

CO2 Performance Portfolio

Supplier CO2 Emissions Analysis

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1. Introduction

Arup has made a commitment to be a net zero organisation by 2030. GHG Reporting Scope 3 Categories 1 and 2 concern “Purchased Goods and Services” and “Capital Goods”.

This document aims to assess the goods and services suppliers during the calendar year 2022 and report according to the requirements of the CO2-prestatieladder.

Arup Europe Region (ER) has produced a Europe Region Net Zero GHG Reduction Plan. The plan reports that 67% of the Arup ER emissions come from Scope 3 Purchased goods and services and capital goods. This is a key reason why Arup NL have investigated the emissions from our upstream supply chain. A comparison will be made between the Arup NL upstream supplier emissions with those presented in the ER Net Zero GHG Reduction Plan.

This report will focus on the top 80% of Arup NL suppliers based on purchase value. This approach allows significant insight into our potential carbon emission influence within our supply chain whilst keeping the number of suppliers within the analysis manageable. It is also in line with the 80% for identification of an organisational boundary set out in Chapter 4 of the CO2 Prestatieladder Handbook, “Methode 2; de laterale methode”.

1.1 Definitions

1.1.1 GHG Protocol Sub-categorization Definitions & Commentary:

As per the GHG Protocol ‘Corporate Value Chain (Scope 3) Accounting and Reporting Standard’¹, this category of scope 3 emissions is defined as follows:

- **(1) Purchased Goods and Services** – ‘Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in categories 2-8’.

For reference the GHG standard combines Goods and Services procured by Arup, however for analysis we should have these divided to reflect the varying scales of which Arup procure services and goods. In addition Scope 2-8 include other scope 3 emissions Arup manage separately, for example Business Travel, Employee commuting, waste generated in operations etc.

- **(2) Capital Goods** – ‘Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year’. This must include ‘All upstream (cradle-to-gate)² emissions of purchased capital goods’

Within previous GHG Emissions reporting cycles, Arup have utilized a spend based approach whereby spend data has been used to generate a carbon emission value for different services and goods procured by Arup – this is an acceptable methodology, however is less accurate than supplier & service provide carbon data.

¹ https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporting-Standard_041613_2.pdf

² <https://www.eea.europa.eu/help/glossary/eea-glossary/cradle-to-grave>

2. Methodology

2.1 Methodology Followed

The following methodology has been used to identify relevant suppliers and calculate the associate CO2 emissions.

Stage 1 – Identification of relevant suppliers within an organisation boundary:

1. A list of suppliers and invoices was provided by the Finance Team for the 2022 calendar year (1st January to 31st December), see Appendix A.
2. CO2-Prestatieladder Handboek 3.1 section 4.1 “Methode 2: de laterale methode” has been used to identify which suppliers fall within the organisational boundary. To do this, the suppliers were first ranked from largest (highest spend) to smallest (lowest spend). The cumulative purchase value of suppliers was then calculated and the top 80% of suppliers was identified, see Figure 1. Table 1 contains a list of the ranked suppliers.
3. Suppliers have been categorised as suppliers of Purchased Goods, Purchase Services or Capital Goods.
4. Suppliers of services have been reviewed to ensure that the Goods and Services have not been included in other GHG Emission Reporting Scope areas. Details of the suppliers that have been excluded from the Scope 3 Category 1 & 2 analysis can be found in Table 5.
5. Suppliers with negative total spends have also been excluded.

