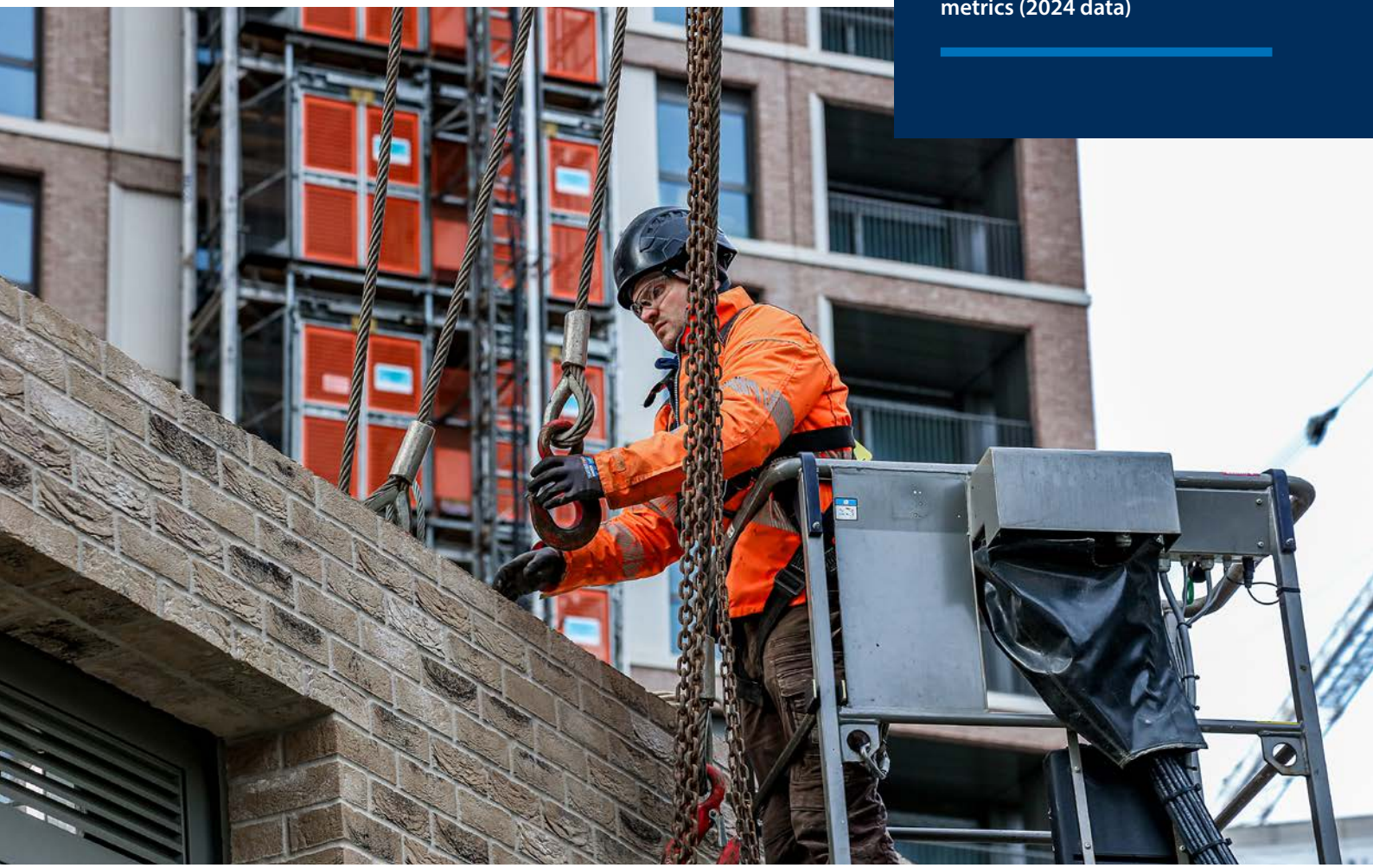
Precast Concrete and Masonry Sustainability Report 2025

An annual report of performance metrics (2024 data)



Mineral Products Association

Introduction

This is our second report for the precast and masonry sectors under UK Concrete's new Sustainable Construction Strategy, launched in 2023. It has also been almost two decades since the first precast & masonry sustainability sector report in 2007. Since then, the sector has seen considerable improvement in a wide range of environmental aspects, significantly reducing its ecological footprint on the environment, while continuing to grow and thrive economically and socially.

The strong decarbonisation trend observed in recent years remains firmly on track, illustrated by substantial reductions in embodied carbon, energy intensity, and waste generation. Adoption of sustainable, quality and responsible sourcing management systems remains high, further reinforcing precast and masonry manufacturing as a sustainably conscious and proactive sector within the construction industry.

Marked progress has also been made in developing Sector EPDs. Well over 60% of the membership's total production is now covered by valid Sector EPDs. We've also seen a rise in EPD development in the industries upstream the supply chain, with published EPDs now available from all cement manufacturers in the UK. This improves our ability to monitor and report on progress and generate more accurate and representative EPDs and other supporting data.

There has also been a sharp rise in the number of member companies launching new lower carbon product lines, over 30% of companies audited last year compared to 23% in the year before.

This is directly reflected in the high levels of low carbon Supplementary Cementitious Materials (SCMs) use across the sector. A good example of this is the precast paving and landscaping sector where SCM made up 31.3% of total cementitious content. It is also reflected in the overall embodied carbon footprint of the sector as the total sector embodied carbon, excluding raw materials' transport, went down from 200.8 kg CO_2e/m^3 in 2018 to 162.6 kg CO_2e/m^3 in 2024. This is a 19% drop in embodied carbon across the entire supply chain within six years only.

Consistent with the previous edition, the performance data has been presented in alignment with the key areas identified in the recently updated UK Concrete Industry Sustainable Construction Strategy: Carbon, Circular Economy, Social Outcomes, and the Natural Environment. We hope that this 2025 report (covering 2024 data) proves informative and valuable.

Graham Sargeant, *Chairman of the Precast & Masonry Sustainability & Environment Committee (SEC)*

UK Concrete Sustainable Construction Strategy

Launched in 2008, the UK Concrete Sustainable Construction strategy aims to demonstrate the leadership and ambition of the UK Concrete industry in delivering a sustainable, low-carbon built environment in a socially, environmentally, and economically responsible manner. In 2024, the strategy was refreshed to focus on the sector's journey to 2030. The Precast & Masonry Charter is part of the UKC Sustainable Construction Strategy. Relevant data and information from the MPA Precast and Masonry Charter audits feed into the UK Concrete Sustainability data reports.

