

## Clays Carbon Footprint 2024 – Calculation Methods

The greenhouse gas inventory is prepared following the Greenhouse Gas Protocol (GHGP) Corporate Standard<sup>1</sup> and Value Chain Accounting and Reporting Standard<sup>2</sup>. The operational control approach is adopted to define our organisational boundary between scopes 1&2 and scope 3 aligned with our financial accounting approach. All seven greenhouse gases listed in the Kyoto Protocol are accounted for measured as carbon dioxide equivalent (CO<sub>2</sub>e). Certain calculations without a complete CO<sub>2</sub>e figure available are highlighted below. Our scope 3 inventory follows a hybrid calculation approach, using primary activity data and supplier-specific emissions factors where available, and otherwise uses secondary sector averages and spend-based conversion factors to reach a complete measurement. The GHGP defines 15 scope 3 categories of which 5 categories are deemed as not applicable to Clays and a further 2 categories are excluded from the inventory due to limited significance and relevance. The calculation methods used for each category, the activity data sources, the applied conversion factors and the justifications for exclusions are detailed below. Any changes in the categories included or to the calculation methods are tracked according to the overall impact on emissions to enable us to qualify a significant change, requiring a recalculation and potential resubmission to the Science Based Targets initiative (SBTi) following the best available methods.

Scope	Activity/category	Description of method	Activity data	Conversion factors
1	1. Heating	Includes emissions from stationary onsite combustion of medium fuel oil, kerosene, propane and white diesel used for heating, calculated by multiplying our primary litre consumption from fuel bills by the corresponding conversion factors from DEFRA 2024.  Further upstream indirect emissions from the extraction, production and transportation of fuel oils before onsite combustion are included within scope 3 category 3 (Fuel- and energy- related activities) under upstream purchased fuels.	Primary financial data	DEFRA 2024 <sup>3</sup>
	2. Vehicles	Includes mobile combustion emissions from the use of vehicles leased or owned by Clays, calculated using the fuel-based method with primary data on litre consumption multiplied by the corresponding conversion factors from DEFRA 2024.  Further upstream indirect emissions from the extraction, production and transportation of fuels before combustion are included within scope 3 category 3 (Fuel- and energy- related activities) under upstream purchased fuels.	Primary financial data	DEFRA 2024 <sup>3</sup>
	3. Refrigerants	Includes fugitive emissions released from refrigeration equipment onsite, calculated with primary usages of refrigerants multiplied by global warming potential values (GWP) values from DEFRA 2024 (including non-Kyoto products).	Primary procurement data	DEFRA 2024 <sup>3</sup>
2	Location-based	Location-based emissions are calculated considering the physical flow of electricity based on the production sources operating in a defined geographical boundary over a set period. This includes annual electricity consumption at our site in Bungay converted to emissions using the UK grid average production mix factor from DEFRA 2024.	Primary financial data	DEFRA 2024 <sup>3</sup>