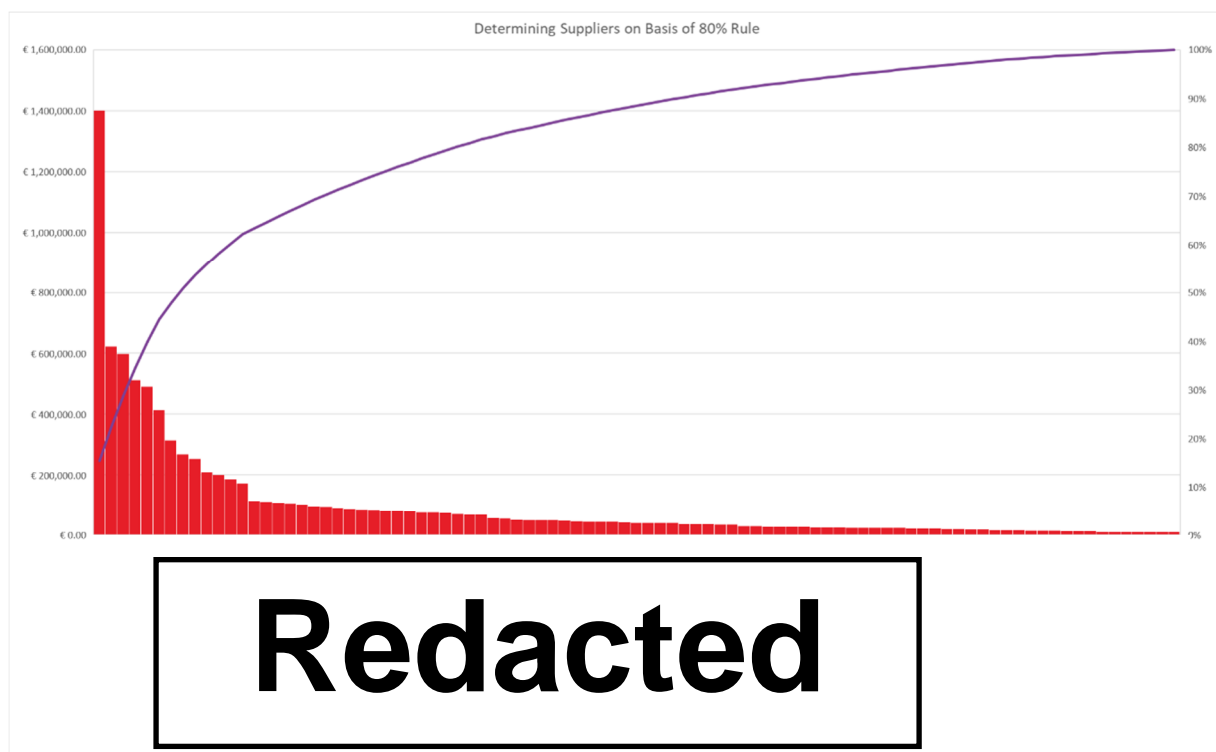


Figure 1: Identification of top 80% of suppliers

This results in the 91 suppliers shown in Table 1 being included in the analysis.

Stage 2 – Calculation of CO2 emissions

A database of UK Department for Environment, Food and Rural Affairs (DEFRA) emissions factors developed by the Centre of Sustainability Accounting (CenSA) has been used to estimate CO2 emissions based on the cost of the goods and services. See Appendix B for details. These emissions factors are based on data from 2019, at this time there is not a more recent update to the data so costs have been indexed accordingly. (Note that this is an improvement on the 2011 factors which were used in this analysis for the reporting period January to December 2021.)

6. Each supplier has assigned a product category according to the Standard Industrial Classification (SIC) Codes.
7. The total kg of CO₂ per £ is read from the DEFRA emissions factor database for each product category.
8. The emission factors have been indexed from 2019 to 2022 figures³
9. The total spend per supplier was converted from EUR to £ using an average exchange rate for 2022⁴ to calculate a 2022 £ equivalent spend per supplier.
10. The total kg of CO₂ per £ is then multiplied by the 2022 equivalent emission factor to estimate the CO₂ emissions per supplier.

The results of this calculation are shown in Section 2.2.

Table 1: List of Suppliers included in analysis

Supplier	Total Spend with Supplier	DEFRA Product Category	Supplier Type
Redacted		Insurance, reinsurance and pension funding services, except compulsory social security & Pensions	Purchased Services
		Real estate services, excluding on a fee or contract basis and imputed rent	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Education services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Rental and leasing services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Computer programming, consultancy and related services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Services auxiliary to financial services and insurance services	Purchased Services

³ Using a conversion rate of 1.05 GBP in 2022 to 1 GBP in 2019 (<https://www.worlddata.info/europe/united-kingdom/inflation-rates.php>)

⁴ 1EUR to 0.8528GBP (<https://www.exchangerates.org.uk/EUR-GBP-spot-exchange-rates-history-2011.html#:~:text=Average%20exchange%20rate%20in%202011,GBP%20on%2009%20Jan%202011>)

Supplier	Total Spend with Supplier	DEFRA Product Category	Supplier Type
Redacted		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Computer programming, consultancy and related services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Other professional, scientific and technical services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Services of head offices; management consulting services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Computer, electronic and optical products	Capital Goods
		Services to buildings and landscape	Purchased Services
		Services to buildings and landscape	Purchased Services
		Accounting, bookkeeping and auditing services; tax consulting services	Purchased Services
		Education services	Purchased Services
		Accounting, bookkeeping and auditing services; tax consulting services	Purchased Services
		Services of head offices; management consulting services	Purchased Services
		Accounting, bookkeeping and auditing services; tax consulting services	Purchased Services
		Telecommunications services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Financial services, except insurance and pension funding	Purchased Services

Supplier	Total Spend with Supplier	DEFRA Product Category	Supplier Type
Redacted		Education services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Warehousing and support services for transportation	Purchased Services
		Accommodation services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Printing and recording services	Purchased Goods
		Services of head offices; management consulting services	Purchased Services
		Accommodation services	Purchased Services
		Security and investigation services	Purchased Services
		Education services	Purchased Services
		Legal services	Purchased Services
		Services of head offices; management consulting services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Human health services	Purchased Services
		Computer, electronic and optical products	Purchased Goods
		Services furnished by membership organisations	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Office administrative, office support and other business support services	Purchased Services
		Construction4	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Goods
		Construction4	Purchased Services