Details of the strategy, latest performance reports and more can be found here: **www.sustainableconcrete.org.uk**

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Executive Summary

Performance indicators data collected for 2024 covered 125 production sites, around 11.71 million tonnes of precast and masonry block. It is estimated that this represented around 59% of UK's production in 2024. Companies reporting data employed 8,823 full time equivalent members of staff that year.

Auditing, Certification and Management Systems

- **89%** of precast and masonry factories' management systems certified to both ISO 9001 and ISO 14001.
- **88%** of precast and masonry produced in 2024 certified to responsible sourcing standard BES 6001.

Road to Net Zero Carbon

- Compared to 2016, savings associated with the embodied carbon of cement used in structural precast products in 2024 reached **66 kg CO_2e/m^3**.
- Factory carbon emissions down by **45%** since 2010.
- SCMs now make up **20.9% of total binder content** used in precast & masonry.
- For some sectors, such as precast paving products, use of SCM exceeded **31%** of the cementitious content of products.
- **40%** of precast and masonry manufacturers have developed Environmental Product Declarations (EPDs) covering **120** different products. Well over **60%** of members are now covered by sector EPDs for one, or more, of their products.

Energy Efficiency

- **61.1%** of all electricity used in members' factories come from renewable sources.
- On-site wind turbines, solar panels, HVO and REGO electricity made up **29%** and **19%** of all energy used in making architectural and structural precast products and precast paving products (respectively) in 2024.

Resources and Circularity

- Secondary and recycled aggregates constituted around **12.7%** of all aggregates used in precast and masonry factories in 2024.
- Waste to landfill dropped by over 90% since 2012 to no more than **160 grammes per tonne in 2024**.
- Precast and masonry factory consumed **120.5 litres** of mains and groundwater water for every tonne of product, which is **10.2 litres lower** than the year before.

Social Outcomes

- Almost **nine out of every 10** of our member companies made charitable donations, totalling around £370,000 in 2024.
- Member companies also offered **423 volunteering hours** (per company) in 2024.
- **25.6%** of masonry and precast manufacturing sites had local community liaison schemes in 2024.

Local Construction Materials

- Over **69%** of reinforcement used in precast concrete was sourced from mills in the UK, with another **21.6%** originating from steel mills in the European Union.
- The average delivery distance from factories to customers was **105.8 km** in 2024, with an average truckload of **21.9 tonnes** per delivery.

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Performance report

Carbon

Precast and masonry manufacturers in the UK continue to decarbonize their products. The total embodied carbon associated with precast and masonry factory emissions, and the raw materials they use, dropped from 166.8 kg CO_2e per m^3 of masonry/ precast product in 2023 to 162.6 kg CO_2e/m^3 in 2024.

This is despite the fact that the 2024 sample included significantly more reinforced products and had higher GGBS carbon factors compared to earlier years. Major factors contributing to a long-term downward trend in embodied carbon include reductions in the carbon factors for CEM I and rebar, as well as investments by precast and masonry manufacturers to reduce both factory and product carbon emissions.

Factory carbon emissions dropped further in 2024 at levels 23% lower than in 2012 and 45% lower than in 2010. While energy consumption remained largely unchanged. 61.1% of all electricity used in the factories in 2024 came from renewable sources. The overall average of energy from green and renewable sources rose slightly to 12.15% of all energy consumed in precast and masonry factories. The share of renewable energy also remained high across both structural & architectural precast and precast paving factories, reaching 28.6% and 19% of total energy consumed at these factories respectively.

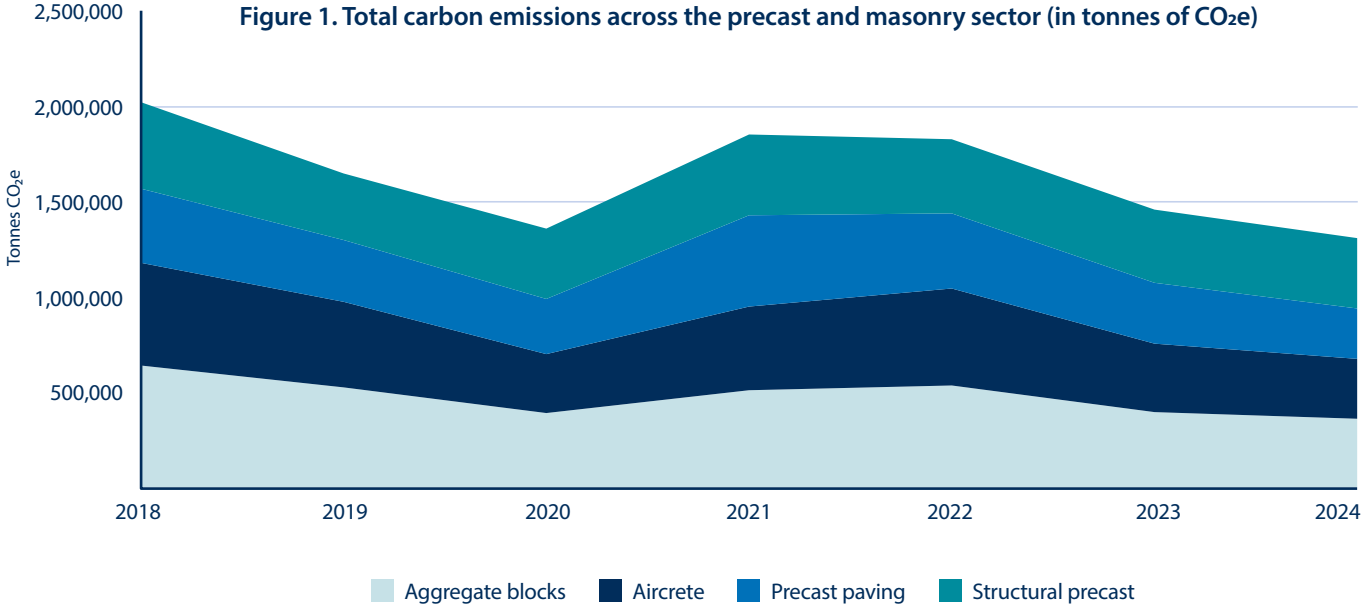
			Precast Sector Baseline		Concrete Performance						
Sustainability Principle	**Performance Indicator**	**Unit**	**Year**	**Value**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Energy efficiency	Energy intensity (factory energy only) as a proportion of production output	kWh/ tonne	**2012**	**50.59**	49.32	47.26	49.22	54.31	59.14	58.60	**58.61**
CO_2e emissions – production	Total CO_2e emissions (materials and concrete manufacture, location basis)	Mt CO_2e	**2012**	**1.30**	2.04	1.68	1.35	1.87	1.85	1.50	**1.32**
	Precast & masonry factory CO_2e emissions	Kg CO_2e/ tonne	**2012**	**14.31***	10.62*	9.63*	9.99*	10.02*	10.94*	11.42	**10.96**
	CO_2e emissions (materials and concrete manufacture) (location basis)	Kg CO_2e/ tonne	**2012**	**132.5**	136.6	115.5	118.6	122.3	116.1	117.3	**113.0**
		Kg CO_2e/ m^3	**2012**	**197.9**	200.8	169.8	178.3	174.0	165.5	166.8	**162.6**
	CO_2e emissions (materials and concrete manufacture) (based on 2018 fixed material type proportions	Kg CO_2e/ tonne			136.6	112.8	115.6	111.5	109.1	109.9	**105.4**
CO_2e emissions – transport	Transport to construction site CO_2e emissions	Kg CO_2e/ tonne			-	-	-	-	-	9.8	**9.5**