	Market-based	<p>Market-based emissions for purchased electricity are measured based on procurement choice, calculated using annual electricity consumption multiplied by a supplier or product-specific emissions factor.</p> <p>In 2024, Clays purchased electricity through multiple energy tariffs. For January to September 2024, Clays sourced bioenergy generated from a supplier-owned asset. Following the Greenhouse Gas Protocol, direct carbon dioxide emissions from biomass combustion are considered as zero whilst methane and nitrous oxide emissions are reported within scope 2.</p> <p>From October 2024, Clays entered into a new renewable energy contract with hydropower, backed by renewable energy certificates (RECs) procured through a supplier-owned asset (bundled certificates), counted as zero scope 2 market-based emissions.</p>	<p>Primary financial data</p> <p>Primary data from supplier</p>	DEFRA 2024 <sup>3</sup>
3	1: Purchased goods and services	<p>Emissions in this category cover all upstream emissions from the manufacture of products and provision of services purchased by Clays. Purchased goods include all cradle-to-gate emissions from purchased materials and chemicals covering paper, inks, glue, pallets, finishing materials and packaging. Approximately 70% of paper throughout is purchased by our publishers, therefore cradle-to-gate emissions are not included within Clays scope 3 inventory. Following the GHGP, upstream emissions from recycling processes for purchased goods with recycled content are accounted for in category 1. Purchased services include outworking (printing), engineering, postal, professional and further uncategorised residual services.</p> <p>Greenhouse gas emissions from paper production (1a – including i. Reels and ii. Sheets) are calculated following the methods in the hierarchy below based on availability:</p> <ol style="list-style-type: none"> <li>1. CEPI Ten Toes carbon footprint statements (fossil or biogenic CO<sub>2</sub>e)<sup>4</sup> or equivalent</li> <li>2. Paper Profiles<sup>5</sup> or equivalent (including fossil CO<sub>2</sub> emissions and purchased electricity under the market-based method) and estimates for scope 3 categories.</li> <li>3. DEFRA 2024 paper and board conversion factors adjusted (CO<sub>2</sub>e)</li> </ol> <p>In addition to the categories included within these statements, estimates are also included for the below categories where relevant:</p> <ul style="list-style-type: none"> <li>• Upstream indirect/well-to-tank purchased electricity</li> <li>• Electricity transmission and distribution (T&amp;D) losses (upstream and generation)</li> </ul>	<p>Primary procurement data based on weight or spend</p>	<p>Primary supplier data when available</p> <p>Hybrid estimates</p> <p>Secondary averages</p> <p>DEFRA 2024<sup>3</sup></p> <p>EuPIA Ecomatters 2020<sup>6</sup></p> <p>International Aluminium Institute (IAI)<sup>9</sup></p> <p>Hybrid spend-based factors</p> <p>CaDI database<sup>8</sup></p>