Supplier	Total Spend with Supplier	DEFRA Product Category	Supplier Type
Redacted		Services of head offices; management consulting services	Purchased Services
		Furniture	Capital Goods
		Education services	Purchased Services
		Services furnished by membership organisations	Purchased Services
		Insurance, reinsurance and pension funding services, except compulsory social security & Pensions	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Food and beverage serving services	Purchased Services
		Legal services	Purchased Services
		Food and beverage serving services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Accommodation services	Purchased Services
		Financial services, except insurance and pension funding	Purchased Services
		Accommodation services	Purchased Services
		Education services	Purchased Services
		Food and beverage serving services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Insurance, reinsurance and pension funding services, except compulsory social security & Pensions	Purchased Services
		Food and beverage serving services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Services of head offices; management consulting services	Purchased Services
		Office administrative, office support and other business support services	Purchased Services
		Computer programming, consultancy and related services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services

Supplier	Total Spend with Supplier	DEFRA Product Category	Supplier Type
<div>Redacted</div>		Education services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Office administrative, office support and other business support services	Purchased Services
		Electrical equipment	Purchased Services
		Real estate services on a fee or contract basis	Purchased Services
		Education services	Purchased Services
		Architectural and engineering services; technical testing and analysis services	Purchased Services
		Services to buildings and landscape	Purchased Services
		Paper and paper products	Purchased Services
Total			

2.2 CO2 Emissions

2.2.1 Scope 3 Category 1 – Purchased Goods and Services

Table 2 gives the CO2 emissions for the goods suppliers. The total CO2 emissions for the goods suppliers identified within the top 80% of suppliers is 11269kg from a total of 1 Purchased Goods supplier. provides office supplies, including toner.

Table 2: CO2 emissions for Purchased Goods Suppliers

Purchased Good Suppliers	2022 Spend (£)	SIC Code	Product Category	2022 kg CO2e/£	Total kg CO2e
Redacted		18	Printing and recording services	0.298	Redacted
Total					11,269

Table 3 gives the CO2 emissions for from Purchased Services. The total CO2 emissions for the services suppliers identified within the top 80% of suppliers is 681,271 kg CO2e from a total of 87 services suppliers.

Table 3: CO2 emissions for Service Suppliers

Purchased Services Suppliers	2022 Spend (£)	SIC Code	Product Category	2022 kg CO2e/£	Total kg CO2e
Redacted		65.1-2	Insurance and reinsurance services, except compulsory social security	0.051	Redacted

Purchased Services Suppliers	2022 Spend (£)	SIC Code	Product Category	2022 kg CO2e/£	Total kg CO2e
Redacted		68.12	Real estate services, excluding on a fee or contract basis and imputed rent	0.062	Redacted
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		85	Education services	0.050	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		77	Rental and leasing services	0.086	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		62	Computer programming, consultancy and related services	0.074	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		66	Services auxiliary to financial services and insurance services	0.043	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		62	Computer programming, consultancy and related services	0.074	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		74	Other professional, scientific and technical services	0.106	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		70	Services of head offices; management consulting services	0.078	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		81	Services to buildings and landscape	0.108	

Purchased Services Suppliers	2022 Spend (£)	SIC Code	Product Category	2022 kg CO2e/£	Total kg CO2e
Redacted		81	Services to buildings and landscape	0.108	Redacted
		69.2	Accounting, bookkeeping and auditing services; tax consulting services	0.108	
		85	Education services	0.050	
		69.2	Accounting, bookkeeping and auditing services; tax consulting services	0.108	
		70	Services of head offices; management consulting services	0.078	
		69.2	Accounting, bookkeeping and auditing services; tax consulting services	0.108	
		61	Telecommunications services	0.083	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		64	Financial services, except insurance and pension funding	0.052	
		85	Education services	0.050	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		52	Warehousing and support services for transportation	0.131	
		55	Accommodation services	0.140	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		70	Services of head offices; management consulting services	0.078	
		55	Accommodation services	0.140	
		80	Security and investigation services	0.078	
		85	Education services	0.050	
		69.1	Legal services	0.031	
		70	Services of head offices; management consulting services	0.078	
		71	Architectural and engineering services; technical testing and analysis services	0.114	