*Based on CO_2 emissions only (not CO_2e).

A high use rate of supplementary Cementitious Materials (SCMs), combined with a reduction in overall cement content in 2024, was the primary driver for the sector-wide decrease in embodied carbon, falling from 166.8 kg CO_2e/m^3 in 2023 (and 200.8 kg CO_2e/m^3 in 2018) to **162.6 kg CO_2e/m^3** in 2024.

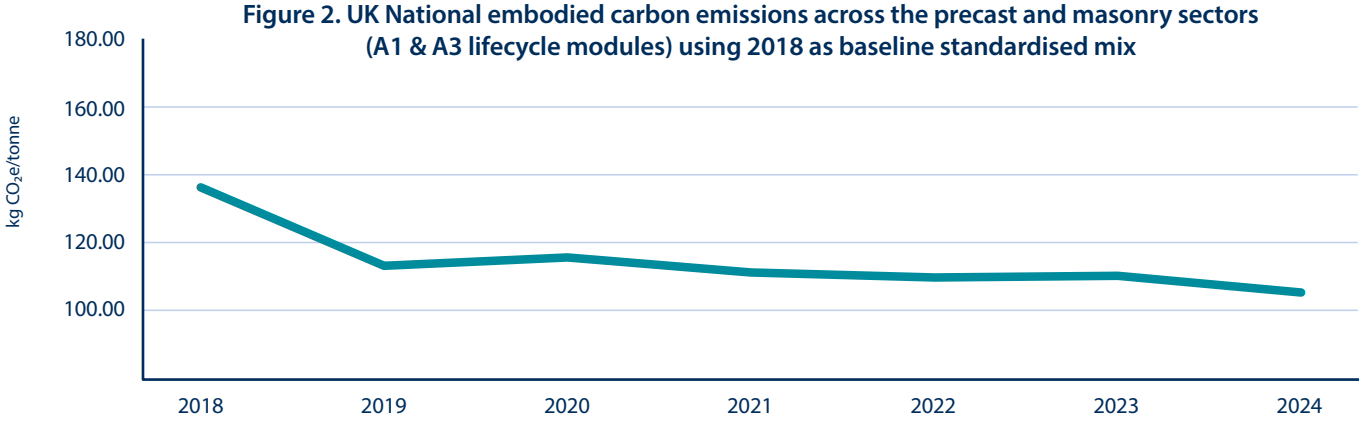
In addition to a temporary decline in emissions associated with the Covid 19 pandemic, overall greenhouse gas (GHG) emissions rebounded in 2021 and 2022 but have been decreasing since 2023 **(Figure 1).**

Figure 1. Total carbon emissions across the precast and masonry sector (in tonnes of CO_2e)



To assess whether decarbonisation contributed to this overall reduction in GHG emissions, we recalculated embodied carbon emissions per tonne, assuming a fixed proportional output of blocks, aircrete, paving, and structural precast products, using 2018 as the baseline year. The results (Figure 2) indicate a consistent and gradual decline in GHG emissions since 2018. The most significant reduction, between 2018 and 2019, is attributed to a drop in the embodied carbon for CEM I, which decreased from 913 kg CO_2e/t to 860 kg CO_2e/t. CEM I embodied carbon dropped further to 839.9 kg CO_2e/t in 2020. A similar trend, albeit with different values, was also observed when using 2012 as the baseline for production output. Other key contributors to the long-term downward trend in embodied carbon for the precast and masonry sectors include decarbonisation of reinforcing steel in the UK, as well as major investments by precast and masonry manufacturers to reduce both factory and product-level carbon emissions. MPA Sustainability audits last year show that **17 out of 27** manufacturers assessed invested in solar panels and other on-site energy-saving installations. In addition, **13 manufacturers** launched new low-carbon product lines during the year.

Figure 2. UK National embodied carbon emissions across the precast and masonry sectors (A1 & A3 lifecycle modules) using 2018 as baseline standardised mix



Average delivery distances went down slightly to **105.8 km** in 2024 while the average load per delivery went up to **21.9 tonnes**. This equates to around **9.5 kg CO_2e/t** across the sector, a 3% reduction compared to the previous year.

Circular Economy

Replacement of conventional CEM I cement with SCMs was high across all product groups, averaging 20.9%. Other circular economy and resource efficiency indicators for the sector remain unchanged in 2024, reflecting a consistent trend in waste minimisation, resource efficiency and recycling across the sector.

		Precast & Masonry sector baseline		Precast & Masonry Performance						
Sustainability Principle	**Performance Indicator**	**Year**	**Value**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Waste Minimisation	Total materials diverted from the waste stream (% of total factory waste)	**2012**	**95.8%**	99.3%	98.4%	99.5%	98.0%	99.0%	99.3%	99.5%
Resource Efficiency	Waste to landfill as a proportion of production output (kg/ tonne)	**2012**	**1.67**	0.23	0.31	0.15	0.69	0.37	0.26	0.16
	% of additional cementitious materials (GGBS, fly ash, limestone fines, etc.) as proportion of total binder content	**2012**	**23.3%**	17.5%*	18.6%*	17.9%*	20.2%*	20.7%*	21.3%	20.9%
	Total cementitious content (tonne/tonne)	**2012**	**0.142**	0.148	0.137	0.140	0.142	0.142	0.169	0.137
	% of Recycled/ Secondary aggregates as a proportion of total concrete aggregates	**2012**	**20.3%**	16.0%	12.6%	11.6%	14.3%	13.1%	9.8%	12.7%
Quality & Performance	% of sites covered by UKAS accredited ISO 9001 quality management systems	**2012**	**91.1%**	94.9%	95.1%	87.9%	91.6%	89.4%	89.2%	89.2%
Local sourcing of reinforcing steel	% of reinforcing steel sourced from mills in the United Kingdom and EU	**2012**					80.7%	91.7%	77.1%	90.6%

*Values revised based on improved data and interpretation for previous years.

