

# Precast Concrete and Masonry Sustainability Report



**Mineral Products Association** 



### Introduction

Welcome to the precast and masonry sustainability sector report. Over the past 17 years we have placed transparency and data provision at the forefront of our commitment to sustainability. The mineral products sector recognises that any effective decarbonisation strategy must be based on both accountability and verifiable progress. It is our firm belief that any conversation on sustainable material choices in construction should be predicated on transparent data and a level playing field. All too often we encounter environmental claims, especially related to the increased use of timber which don't pass this test. This annual report is one way, as precast and masonry manufacturers, in which we are demonstrating our commitment to wider industry efforts to reach net zero carbon emissions by 2050.

Transparency is more than a buzzword; it is a tool to encourage greater interaction with our stakeholders. Our hope is that whether you're an investor, client or a community member concerned about environmental or social responsibility, this report offers at least a snapshot of our sector's performance. In efforts to increase the utility of these reports we have now included an up-to-date data sheet designed to support buildings, landscape, and infrastructure Whole Life Carbon Assessments (WLCA).

#### The metrics in this report demonstrate important sector progress:

#### Decarbonisation

The sector continues to make substantial progress towards net zero carbon, with our members introducing more carbon efficient mixes and lower carbon solutions across their value chain. This is evidenced by the use of lower carbon supplementary cementitious materials (SCMs) to replace Portland Cement (CEM I) and further adoption of green energy solutions. In 2022, the sector recorded the highest use of SCMs since the Charter was introduced 17 years ago (25.7%).

Cradle-to-Gate embodied carbon emissions continue to drop significantly, going down by over 13% in the last five years. Most of the electricity used by precast and masonry factories in 2022 came from renewable resources, either generated on-site or via green energy tariffs.

We are also seeing a significant rise in verified Environmental Product Declarations (EPDs) published by member companies this year, supporting the construction industry with accurate and reliable embodied carbon data.

#### Water and waste

Water consumption and waste-to-landfill levels remain low, 7% and 79% lower (respectively) compared to 2012. Many of these improvements are enabled by the fact that 88% of masonry and precast production is carried out under UKAS accredited environmental management systems (ISO 14001).

I look forward to updating on progress again next year when our metrics will reflect the latest UK Concrete Sustainable Construction Strategy. The UK Concrete strategy is set to expand on decarbonisation efforts but will also provide much greater clarity and detail in areas such as circular economy, natural environment, social value and well-being.

**Phil Ball,** Chair, MPA Precast and MPA Masonry Sustainability and Environment Committee

**Cover photo credit:** Opened in 2022, Project 80 is a housing development in Birmingham, by Midland Heart, delivering high-performing, energy-efficient homes. Built in masonry the homes achieved performance requirements in line with those expected in the Future Homes Standard, set to be introduced in 2025.

## Executive Summary

KPI data collected for 2022 covered 128 production sites that manufactured 16 million tonnes of precast and masonry products and employed nearly 10,000 full time equivalent members of staff. Our estimate is that this represents approximately 70% of UK's precast and masonry production.

#### Auditing, Certification & Management Systems

- 45 manufacturers audited under the Precast Sustainability Charter in 2022
- Over 88% of production sites certified to both ISO 9001 and ISO 14001

 Responsible sourcing certification has increased to 81.5% of production

#### Road to Net Zero Carbon



- CO<sub>2</sub> emissions per tonne have reduced by 25% since 2012
- Factory CO<sub>2</sub> emissions reduced by 46% since 2010
- Use of lower carbon cements has reached 25.7%
- 25% of members had 3rd party verified Environmental Product Declarations (EPDs)

#### Energy Efficiency

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- 56% of electricity used in precast and masonry factories is from renewable sources
- On-site wind turbines, solar energy, and other green energy installations generated 13.8% of electricity to member factories

#### Resources and Circularity



- 70% of reinforcement used in precast concrete can be traced to steel mills in the UK
- Waste generated from precast and masonry production reduced by 12% from 2012 to 35kg per tonne
- Waste to landfill has reduced by 78% since 2012 to 360 grammes per tonne



 95% of member companies made charitable donations in 2022

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 Members have now started to report volunteering hours. Over 1,500 volunteering hours were reported in 2022

#### Local Construction Material



- 87.8km average delivery distance from factory to customer site 2022
- This equates to transport CO<sub>2</sub> of less than 5 kg CO<sub>2</sub>e/ tonne

### Performance report

### Climate Change and Energy

### The carbon dioxide emissions from precast and masonry production have reduced by 46% since 2010 and are now 10.86 kg CO<sub>2</sub>e/t.