Purchased Services Suppliers	2022 Spend (£)	SIC Code	Product Category	2022 kg CO2e/£	Total kg CO2e
Redacted		86	Human health services	0.101	Redacted
		94	Services furnished by membership organisations	0.070	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		82	Office administrative, office support and other business support services	0.095	
		41.2	Buildings and building construction works	0.191	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		41.2	Buildings and building construction works	0.191	
		70	Services of head offices; management consulting services	0.078	
		85	Education services	0.050	
		94	Services furnished by membership organisations	0.070	
		65.1-2	Insurance and reinsurance services, except compulsory social security	0.051	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		56	Food and beverage serving services	0.148	
		69.1	Legal services	0.031	
		56	Food and beverage serving services	0.148	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		55	Accommodation services	0.140	
		64	Financial services, except insurance and pension funding	0.052	
		55	Accommodation services	0.140	
		85	Education services	0.050	
		56	Food and beverage serving services	0.148	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		65.1-2	Insurance and reinsurance services, except compulsory social security	0.051	
		56	Food and beverage serving services	0.148	

Purchased Services Suppliers	2022 Spend (£)	SIC Code	Product Category	2022 kg CO2e/£	Total kg CO2e
Redacted		71	Architectural and engineering services; technical testing and analysis services	0.114	Redacted
		70	Services of head offices; management consulting services	0.078	
		82	Office administrative, office support and other business support services	0.095	
		62	Computer programming, consultancy and related services	0.074	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		85	Education services	0.050	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		82	Office administrative, office support and other business support services	0.095	
		27	Electrical equipment	0.414	
		68.3	Real estate services on a fee or contract basis	0.060	
		85	Education services	0.050	
		71	Architectural and engineering services; technical testing and analysis services	0.114	
		81	Services to buildings and landscape	0.108	
		17	Paper and paper products	0.508	
Total					681,271

2.2.2 Scope 3 Category 2 – Capital Goods

Table 4 gives the CO2 emissions for capital goods suppliers. The total CO2 emissions for the capital goods suppliers identified within the top 80% of suppliers is 48,007kg from a total of 3 Capital Goods suppliers.

The computers and associated hardware supplied by and are essential for the operation of Arup. measures and reports their sustainability impact⁵ and have various awards and accreditations nationally and internationally such as 2022 Energy Star Partner of the Year. ⁶ is also recognised by the Energy Star rating system as well as the EPEAT that evaluates electronics for their effect on the environment.

⁵ <https://www>

⁶ <https://www>.

Table 4: CO2 emissions for Capital Goods Suppliers

Purchased Good Suppliers	2022 Spend (£)	SIC Code	Product Category	2022 kg CO2e/£	Total kg CO2e
Redacted		26	Computer, electronic and optical products	0.362	Redacted
		26	Computer, electronic and optical products	0.362	
		31	Furniture	0.438	
Total					48007

2.3 Assumptions and Exclusions

In carrying out this analysis a number of assumptions and exclusions have been made. These are as listed in

Table 5: Assumptions and Exclusions

No.	Related Suppliers	Assumption / Exclusion	Follow up to improve accuracy of reporting
1	Redacted	This supplier is a travel agency. Our invoicing data for 2022 does not enable us to separate out the costs related to transportation, hotels and travel agency services. Emissions due to transportation have been included within Scope 3 Category 6 reporting in the Energy Management Plan. Therefore to avoid double counting, data from Reis & Zo has been excluded from this Scope 3 Category 1&2 analysis.	It is noted that this exclusion results in emissions resulting from hotel stays and travel agency services being excluded from Scope 3 Category 1 data. In the future it would be good to find a way to separate out the data relating to transportation, hotels and travel agency services to allow a more complete reporting.
2		This is a lease car agency. Emissions from lease vehicles are included in Scope 1 and 2. Therefore to avoid double counting, data from Friesland Lease has been excluded from this Scope 3 Category 1&2 analysis.	It is noted that emissions relating to the lease car agency costs are not included in our analysis.
3		This data relates to a contracted staff member. All staff costs are accounted for elsewhere in the reporting. Therefore to avoid double counting, this data has been excluded from this Scope 3 Category 1&2 analysis.	None

No.	Related Suppliers		Assumption / Exclusion	Follow up to improve accuracy of reporting
	Redacted			
4			This is payment of NS Business Cards for travel by public transport. Emissions from this data is included in Scope 3 Categories 6 and 7. Therefore to avoid double counting, this data has been excluded from this Scope 3 Category 1&2 analysis.	None
5			Product categories have been manually assigned to the data based on the type of supplier.	Reporting quality could be improved if more details can be recorded and provided for each supplier invoice.

2.4 Relative Scope and Influence

Based on the product categories, the relative scope of each category can be determined using the format of Table 6.1 from the CO2 Performance Ladder Handbook 3.1 for each Product Market Combination (PMC).