	<p>The breakdown of the remaining materials, chemicals and services is illustrated below. When available, primary conversion factors from our suppliers are used and otherwise sector averages based on volume. The remaining procurement spend from our smaller suppliers of materials and services is calculated using a hybrid spend-based approach.</p> <table border="1"> <thead> <tr> <th>Ref</th><th>Material/service</th><th>Description</th><th>Conversion factor</th></tr> </thead> <tbody> <tr> <td>1bi.</td><td>Inks and toner</td><td>Pigments mixed with oils for printing text, covers and jackets.</td><td>Supplier-specific/EuPIA Ecomatters 2020 adjusted/hybrid</td></tr> <tr> <td>1bii.</td><td>Varnish</td><td>Lacquer applied to covers/jackets for protection and appearance</td><td>EuPIA Ecomatters 2020 adjusted</td></tr> <tr> <td>1biii.</td><td>Glue</td><td>Adhesives used to bind book blocks and covers together</td><td>Supplier-specific/DEFRA 2024/hybrid</td></tr> <tr> <td>1biv.</td><td>Foil</td><td>Aluminium foil applied to covers/jackets for appearance</td><td>Supplier-specific/DEFRA 2024</td></tr> <tr> <td>1bv.</td><td>Pallets</td><td>For transportation and distribution</td><td>DEFRA 2024</td></tr> <tr> <td>1bvi.</td><td>Plates</td><td>Aluminium sheets used for lithographic printing</td><td>Supplier-specific/IAI/DEFRA 2024</td></tr> <tr> <td>1bvii.</td><td>Laminate</td><td>Plastic film applied to covers for protection and appearance</td><td>Supplier-specific/DEFRA 2024/hybrid</td></tr> <tr> <td>1bviii.</td><td>Blocks</td><td>Metal dies used for cover/jacket finishes</td><td>DEFRA 2024/hybrid</td></tr> <tr> <td>1bix.</td><td>Slip cases</td><td>Cardboard covers for sets</td><td>DEFRA 2024/hybrid</td></tr> <tr> <td>1c.</td><td>Packaging</td><td>Materials used to package products including carton board and plastic film</td><td>DEFRA 2024/hybrid</td></tr> <tr> <td>1di.</td><td>Printing services</td><td>Outworking including finishing and pre-retail</td><td>Hybrid spend-based factors</td></tr> <tr> <td>1dii.</td><td>Engineering services</td><td>Servicing and maintenance of onsite machinery</td><td>Hybrid spend-based factors</td></tr> <tr> <td>1diii.</td><td>Postal services</td><td>Courier services</td><td>Hybrid spend-based factors</td></tr> <tr> <td>1div.</td><td>Professional services</td><td>Other professional services</td><td>Hybrid spend-based factors</td></tr> <tr> <td>1ei.</td><td>Residual services</td><td>All other uncategorised services</td><td>Hybrid spend-based factors</td></tr> <tr> <td>1eii.</td><td>Residual materials</td><td>All other uncategorised materials</td><td>Supplier-specific/DEFRA 2024/hybrid</td></tr> </tbody> </table>	Ref	Material/service	Description	Conversion factor	1bi.	Inks and toner	Pigments mixed with oils for printing text, covers and jackets.	Supplier-specific/EuPIA Ecomatters 2020 adjusted/hybrid	1bii.	Varnish	Lacquer applied to covers/jackets for protection and appearance	EuPIA Ecomatters 2020 adjusted	1biii.	Glue	Adhesives used to bind book blocks and covers together	Supplier-specific/DEFRA 2024/hybrid	1biv.	Foil	Aluminium foil applied to covers/jackets for appearance	Supplier-specific/DEFRA 2024	1bv.	Pallets	For transportation and distribution	DEFRA 2024	1bvi.	Plates	Aluminium sheets used for lithographic printing	Supplier-specific/IAI/DEFRA 2024	1bvii.	Laminate	Plastic film applied to covers for protection and appearance	Supplier-specific/DEFRA 2024/hybrid	1bviii.	Blocks	Metal dies used for cover/jacket finishes	DEFRA 2024/hybrid	1bix.	Slip cases	Cardboard covers for sets	DEFRA 2024/hybrid	1c.	Packaging	Materials used to package products including carton board and plastic film	DEFRA 2024/hybrid	1di.	Printing services	Outworking including finishing and pre-retail	Hybrid spend-based factors	1dii.	Engineering services	Servicing and maintenance of onsite machinery	Hybrid spend-based factors	1diii.	Postal services	Courier services	Hybrid spend-based factors	1div.	Professional services	Other professional services	Hybrid spend-based factors	1ei.	Residual services	All other uncategorised services	Hybrid spend-based factors	1eii.	Residual materials	All other uncategorised materials	Supplier-specific/DEFRA 2024/hybrid		
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2: Capital goods	<p>Includes all upstream emissions from the production of capital goods purchased or acquired by Clays in the data year. Following the GHGP, upstream emissions from recycling processes for capital goods with recycled content are accounted for in category 2. When available, the approximate weight of the machinery is multiplied by DEFRA 2024 conversion factors and otherwise a spend-based method is applied using hybrid factors derived from machinery weights.</p>	Primary procurement data (if available) or spend	DEFRA 2024 <sup>3</sup>  Hybrid estimates																																																																				
3: Fuel- and energy-related activities	<p>Emissions in this category include those related to the production of fuels and energy purchased by Clays, covering three activities:</p>	Primary financial data  Primary supplier data	DEFRA 2024 <sup>3</sup>  Primary supplier data																																																																				