Quality Management Systems
Coverage of ISO 19001 certified Quality Management Systems has been largely unchanged at roughly around **89% to 90%** for a number of years.

Waste minimisation
Waste generated at factories dropped slightly to **33.7 kg/ tonne**, around 70% of which was recycled offsite, and the remainder (29.5%) recycled within factories prior to reuse of resale. Waste to landfill reduced as well to no more than 0.16 kg per tonne of product.

Secondary and recycled aggregate use
Use of secondary aggregates rose to **12.7%** in 2024. Most of which was reclaimed pulverized fly ash (PFA) waste and recycled cullet (glass). Other secondary aggregates include rushed concrete aggregates (CCA) and reclaimed bottom ash.

Use of cementitious materials
As noted in earlier sections, use of SCMs was high across all product groups, with 31.3% and 18.1% average CEM I replacement reported by the precast paving and reinforced precast products' sectors respectively. SCM levels also remained high within structural precast products, with embodied carbon savings due to SCM utilisation reaching **66 kg CO_2e/m^3 compared to 2016**. Overall SCM utilisation remained high, at **20.9%,** while overall cementitious content per tonne dropped to 136.6 kg/ tonne. It should be noted that the drop in cementitious content was due to better raw material information and data retrieved during the development of sector EPDs for some masonry products.

CEM II A-L (a cement blend which uses limestone fines as a SCM) has been the most utilised cement blend by the sector, making up a sixth of all Portland-based cements in 2024. Limestone fines were the most employed SCM in precast and masonry factories in 2024 (10.6 kg/ tonne), followed by GGBS and then fly ash.

Figure 3. Cementitious content per tonne (kg/ tonne of product) across the UK precast and masonry sector.

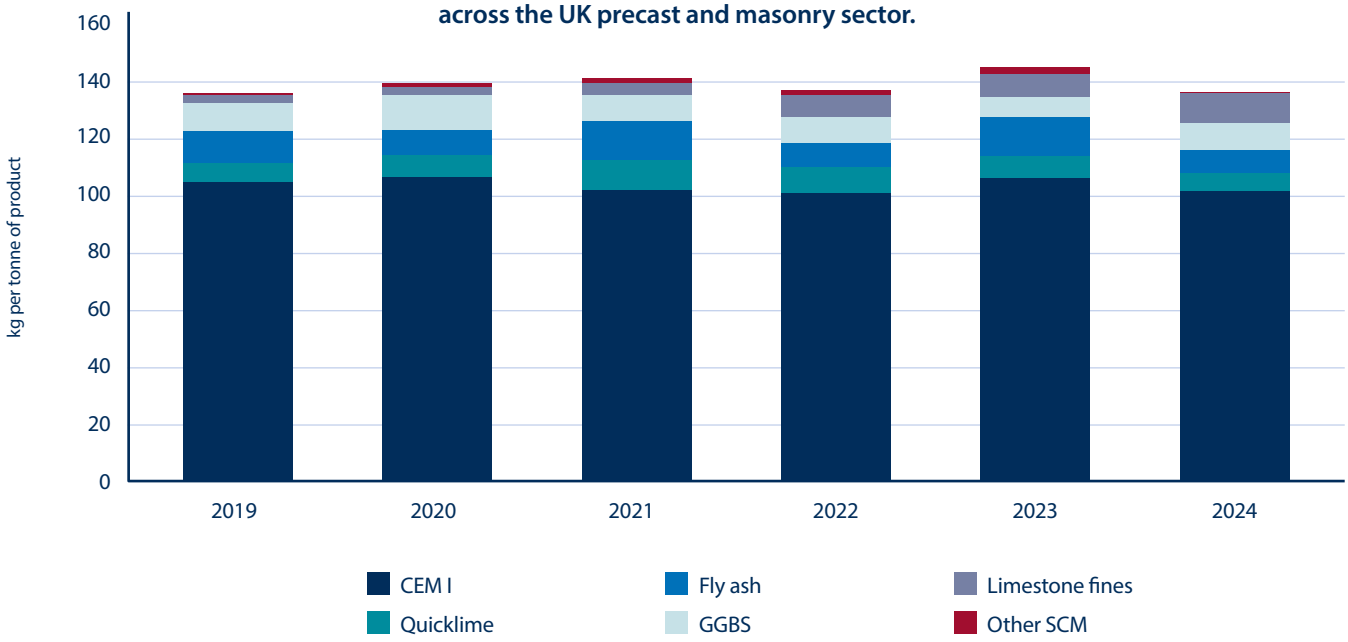
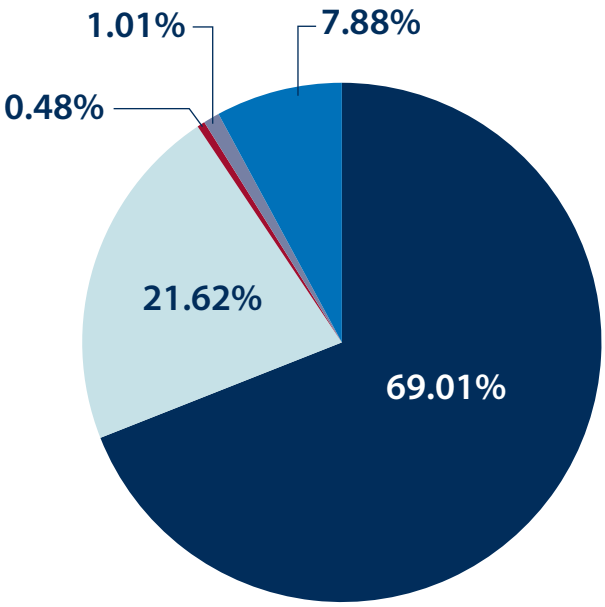


Figure 4. Reinforcing steel used in the UK precast concrete sector by country of source.