Table 6: Relative scope and influence of each product category

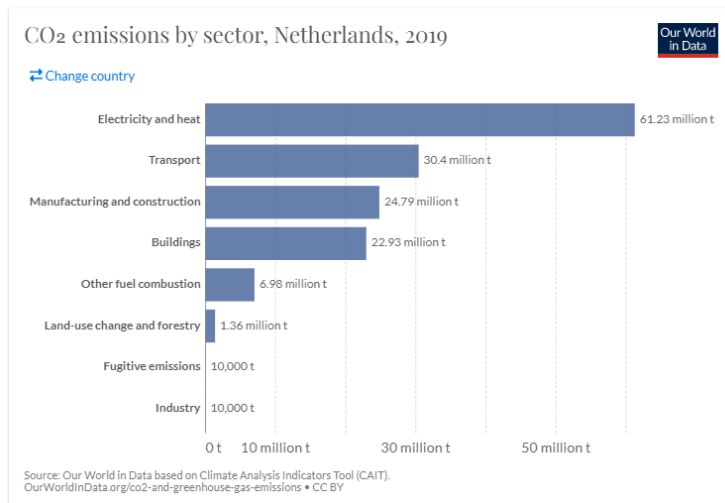
PMC Sectors & Activities	Description of activity where CO2 is released	Relative importance of CO2 burden of the sector and influence of the activities		Potential influence of the organisation on CO2 emissions
		Sector	Activities	
Accommodation services	Building facilities Purchased goods & services Capital goods	Medium	Medium	Small
Accounting, bookkeeping and auditing services; tax consulting services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Architectural and engineering services; technical testing and analysis services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Small

PMC Sectors & Activities	Description of activity where CO2 is released	Relative importance of CO2 burden of the sector and influence of the activities		Potential influence of the organisation on CO2 emissions
		Sector	Activities	
Buildings and building construction works	Staff travel Purchased goods & services Capital goods Vehicles & machinery Energy Transportation	Medium	Medium	Small
Computer programming, consultancy and related services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Computer, electronic and optical products	Purchased goods Capital goods Manufacturing processes Transportation	Small	Small	Negligible
Education services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Electrical equipment	Purchased goods Capital goods Manufacturing processes Transportation	Small	Small	Negligible
Financial services, except insurance and pension funding	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Food and beverage serving services	Building facilities Staff travel Purchased goods Capital goods Transportation	Small	Small	Small
Furniture	Purchased goods Capital goods Manufacturing processes Transportation	Small	Small	Negligible
Human health services	Building facilities Staff travel Purchased goods	Small	Small	Negligible

PMC Sectors & Activities	Description of activity where CO2 is released	Relative importance of CO2 burden of the sector and influence of the activities		Potential influence of the organisation on CO2 emissions
		Sector	Activities	
	Capital goods			
Insurance and reinsurance services, except compulsory social security	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Legal services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Office administrative, office support and other business support services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Other professional, scientific and technical services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Paper and paper products	Purchased goods Capital goods Manufacturing processes Transportation	Small	Small	Negligible
Printing and recording services	Purchased goods Capital goods Manufacturing processes Transportation	Small	Small	Small
Real estate services on a fee or contract basis	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Real estate services, excluding on a fee or contract basis and imputed rent	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Rental and leasing services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible

PMC Sectors & Activities	Description of activity where CO2 is released	Relative importance of CO2 burden of the sector and influence of the activities		Potential influence of the organisation on CO2 emissions
		Sector	Activities	
Security and investigation services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Services auxiliary to financial services and insurance services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Services furnished by membership organisations	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Services of head offices; management consulting services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Services to buildings and landscape	Staff travel Purchased goods & services Capital goods Vehicles & machinery Energy Transportation	Medium	Medium	Small
Telecommunications services	Building facilities Staff travel Purchased goods & services Capital goods	Small	Small	Negligible
Warehousing and support services for transportation	Building facilities Staff travel Purchased goods & services Capital goods	Medium	Medium	Small

Annual CO₂ emissions by sector



The above charts looked total greenhouse gas emissions – this included other gases such as methane, nitrous oxide, and smaller trace gases.

How does this breakdown look if we focus only on carbon dioxide (CO₂) emissions? Where does our CO₂ come from?

This chart shows the distribution of CO₂ emissions across sectors.

The global breakdown for CO₂ is similar to that of total greenhouse gases – electricity and heat production dominates, followed by transport, and manufacturing and construction. One key difference is that *direct* agricultural emissions (if we exclude land use change and forestry) are not shown; most direct emissions from agriculture result from methane (production from *livestock*) and nitrous oxide (released from the application of *fertilizers*).

Like total greenhouse gas emissions, this breakdown varies between countries.

Figure 2: Source for estimating relative importance of CO₂ burden of sector and activity in Table 2 (Source: <https://ourworldindata.org/emissions-by-sector#co2-emissions-by-sector>)

3. Analysis of the data

3.1 Comparison with ER Net GHG Reduction Plan

Striving towards Net Zero, in August 2020 the Europe Region produced the ER Net GHG Reduction Plan. The plan identifies purchased goods and services to account for 63% of Arup's global emissions and 68% of the Arup Europe Region emissions based on 2018 data, see Appendix E.