Energy consumption rose slightly in 2022 to 58.7 kWh/t, compared to 54.4 kWh/t in 2021. The share of renewable energy, not subject to feed-in-tariffs, increased to 9.6%. In 2022, 56% of all electricity used in precast and masonry factories was from renewable sources. Including 13.8% of electricity generated from on-site renewables including solar photo-voltaics (PV) and wind turbines. MPA has also started collecting data on use of hydro-treated vegetable oil (HVO-100) as an alternative fuel. Additional bio-fuel options will be added for the next reporting period.

Several product manufacturers have increased the share of renewable energy being used. For example, 35% of all energy used in architectural and structural precast factories came from renewable sources.

2022 saw an increase in the amount of production certified to energy management systems (ISO 50001), rising to 57.2%, compared to 52.4% in 2021.

Transport data from 2022 shows that the average lorry carried just over 31.5 tonnes of precast and masonry product per delivery. The average delivery distance from factory to customer site was 87.8 km. Using DEFRA GHG conversion factors for an HGV >33t, fully laden, this equates to less than 5 kg CO<sub>2</sub>e/ tonne.



#### Carbon Emissions of Precast and Masonry Production (kg/CO<sub>2</sub>/t)

## Sustainable consumption and production systems

MPA Precast and MPA Masonry use the coverage of UKAS accredited management systems as an indicator of commitment and effort to address environmental aspects and impacts. Management systems can also act as an indicator for capacity-building and companies' ability to develop the necessary skills to stay competitive and able to adopt new technologies and solutions. In 2022, certification levels were 88.6% for ISO 9001 and 88.1% for ISO 14001 management systems. Responsible Sourcing certification to BES 6001 remained high at 81.5%.

Precast and masonry were one of the first product sectors to produce generic (now known as sector) Environmental Product Declarations (EPDs). 2022 data shows 25% of our members are providing thirdparty verified EPDs. New sector EPDs for masonry and precast products are being produced during 2024. 38% of our members have developed BIM objects and/ or digital Product Data Sheets (PDS) for their products.

## Natural resources and circular economy

The data submitted measures water use, waste generation and the use of secondary or recycled materials. Water consumption at precast and masonry factories dropped compared to last year, with an overall reduction from 2012 of 7%. Waste minimisation and the use of recycled and secondary aggregates has started to plateau. The use of lower carbon, supplementary cementitious materials (SCMs) has risen to 25.7%.

#### Water use

Water consumption improved in 2022, compared to 2021. Mains water and groundwater use of 76.7 litres/t and 42.2 litres/t (respectively), compared to 82.0 and 45.3 litres/t respectively in 2021.

#### Waste minimisation

Factory waste rose slightly in 2022 to 35 kg/tonne, compared to 34.3 kg/ tonne in 2021. Waste to landfill dropped to 0.36 kg/t compared to 1.67 kg/t in 2012. Over 98% of factory waste was recycled and reused, this can be on or off the factory site.

#### Secondary and recycled aggregates

In 2022, 12% of all aggregates used in the manufacture of precast and masonry products was from recycled or secondary sources. This is compared to 20.3% in 2012. This reflects a downward trend seen since the mid-2010s, as members continue to report that the supply of these materials is unable to keep pace with demand.

#### Lower carbon cements

The use of lower carbon supplementary cementitious materials (SCMs) in precast and masonry products has risen to 25.7% of all cements used, compared to 17.9% in 2020. Almost 11.7% of all cements used in 2022 were limestone fines. There has also been a rise in the use of GGBS and fly ash compared to previous years.

An average of 151 kg of cementitious material was used per tonne of masonry and precast concrete in 2022. This represents a slight increase that can be attributed to the increased proportion of precast products (compared to masonry) in the 2022 data set.

#### **Reinforcing steel**

Around 70% of all reinforcing steel (rebar, mesh, strand, etc) used by our members came from UK based mills. This is significantly higher than all previous years. The remaining 30% was sourced from suppliers based in the EU (21.7%), Turkey (2.6%), Eastern Europe (0.2%) and the rest of the world (5.4%).