	<ul style="list-style-type: none"> <li>a. Upstream purchased fuels: Emissions from the production of fuels for heating and company vehicles included within scope 1, calculated with DEFRA 2024 well-to-tank conversion factors.</li> <li>b. Upstream purchased electricity: Indirect/well-to-tank emissions from the production of fuels used for the generation of purchased electricity with the split described under scope 2 market-based emissions. Electricity backed by unbundled certificates is considered as grid average calculated with DEFRA 2024 factors. Electricity purchased through bundled certificates is calculated using an adjusted supplier-specific factor for the biomass supply chain. From October 2024, electricity was backed by bundled renewable energy certificates from natural renewables (hydropower), therefore emissions are deemed as zero.</li> <li>c. Transmission and distribution (T&amp;D) losses: Includes upstream/indirect and direct emissions from additional electricity consumed in the T&amp;D network calculated using DEFRA 2024 grid average production mix factors.</li> </ul>		
4: Upstream transport	<p>Emissions in this category cover the transportation and distribution of purchased goods included within category 1, in addition to third-party transportation and distribution services purchased by Clays for customer deliveries. All sub-categories are calculated using the distance-based method including well-to-wheel emissions:</p> <ul style="list-style-type: none"> <li>a. Transportation of paper (ai. reels and aii. sheets): Emissions from the upstream freight of reels and sheets included within category 1, estimated from the location of the original manufacturing site and via points. When available, supplier-specific conversion factors are used and otherwise the one-way distance travelled is multiplied by delivery weights and DEFRA 2024 well-to-wheel conversion factors by the mode of transport.</li> <li>b. Transportation of materials: Emissions from the upstream freight of all other production materials included within category 1, estimated from the location of the original manufacturing site and via points. When available, supplier-specific conversion factors are used and otherwise the weight of each material is multiplied by the one-way distance travelled and DEFRA 2024 well-to-wheel conversion factors by the mode of transport.</li> <li>c. Downstream deliveries: Following the GHGP, this category also includes emissions from our outbound transport in the delivery of our finished products to our customers as a purchased service. This is calculated with the fuel-based method applying supplier-specific data and DEFRA 2024 well-to-wheel conversion factors for white diesel.</li> </ul>	<p>Primary procurement data</p> <p>Primary internal data</p>	<p>DEFRA 2024<sup>3</sup></p> <p>Primary supplier data</p>

5: Waste	<p>This category covers the emissions from two activities:</p> <ul style="list-style-type: none"> <li>a. Disposal of waste generated in operations: For the portion of waste generated in operations sent for recycling, emissions are calculated following the recycled content method whereby emissions from the recycling process are allocated to the life cycle that uses the recycled material. Weights of individual materials are obtained from our waste management contractor multiplied by the corresponding DEFRA 2024 conversion factors, including optional emissions from the transportation of waste material sent for recycling.</li> <li>b. Water supply and treatment: Consumption and sewerage volumes are obtained from internal financial data and multiplied by DEFRA 2024 supply and treatment conversion factors.</li> </ul>	Primary financial data	DEFRA 2024 <sup>3</sup>
6: Business travel	Emissions in this category cover the transportation of all full-time employees for business-related activities in vehicles not controlled by Clays. This includes all well-to-wheel emissions from car, air, rail and bus travel calculated using expense claims reported in financial data and DEFRA 2024 conversion factors.	Primary financial data	DEFRA 2024 <sup>3</sup>
7: Employee commuting	This category includes emissions from the transportation of all full-time employees between homes and worksites in vehicles not controlled by Clays. This is calculated using the number of employees and UK average commuting distances across modes of transportation, multiplied by DEFRA 2024 well-to-wheel conversion factors.	<p>Primary number of full-time employees</p> <p>Secondary UK average survey data<sup>7</sup> (adjusted)</p>	DEFRA 2024 <sup>3</sup>
8: Upstream leased assets	Emissions in this category cover the scopes 1 and 2 emissions from a leased storage and pre-retail services site. As Clays do not have control over the operating policies of the site, emissions are allocated to scope 3 following the operational control consolidation approach. This includes emissions from the onsite combustion of fuels and the generation of purchased electricity calculated with DEFRA 2024 conversion factors.	Primary procurement data	DEFRA 2024 <sup>3</sup>
9: Downstream transport	<p>This category includes emissions from the transportation and distribution of sold products to the end-consumer not paid for by Clays. Outbound logistics (customer deliveries) are allocated to upstream transportation and distribution (category 4) following the GHGP. As Clays provide printing and distribution services to publishers, emissions in this category reflect the percentage of paper purchased by Clays in printed books.</p> <p>Emissions are screened using production data and the activity-based method from publisher distribution data covering well-to-wheel emissions. Based on these methods, emissions are estimated at less than 5% of total scope 3 emissions. As emissions in this category are insignificant, and Clays has limited visibility or capacity to influence reductions in this area, category 9 is excluded from the scope 3 inventory consistent with SBTi criteria.</p>	-	-