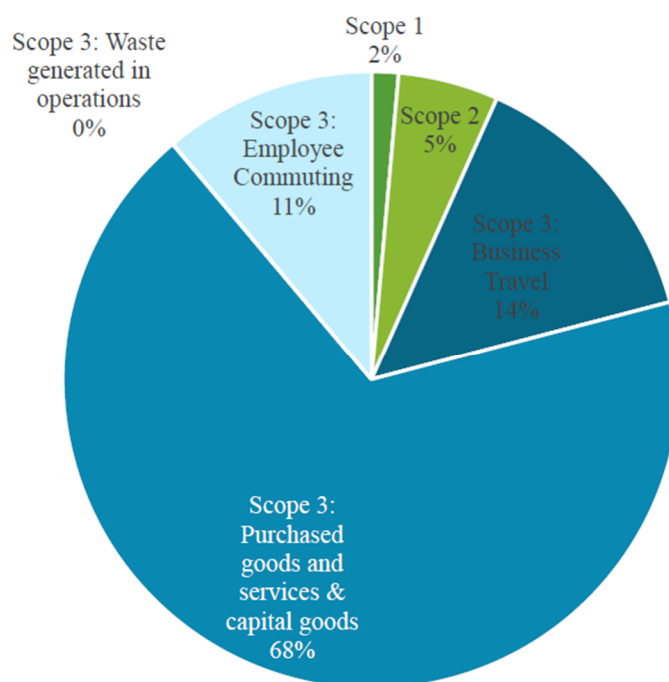


Figure 3: Distribution of Europe Region CO₂ Emissions from ER GHG Reduction Plan (2018 data)

Intuitively the proportion of emissions from purchased good and services appears very high. The analysis in this report can be used to interrogate this. For 2022 the Arup Netherlands emissions are as seen in Table 7 and Figure 4.

Table 7: Arup Netherlands 2021 CO2 Emissions

Scope	Emissions (kg CO2e)
Scope 1	782
Scope 2	119,973
Scope 3: Employee Commuting	42,843
Scope 3: Business Travel	119,277
Scope 3: Purchased goods & services	740,547

CO2 Emissions 2022 (kg CO2e)

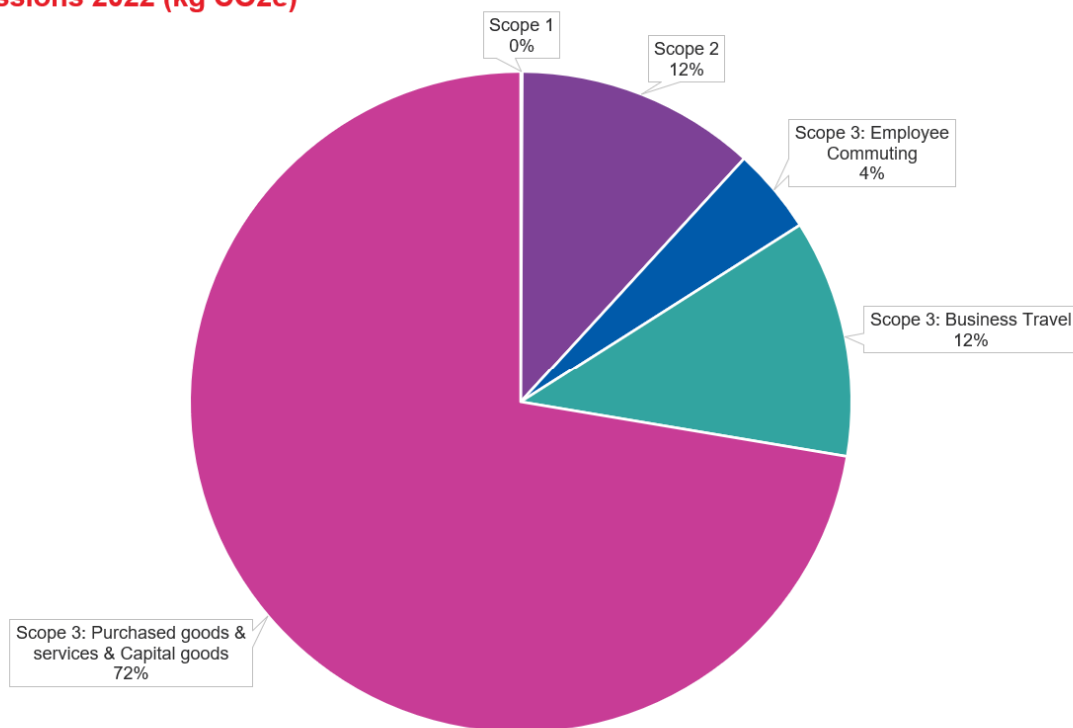


Figure 4: Arup Netherlands CO2 Emissions 2022

This shows the emissions from purchased goods and services to be 72%, slightly higher than the ER figure of 68%. One possible explanation for this is the influence that the pandemic has had on the way we now work, in particular the impact on office occupancy, commuting and business travel. For a more accurate comparison between the Netherlands data and the ER data, the Netherlands 2019 emissions have also been considered. For ease of calculation, the emissions from purchased goods and services have been converted to 2019 values using the currency exchange rate whereas actual emissions values for the other categories have been used. It is assumed that the value of purchased goods in 2019 is similar to those in 2022.