### Sustainable Communities

The precast and masonry sectors continue their commitment to competency and training provision. Data in 2022 has been influenced by mergers and acquisitions in the sector, and a lack of data across these metrics has been caused by the lag in integrating systems and processes.

All MPA Masonry and MPA Precast members are committed to the MPA's health and safety strategy 'Vision Zero'. The latest data shows that UKAS-accredited H&S management systems (ISO 15001) is at 69.9%. The precast and masonry sector's LTIFR rate was around 4.7 per million hours in 2022 compared to 9.8 in 2012.

Around 78% of companies responding have formal code of business ethics policies and 88% reported having an equal opportunities policy. 86.5% of employees were covered by formal training and development policies.

Our members are active in their communities. In 2022, a third of sites operated formal local liaison schemes. Nearly all our members (95%) made charitable donations and the total volunteering hours, from the members who supplied this data, was over 1,500 hours.

#### **Sustainability Charter Audits**

MPA Precast and MPA Masonry require member companies to undergo regular sustainability audits. All audits in 2022 were carried out by a third-party environmental consultant. In 2022, 45 of our members were audited. This included 29 full audits and 16 desktop audits.

The audit process gathers data and also identifies areas of best practice to share that can reduce environmental impact. Recent audit visits show visible progress in increasing on-site renewables, adoption of electric forklifts and use of HVO biofuels to replace diesel.

The audits also provide notes for the members, such as guidance on waste transfer documentation, health surveillance and KPI data reporting.

## Profile of UK Precast and Masonry

MPA Precast and MPA Masonry are part of the Mineral Products Association, the trade association for cement, concrete and aggregates. MPA publishes a "Profile of the UK Mineral Products Industry" full of useful sector data, here we supplement that report with data on the precast and masonry that is intended to inform specifiers of precast and masonry products.

### Resources

Total raw material used in the production of precast and masonry products is 16.62 million tonnes. Of which, the masonry sector consumed around 55%, infrastructure and landscaping products 31%, and architectural and structural precast 14%. Aggregates, either primary or recycled, made up 78% of all raw materials consumed by the sector.

The embodied carbon of raw materials used (Life Cycle Stage A1) was 1.73 million tonnes  $CO_2e$ .

### Resource consumption from the production of UK Precast and Masonry products (tonnes), based on 2022 MPA data.



### Data for Whole Life Carbon Assessment

The data in this section is sector generic data developed from the MPA Precast/MPA Masonry sector sustainability scheme, provided to support Whole Life Carbon Assessments (WLCAs) for life cycle stages A1-to-A3, A4 (transport to site), and A5 (construction waste). This data can be used in conjunction with products EPDs, and other data sources, to develop representative WLCAs for buildings and infrastructure at earlier concept design and/or planning application stages.

Year	CEM I content (inc content in cement blends)	PFA (inc. content in cement blends)	GGBS (inc. content in cement blends)	Limestone fines (inc. content in cement blends)	Quicklime	Others (betocarb, silica fume, cement dust, etc)
2022	66.8%	5.5%	6.3%	11.7%	5.8%	3.8%

#### Table 1: SCM replacement levels in precast/ masonry products (A1 to A3)

Table 1 provides the proportions (%) of different cementitious materials used for the manufacture of precast and masonry, based on 2022 data. Cement content data for different products can be sourced from EPDs or via direct enquiry to manufacturers.



Product Category	km
Masonry (aggregate blocks)	80.6
Masonry (aerated blocks)	140.4
Concrete paving	109.3
Concrete drainage	130.6
Architectural and Structural precast concrete	211.8
Precast flooring	112.7

Product Category	2022
Masonry (aggregate blocks)	25.3
Masonry (aerated blocks)	24.0
Concrete paving	24.1
Concrete drainage	18
Architectural and Structural precast concrete	20.9
Precast flooring	25.0

Product Category	Wastage Rate
Masonry (aggregate blocks)	3% – 5% [1]
Masonry (aerated blocks)	3% – 5% [1]
Concrete drainage	≥1% <sup>[2]</sup>
Architectural and Structural precast concrete	≥1% <sup>[2]</sup>
Precast flooring	≥1% <sup>[2]</sup>
Ready mixed concrete	1% - 2% [1]

#### Table 2: Transport-to-Site (A4) distances

Table 2 provides delivery distances, in km, for each product sector, based on 2020 data. This data set has been provided as the most representative of our members.

