO_2e/GBP$	(DEFRA, 2021)
Miscellaneous	1.02	$kgCO_2e/GBP$	(DEFRA, 2021)
Office Rental & Service Charges	0.18	$kgCO_2e/GBP$	(DEFRA, 2021)
Printing, Photocopying, Postage & Stationery	0.24	$kgCO_2e/GBP$	(DEFRA, 2021)
Rates	0.18	$kgCO_2e/GBP$	(DEFRA, 2021)
Repairs and maintenance	0.08	$kgCO_2e/GBP$	(DEFRA, 2021)
Room Hire - including catering	0.29	$kgCO_2e/GBP$	(DEFRA, 2021)
RP - External consultancy	0.15	$kgCO_2e/GBP$	(DEFRA, 2021)
RP - Other costs	0.29	$kgCO_2e/GBP$	(DEFRA, 2021)
RP - staff costs	0.15	$kgCO_2e/GBP$	(DEFRA, 2021)
Social Events	0.31	$kgCO_2e/GBP$	(DEFRA, 2021)

Spend Analysis	0.18	$kgCO_2e$/GBP	(DEFRA, 2021)
Staff Training	0.17	$kgCO_2e$/GBP	(DEFRA, 2021)
Subscriptions - Professional	0.20	$kgCO_2e$/GBP	(DEFRA, 2021)
Subsistence	0.26	$kgCO_2e$/GBP	(DEFRA, 2021)
Website and CRM	0.14	$kgCO_2e$/GBP	(DEFRA, 2021)
Water use	0.22	$kgCO_2e$/GBP	(DEFRA, 2021)
Wastewater	0.27	$kgCO_2e$/GBP	(DEFRA, 2021)
Office waste	1.29	$kgCO_2e$/GBP	(DEFRA, 2021)

5.4 Context

5.4.1 What is the importance of measuring greenhouse gases (GHGs)?

GHG emissions are contributing to global warming and climate change, which have been recognised as a key sustainable development issue. Many governments through local and international efforts are taking steps to reduce GHG emissions through national policies that include the introduction of emissions trading programs, voluntary programs, carbon or energy taxes, and regulations and standards on energy efficiency and emissions. As a result, companies must be able to understand and manage their GHG risks if they are to ensure long-term success in a competitive business environment, and to be prepared for future national or regional climate policies.

Quantification of GHGs emitted by a business or organisation's activities in the form of a carbon footprint is an important tool used by stakeholders to recognise their impact and act, often through offsetting activities.

Offsetting is a particular method employed to reduce, remove, or prevent the release of GHG emissions into the atmosphere, which can be done through the purchase and retirement of carbon credits. Due to the tight control on carbon credits, retirement of a credit is the only method one can do to offset their carbon footprint. For example, if a business produced 100 tonnes of CO_2, they would need to purchase and retire 100 carbon credits to become carbon neutral.

5.4.2 Reporting standards

When performing a GHG inventory, these assessments should align with one of two recognised standards for accounting and reporting corporate GHG emissions. The

most well-known is the "Greenhouse Gas Protocol – Corporate Accounting and Reporting Standard" (GHG Protocol, 2011) developed in a partnership of the World Business Council for Sustainable Development (WBCSD) and the World Resource Institute (WRI). The International Organization for Standardization (ISO) also produced the ISO14064 specification series, detailing specification and guidance for the organisation and project levels, as well as for the validation and verification of emissions.

Data supplied by clients is used in GHG assessments, which is quantified into GHG emission estimates by applying relevant and up-to-date emission factor(s) from reputable sources, like DEFRA. An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Quality and accuracy of emission factors can vary between government publications and scientific research journals, therefore it is best practice to apply emission factors only from reputable sources, such as DEFRA.

GHG assessments quantify all six Kyoto Protocol GHGs, where applicable, and are measured in terms of tonnes carbon dioxide (CO_2) equivalence, or tCO_2e, where equivalence means having the same warming effect as CO_2 over a period of 100 years. The six Kyoto Protocol gases are CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6) and perfluorocarbons (PFCs). The global warming potential (GWP) of each GHG is listed in Table 11.

Table 11: GHGs listed in the Kyoto Protocol and their Global Warming Potential (GWP)

Greenhouse Gas	Chemical Formula	GWP (CO_2e)
Carbon dioxide	CO_2	1.0
Methane	CH_4	27.0
Nitrous oxide	N_2O	273.0
Hydro fluorocarbons	HFCs	Depends on gas
Sulphur hexafluoride	SF_6	24,500
Perfluorinated compounds	PFCs	Depends on gas

5.5 Emissions Scopes

Emission sources can be broken down into three distinct categories called Scopes.

Scope 1

Scope 1 accounts for the direct GHG emissions occurring from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.: emissions from chemical production in owned or controlled process equipment.

Scope 2

Scope 2 accounts for GHG emissions from the generation of purchased electricity, heat or steam consumed by the company. Purchased electricity, heat or steam is defined as electricity, heat or steam that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity, heat or steam is generated.

Scope 3

Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials, transportation of purchased fuels and use of sold products and services.

The GHG Protocol describes the quantification of Scope 1 and 2 as mandatory, whereas Scope 3 emissions are considered optional. Depending on the nature/remit of an organisation, Scope 3 activities can contribute a significant proportion of overall emissions, and therefore to gain a proper understanding of an organisation's GHG emissions it is advisable to include all relevant sources.

5.6 Client Contact Details

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