Reinforcing steel
Over 90% of all reinforcing steel used in precast factories in 2024 was sourced from mills based in the United Kingdom or the European Union. The reinforcement principally comprised of recycled steel manufactured using the lower embodied carbon Electric Arc Furnace (EAF) process. Less than 8.9% of rebar was sourced from mills outside Europe.

UK
Turkey
Rest of World
EU
Eastern Europe

Natural Environment

UK Concrete's Sustainability Strategy introduces a new pillar for Natural Environment focussing on supporting biodiversity and exploring the ways concrete can benefit nature and society. This also includes all aspects of environment and water management.

Environmental Management Systems
The proportion of precast concrete and masonry factories tonnage covered by ISO 14001 certified Environmental Management Systems remained largely unchanged, at **89.3%** in 2024.

Water use
Both groundwater and Mains water use dropped in 2024 to **39.8** and **80.7** litres/ tonne respectively. This is compared to **46.8** and **82.3** litres/ tonne for both water sources in 2012 respectively.

Site Stewardship
Around **12.8%** of sites had active biodiversity and geodiversity action plans in place in 2024. This is compared to only 2.5% of sites in 2020.

Maintaining clear air and water
The precast and masonry sector maintained its zero convictions record related to air or water emission breaches in 2024. This record remains for well over 10 years.

		Sector Baseline		Precast & Masonry Performance						
Sustainability Principle	**Performance Indicator**	**Year**	**Value**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Environmental Management	% of factories covered by UKAS accredited Environmental Management Systems (EMS)	**2012**	**88.9%**	90.6%	97.8%	95.0%	89.9%	88.9%	90.4%	89.3%
Site Stewardship & Biodiversity	% of relevant production sites that have specific action plans	**2012**	**28.1%**	3.2%	3.4%	2.6%	3.5%	7.9%	21.4%	12.0%
Water	Mains water consumption as a proportion of production output (litres/ tonne)	**2012**	**82.3**	78.5	68.6	77.2	81.9	76.9	86.8	80.7

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Social Outcomes

The sector's social indicators continue to show healthy improvements and commitment to competency and training for the workforce. It should be noted that all MPA Masonry and MPA Precast members are committed to the MPA Health & Safety strategy 'Vision Zero'.

Health Management Systems
Just over **70.7%** of production in precast and masonry factories in 2024 had UKAS accredited Health Management Systems to ISO 45001. This is a 4% improvement compared to 2018.

The Lost Time Injury Frequency Rate (LTIFR) for precast and masonry was around **4.86** in 2024, compared to 9.8 in 2012.

Local community liaison, donations and voluntary work
Members offered well over 12 weeks of voluntary work (per company).

Almost nine out of every 10 member companies **(88.1%)** made charitable donations in 2024 with an average of around **£10,280** per company reporting (around £370,000 in total). Around **25.6%** of members reported having local community liaison schemes.

Responsible Sourcing
There has been a rise in precast and masonry tonnage certified to responsible sourcing standard BES 6001, increasing from 85.8% in 2023 to **88%** in 2024.

Competence and skills
91.3% of employees had formal training under their companies' development policies in 2024. Reported average training hours were around **15.3 hours** per employee.

		Precast & Masonry Sector Baseline		Precast & Masonry Performance						
Sustainability Principle	**Performance Indicator**	**Year**	**Value**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Health & Safety	% of Factories with UKAS accredited Health Management Systems to ISO 45001	**2012**	**64.9%**	66.5%	72.0%	70.2%	73.7%	70.7%	71.5%	70.7%
	Lost Time injuries LTIFR rate for direct employees per 1,00,00 hours worked	**2012**	**9.8**	6.66	5.73	6.2	6.5	4.7	5.66	4.86
Competence & Training	% of Employees trained in 2024 under certified management systems	**2012**	**98.6%**	99.1%	98.8%	77.2%	99.1%	90.8%	94.3%	91.3%
Responsible Sourcing	% of production certified to BES 6001	**2012**	**71.7%**	77.9%	82.1%	85.7%	88.3%	82.2%	85.8%	88.0%

Photo credit: © Tarmac

Data for Whole Life Carbon Assessment (WLCA) and Scope 3 assessments

MPA Precast and MPA Masonry annually report on a number of industry generic factors, based on the annual sector performance indicators submissions, which are designed to support Whole Life Carbon Assessments (WLCA) for upfront carbon life cycle stages, A1-A3 (cradle-to-gate), A4 (transport-to-site) and A5.3 (construction waste), in addition to Scope 3 reporting.

This data can be used in conjunction with our members' products' EPDs, or Sector EPDs, to develop WLCAs for buildings and infrastructure which are as representative and accurate as possible.

This data is applicable only to members of MPA Precast and/ or MPA Masonry and are not representative of other manufacturers of precast concrete and masonry.

Proportion of SCMs used to replace CEM I in the precast and masonry sector (for A1-A3)

Representative default embodied carbon data for precast and masonry products should be sourced from https://www.sustainableconcrete.org.uk/Metrics-reporting/Sector-EPDs.aspx. Sector EPDs should be used as well for Scope 3 calculations (3.1 Purchased Goods & Services) where no specific product EPD is available.

Where no suitable sector or manufacturer EPDs are found, and a suitable representative carbon factor needs to be calculated, SCM replacement ratios from the table below can be used. In this table, the cement blends were included based on CEM I and SCM mix proportions within each type of cement (CEM II B-V, etc.).

	Masonry (aggregate blocks)		Precast concrete paving		Reinforced precast concrete	
	2018	2024	2018	2024	2018	2024
Limestone fines	1.5%	2.2%	9.3%	10.3%	4.3%	8.2%
GGBS	4.5%	11.9%	9.2%	9.7%	0.8%	4.4%
Fly ash	5.2%	1.8%	9.3%	11.4%	0.7%	4.6%
Other	0.8%	0.1%	0%	0%	0.5%	0.8%
Total	**11.9%**	**16.0%**	**27.7%**	**31.3%**	**6.4%**	**18.1%**

Proportions of different SCMs used to replace CEM I for the precast and masonry sector in the UK (based on MPA Precast/ MPA Masonry statistics).