Table 8: Arup Netherlands 2019 CO2 Emissions

Scope	Emissions (kg CO2e)
Scope 1	52,289
Scope 2	113,021
Scope 3: Employee Commuting	102,976
Scope 3: Business Travel	409,060
Scope 3: Purchased goods & services	1,167,850

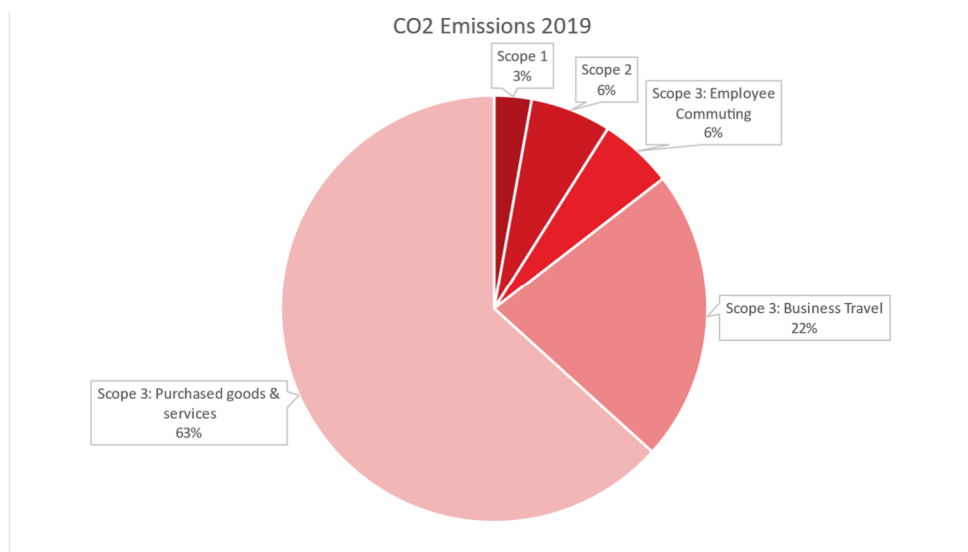


Figure 5: Arup Netherlands CO2 Emissions 2019

In 2019, pre-pandemic, office occupancy, commuting and business travel emissions were higher than in 2022. However the contribution to emissions from purchased goods and services was still considerable at 63%.

3.2 Accuracy of the DEFRA Emissions Factors

The DEFRA emissions factor database was used in both sets calculations. These factors are based on data from 2011 and may no longer be accurate. This has previously been tested using the the Arup 2021 office data.

Table 9: Calculation of an emissions factor based on Arup office 2021 data

2021 emissions for Arup NL (excluding purchasing)	209223	kg Co2e
FTE 2021	Redacted	FTE
Average hourly rate	Redacted	€/hr
2021 turnover	Redacted	€
2021 € to £ exchange rate	0.8597	
Converted 2021 turnover	Redacted	£

Arup 2021 emissions factor	0.006	kg Co2e / £

Arup is categorised as SIC Code 71 “Architectural and engineering services; technical testing and analysis services” which has a DEFRA emissions factor of 0.18 kg CO₂e per £. This is almost 30 times higher than the actual emissions factor calculated using the Arup office 2021 data.

Assuming that all emissions factors are similarly overestimated the actual emissions produced, say conservatively by 25 times, the overall emissions from purchased goods and services would be $1,037,090 / 25 = 41,484$ kg CO₂e. In this case Scope 3 purchased good and services would be 16% of the overall CO₂ emissions, as shown in Figure 6.