10: Processing of sold products	This category includes emissions from the processing of sold intermediate products by third parties subsequent to sale by the reporting company. Intermediate products are products that require further processing, transforming or inclusion in another product before use by the end consumer. As the sold products do not involve any further processing before use by the end-consumer, there are no emissions to calculate under this category.	N/A	N/A
11: Use of sold products	This category includes emissions from the use of goods and services sold by the reporting company. This includes two types; Direct use-phase emissions refer to products that directly consume energy during use, fuels and feedstocks, or emissions released during use. Indirect use-phase emissions are optional to include and refer to products that indirectly consume energy during use. There are no direct use phase emissions for the sold products and indirect-use phase emissions are optional and are excluded due to the limited relevance for Clays.	N/A	N/A
12: End-of-life treatment of sold products	<p>This category includes emissions from the disposal and treatment of sold products. As Clays provide printing and distribution services to publishers, emissions in this category reflect the percentage of paper purchased by Clays in printed books.</p> <p>Emissions are screened using production data, regional waste management scenarios and emissions factors from secondary life cycle databases. For products sent for recycling, the emissions calculation follows the recycled content method. Based on these methods, emissions are estimated at less than 5% of total scope 3 emissions. Clays has a limited ability to measure, track progress against or influence reductions to these categories. This is likely to be determined by the final end-user of the product, therefore we are unable to reasonably measure or set credible targets in this area. As emissions in this category are insignificant with limited relevance to Clays, category 12 is excluded from the scope 3 inventory consistent with SBTi criteria.</p>	-	-
13: Downstream leased assets	This category includes emissions from the operation of assets that are owned by the reporting company and leased to other entities. As Clays do not own any leased assets, there are no emissions to calculate under this category.	N/A	N/A
14: Franchises	This category includes emissions from the operation of franchises not included in scopes 1 and 2. As Clays do not operate any franchises, there are no emissions to calculate under this category.	N/A	N/A
15: Investments	This category includes scope 3 emissions from investments applicable to investors and companies that provide financial services. As Clays neither invest in this way nor provide financial services, there are no emissions to calculate in this category.	N/A	N/A

Our greenhouse gas inventory details our total or 'absolute' emissions to reflect our overall contribution to global greenhouse gas emissions, however this potentially hides changes to our production levels which may be expected to increase or decrease our total emissions even if our performance has remained similar. Therefore to contextualise the changes in our absolute emissions across years, we have reported an intensity ratio expressing our greenhouse gas emissions between each scope per 1,000 tonnes of paper throughput as a consistent benchmark for our performance across years.

Our total paper throughput is calculated using purchasing data combined with internal usage reports including paper purchased by Clays as well as by our publishers. As our scope 3 emissions inventory covers approximately 30% of our total paper throughput, we have also estimated our GHG intensity ratio including producing and transporting paper purchased by publishers for perspective against other categories.

## **Sources**

1. [Corporate Standard | Greenhouse Gas Protocol \(ghgprotocol.org\)](https://ghgprotocol.org/)
2. [Corporate Value Chain \(Scope 3\) Standard | GHG Protocol](#)
3. [Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/conversion-factors-for-company-reporting-of-greenhouse-gas-emissions)
4. [Framework for Carbon Footprints for paper and board products | www.cepi.org](https://www.cepi.org/framework-for-carbon-footprints-for-paper-and-board-products)
5. [Paper Profile](#)
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