Product Category	2024 (km)
Masonry (aggregate blocks)	86.4
Masonry (aircrete blocks)	148
Concrete paving	80.6
Concrete drainage*	142
Architectural & Structural precast concrete	159.9
Precast flooring	178.7

Complete Transport to Site (A4) average distances

Representative average delivery distance data for precast and masonry products for Lifecycle Module A4 in WLCA assessments, or Scope 3.4 (Upstream transportation & distribution) assessments, can be found in the table left.

Delivery distances (km) for each product sector in the UK in 2024 (based on MPA Precast/ MPA Masonry statistics).

*Relatively small sample.

Product Category	Wastage Rate
Masonry (aggregate blocks)	3% – 5%*
Masonry (aerated blocks)	3% – 5%*
Concrete drainage	≥1%†
Architectural & Structural precast concrete	≥1%†
Precast flooring	≥1%†
Ready mixed concrete	1% - 2%*

Construction Wastage on site (A5.3)

Representative average construction wastage rates for Module A5.3 in WLCA assessments, or contractors'/ housebuilders' Scope 3.5 (Waste generated in operations), can be found in the table left. This table is based on RICS' recent WLCA standard in addition to a recent study by consultants, Reusefully, involving 31 surveys and 13 interviews with manufacturers, contractors and five of the UK's top housebuilders.

Recommended Wastage Rates for different masonry and precast concrete product groups.

* Adams, K; Hobbs, G (2023) Wastage rates for blocks and ready mixed concrete. Reusefully, 2023. https://www.mpamasonry.org/MPAMasonry/media/root/assets/MPA-Wastage-Desk-Final-report-01-06-23v3.pdf

† RICS (2023) Whole Life Carbon Assessment for the built environment professional standard. 2nd Ed. RICS, 2023.

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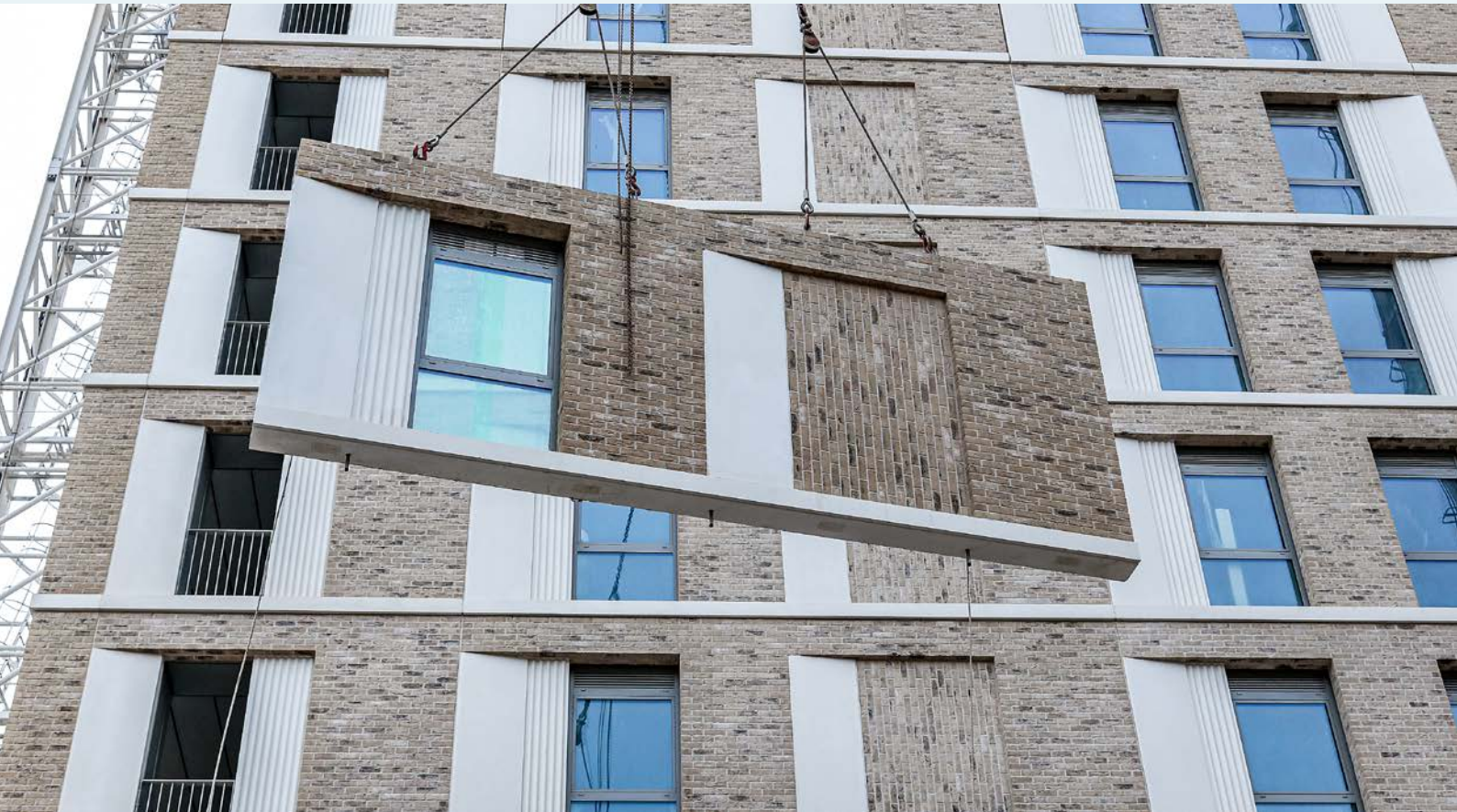


Profile of UK Precast and Masonry

The following section offers further information on the profile of the sector in 2024 in terms of tonnage, raw materials' use, overall Greenhouse Gas emissions, and the main factors contributing to carbon emissions in the year.

Material Use

12.13 million tonnes

of raw materials and secondary materials used by precast and masonry manufacturers in 2024

72%

of the 12.13 million tonnes consisted of fillers and aggregates.

51.4%

of all raw materials and secondary constituents were used in the manufacture of aggregate blocks and aircrete blocks, the majority of which is understood to have been used in the housing sector.

32.8%

of total materials used were for infrastructure, civil engineering and landscaping products.

15.8%

of materials were used to produce architectural and structural precast concrete products.

Figure 5. Resource consumption in the production of UK Precast and Masonry products (in tonnes), based on 2024 MPA data.