The data is the total delivery distance from factory to customer site, divided by the number of deliveries. Where the number of delivery tickets is known, these are used instead of deliveries. Tickets may be associated with multiple deliveries made in a single journey, which is very common in the sector.

#### Table 3: Transport-to-Site (A4) Average load

Table 3 provides the average delivery truck load, in tonnes, for each product sector in the UK, based on 2022 data.

The average in Table 3 is calculated by dividing total year production by the number of deliveries. The average is then weighted based on each company's production tonnage.

#### Table 4: Construction Wastage on site (A5)

Table 4 provides recommended wastage rates for different masonry and precast concrete products.

MPA Precast and MPA Masonry do not collect construction site wastage data. Data in table 4 is referenced to two sources. A recent study <sup>[1]</sup> by environmental consultants Reusefully that was based on survey results from manufacturers, contractors and housebuilders and the standard's default factors as published by RICS <sup>[2]</sup>.

- BRE (2023) PN 514 Rev 3.1: Product Category Rules (PCR) for Type III EPD of construction products to EN 15804+A2. BRE Global, Nov 2023. <u>https://www.greenbooklive.com/filelibrary/EN 15804/BRE-PN514-EN15804-A2-PCR-V3.1.pdf</u>
- 2. RICS (2023) Whole Life Carbon Assessment for the built environment professional standard. 2nd Ed. RICS, 2023.

## Key Performance Indicators (KPIs)

This table summarises performance and progress in 2022 against the Precast and Masonry Sustainability Charter 2012 baseline.

Strategy objective	Key Performance Indicator (KPI) Target (2012 baseline)	2012	2022
Sustainable Consumption & Production	Production tonnage (sites) covered by UKAS accredited Environmental Management Systems	88.9%	88.1% (86.3%)
	Production tonnage (sites) covered by UKAS accredited Quality Management Systems	91.1%	88.6% (89.2%)
	Production tonnage (sites) covered by responsible sourcing certification	71.1%	81.5% (75.8%)
	Environmental convictions for air and water emissions against precast manufacturing sites	0	0
	Companies covered by EPD declarations	n/a	25%
	Companies covered by BIM objects/ PDTs	n/a	38%
Climate Change & Energy	Reducing overall fossil fuel energy (kWh/ tonne) use in production by 10%	62.7	53.1
	Total energy consumption (including renewables) (kWh/tonne)	55.6	58.7
	Reducing $\text{CO}_2$ emissions for production (kg $\text{CO}_2$ / tonne) by 20%	14.3	10.68
	Production tonnage (sites) covered by ISO 50001 (energy management systems)	n/a	57.2% (41.4%)
Natural Resources & Environmental Protection	Reduction of factory waste by 10% (kg/ tonne)	39.8	35
	Reduction of factory waste to landfill (kg/ tonne)	1.67	0.36
	Increasing the proportion of alternative cement additions (as a total of cement content) to 25%	23.4%	25.7%
	Increasing the proportion of recycled/ secondary aggregates to 25%	20.3%	12%
	Reducing mains water consumption by 20%	82.3	76.7
Sustainable Communities	Increasing the proportion of employees covered by certified management systems (e.g. ISO 9001, etc)	95.6%	91.9%
	Increasing tonnage (sites) covered by H&S management systems (OHSAS 18001, ISO 45001, etc)	64.9%	69.9% (62.5%)
	Reduction of industry Lost Time Injury Frequency Rate (LTIFR)	9.8	4.7
	Maintain percentage of relevant sites with formal local liaison schemes	28.1%	31.3%

Notes: MPA Precast and MPA Masonry members produce a range of products. Both the mix of products and the mix of members supplying data year on year may vary. This does create annual variations in data. Members of MPA Precast and MPA Masonry that submit data via the audit and data collection process can use sector data to support responsible sourcing certification (to BES 6001). Third party certification auditors may contact MPA to gain confirmation that annual KPI data has been supplied. Due to legal and technical restrictions, some data items can only be estimated.

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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

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