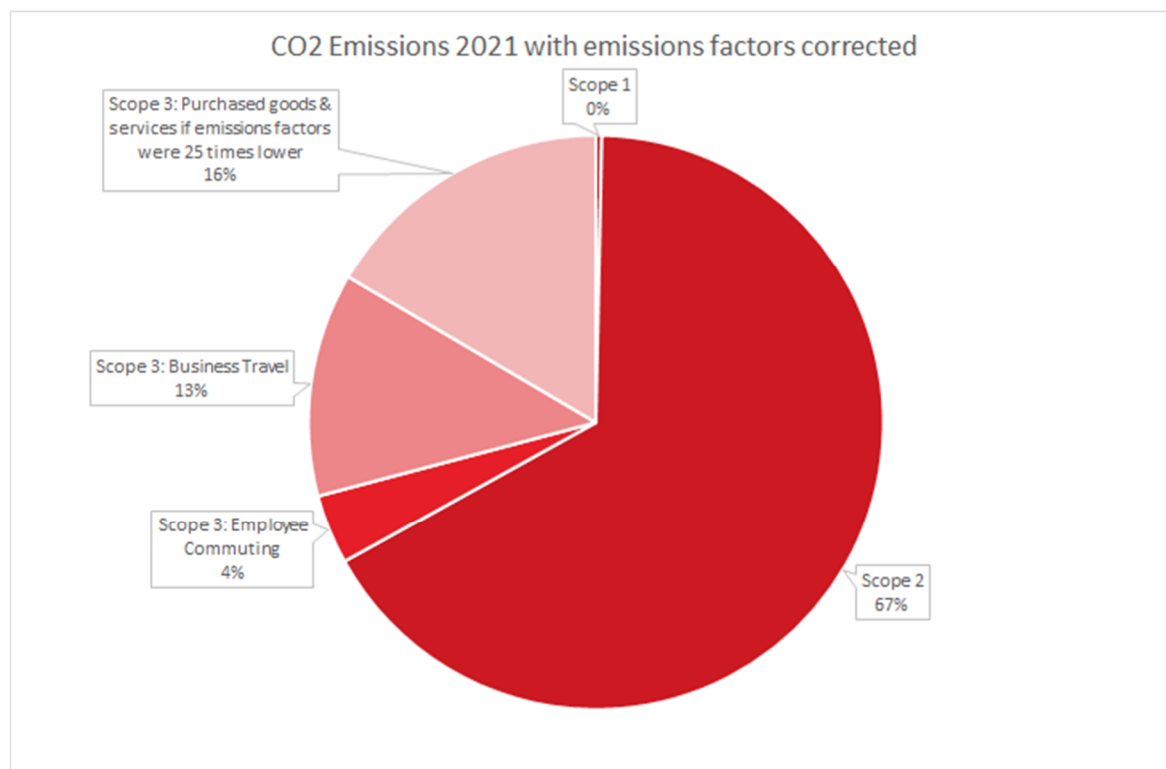


Figure 6: Arup Netherlands CO2 Emissions 2021 with emissions factors corrected

4. Outcomes

4.1 Findings

The key findings from this Upstream CO₂ emissions analysis are:

- Service suppliers make up the majority of the assessment boundary of the Arup Netherlands Upstream Supply Chain.
- CO₂ emission contributions from purchased good and services are very difficult to calculate. Section 2.2.2 of this report shows that the emissions can be calculated as between 16% and 83% depending on the dataset and emissions factors used.
- A crude comparison of the DEFRA emissions factors with a calculated Arup NL office emissions factor show that the DEFRA emissions factors are likely to be highly inaccurate although there is no better alternative calculation method at this time.

4.2 Improvements

A number of improvements have already been identified in Table 5. In addition to these, the following potential improvements have been identified:

- Improvement of emissions from suppliers. In order to improve the calculated emissions from our suppliers, the Europe Region Net Zero team are contacting the top 20 European suppliers to request their specific emissions data. Discussions will also be initiated regarding influencing their emissions. The following Netherlands suppliers are included in this top 20 list:

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Redacted

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- Arup Global is investigating improving invoice tagging and categorisation within the financial system to improve reporting on purchased (capital) good and services.
- Retrospectively determine a 2018 baseline for Scope 3 Categories 6 and 7 for the Netherlands which can be used to set and assess targets.

5. Conclusion

This report has provided an insight into the Scope 3 Purchased (capital) goods and services emissions for Arup NL. It has identified that the majority of the upstream supply chain (by purchase value) is service suppliers.

This report shows that the percentage of Arup NL total carbon emissions which comes from Scope 3 purchased (capital) goods and services is broadly in line with that identified in the Arup ER Net Zero GHG Reduction Plan. However this percentage is still considered high and the accuracy of the emissions factors used to calculate the emissions has been brought in to question. Improvements discussed in section 4.2 are underway to further improve data collection and reporting.

Finally, the Arup ER Net Zero GHG Reduction Plan sets out a target of reducing emissions from top 20 goods suppliers by 20% by 2025 compared to 2018 emissions. The next step is to retrospectively determine a 2018 baseline which can be measured and reported against.

Appendix A

Summary of Invoices – Calendar Year 2022

Appendix B

DEFRA Emissions Factors

Appendix C

Arup Netherlands 2022 Suppliers Ranked

Appendix D

Extract from ER GHG Emissions Reduction Plan