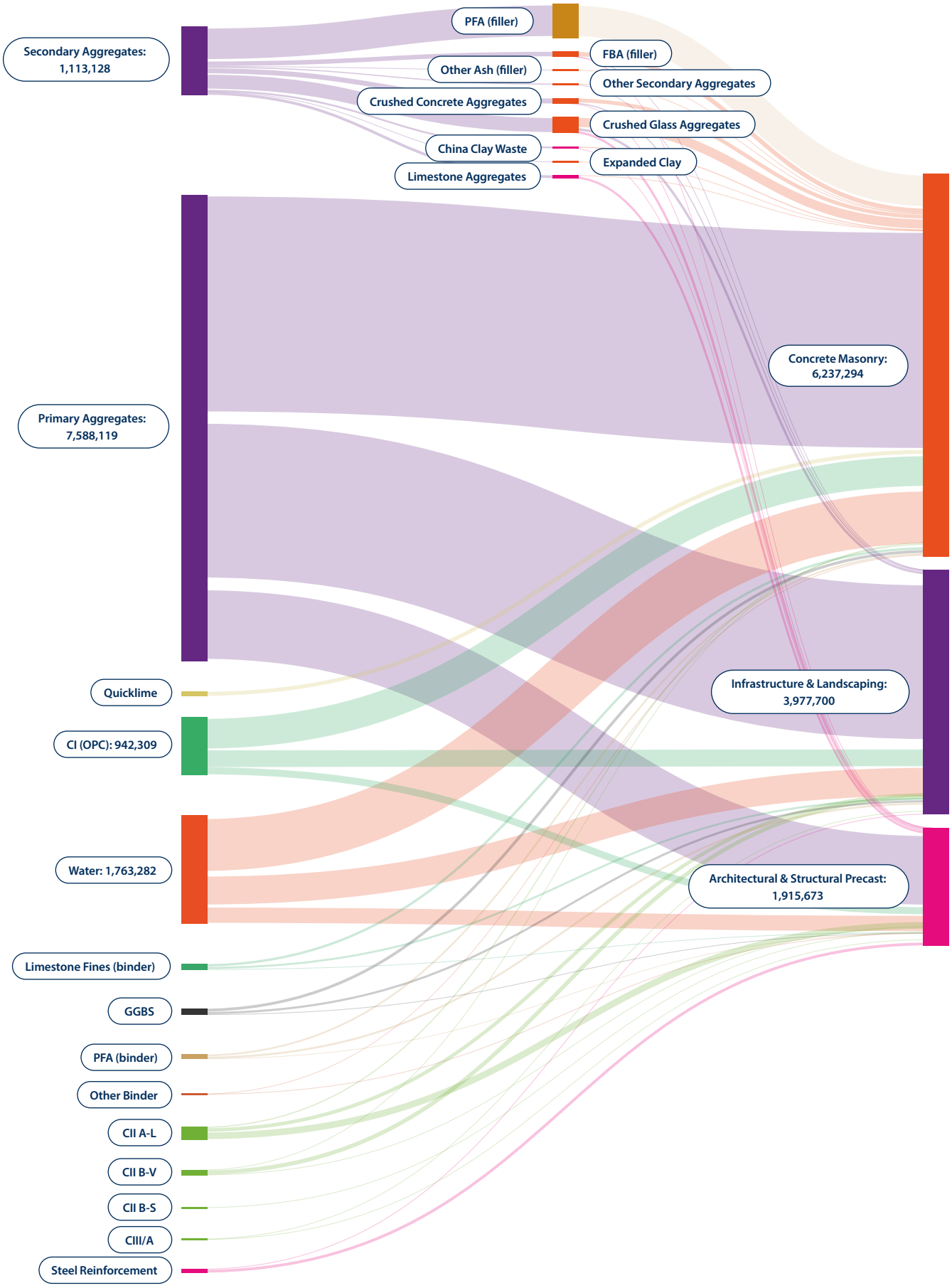
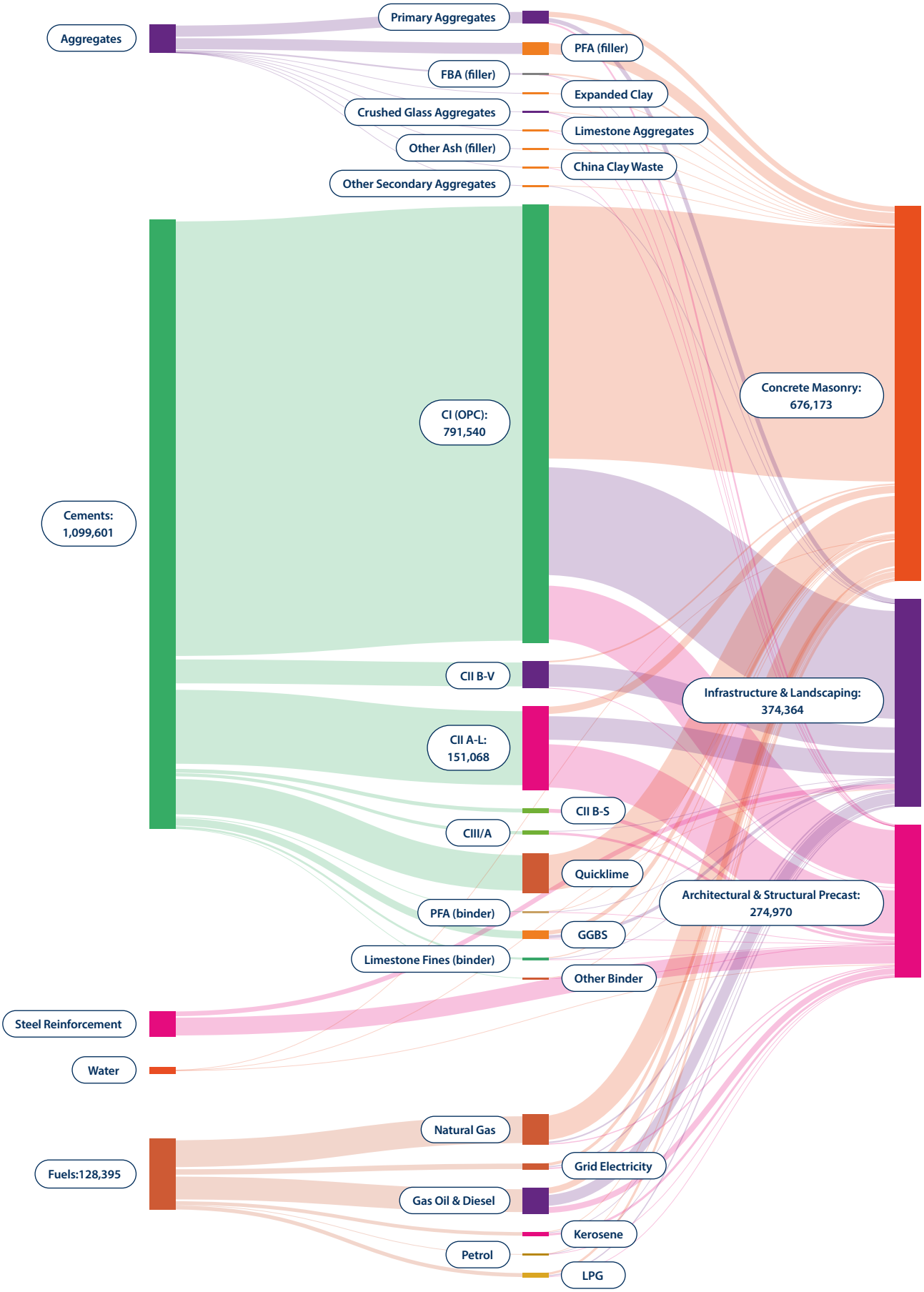
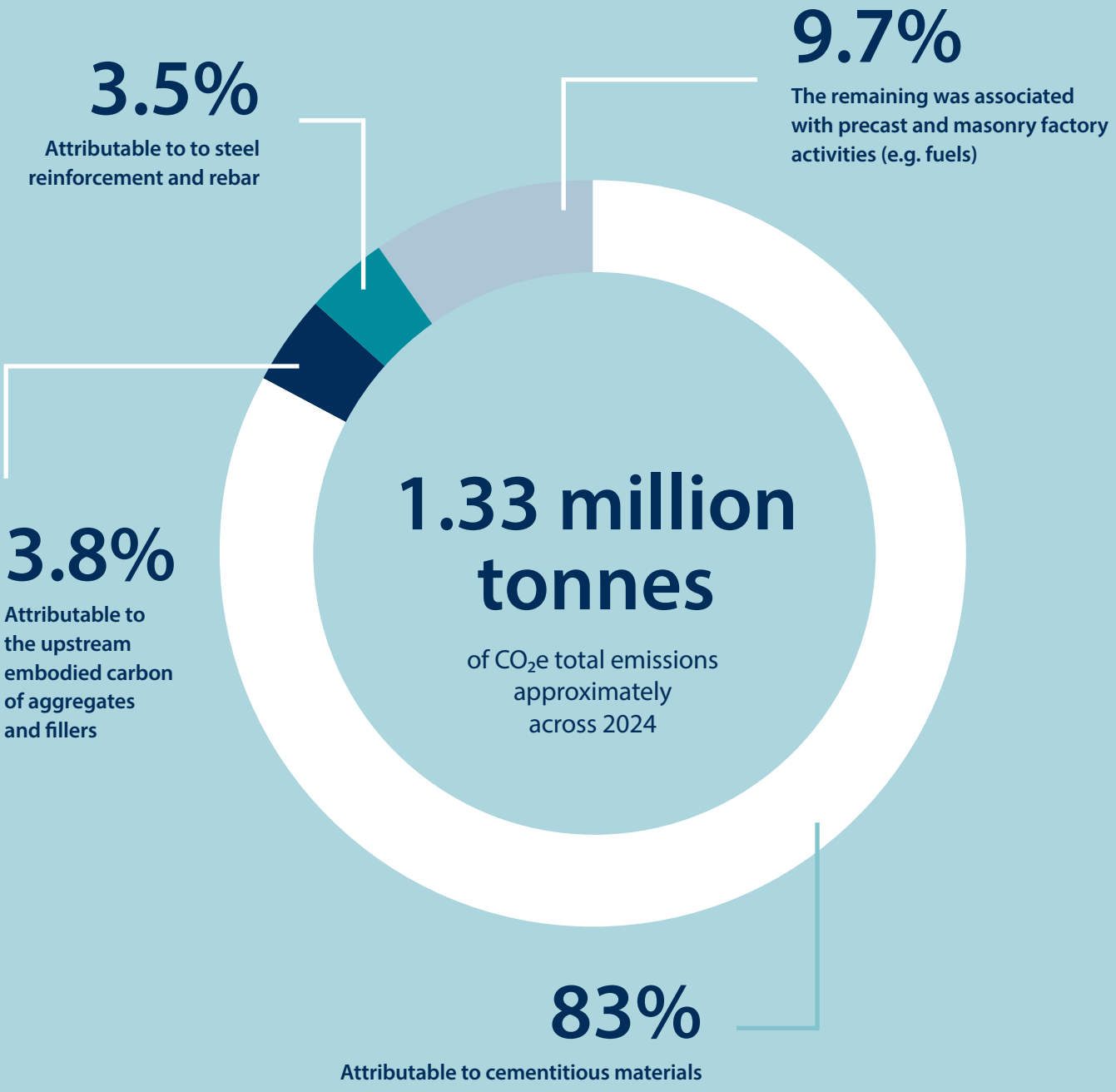


Figure 6.Greenhouse gas emissions (in tonnes of CO_2e) from the production of UK Precast and Masonry products, excluding delivery of raw materials to factories, based on 2024 MPA data.



In previous reports, the methodology for calculating overall embodied carbon was restricted to upstream emissions only (Lifecycle Module A1). This year, the methodology was revised to include both upstream emissions (Module A1) and factory emissions (Module A3). Total carbon emissions in 2024 were approximately 1.33 million tonnes of CO_2e. Of this total, 83% was attributable to cementitious materials, 3.8% to the upstream embodied carbon of aggregates and fillers, and 3.5% to steel reinforcement and rebar. The remaining 9.7% was associated with precast and masonry factory activities (e.g. fuels). The average embodied carbon intensity in 2024 was approximately 162.6 kg CO_2e/m^3 (lifecycle Modules A1 and A3 only).

Breakdown of the carbon footprint of the precast & masonry industry in 2024 (in tonnes CO_2e)



UK concrete is essential, sustainable, protecting people, innovating, helping to tackle climate change and enabling great design

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MPA Precast and MPA Masonry represent the UK precast concrete manufacturers, including aircrete and aggregate concrete blocks. We develop and disseminate best practice guidance to promote precast concrete in construction.

Web www.mpaprecast.org | www.mpamasonry.org

MPA Precast and MPA Masonry are product groups of the Mineral Products Association, the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and industrial sand industries. www.mineralproducts.org

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