



Precast Concrete and Masonry Sustainability Report

An annual report of performance
metrics (2021 data)





Introduction

The last three years have undoubtedly been some of the most challenging for our industry. The UK's construction industry was one of the first to recover from the Covid pandemic in 2020, only for new challenges to emerge this year with the Ukraine war and energy crisis. The precast concrete and masonry sector was able to adapt following the pandemic, meeting market demands in a safe and a responsible manner and should remain resilient despite the current challenges. Our annual sustainability auditing scheme continued throughout that challenging period. Last year we successfully audited 37 member companies with most of our members achieving a >80% audit score.

The last three years also saw a rise in the industry's understanding of the carbon challenge. Today, design and construction communities have a deeper knowledge of the embodied carbon of buildings and structures. The demand for accurate Environmental Product Declarations (EPDs) and embodied carbon data has increased, and the demand for low-carbon solutions has intensified. The precast and masonry sectors were among the first to produce EPDs covering the vast majority of the UK's production of blocks, pavers, infrastructure, structural and architectural precast products. We are updating our Sector EPDs to ensure that the construction industry uses the most accurate and up-to-date data in Whole Life Carbon Assessments (WLCA).

We are committed to the UK Concrete's 2050 Net Zero Roadmap. The roadmap's target is for the concrete & cement sectors to reach net zero by 2050 and utilise the inherent properties of the material to enable buildings to become "Carbon Negative". We are working with UK Concrete on a new Sustainable Construction Strategy for the concrete industry, which will set out in more detail the sectors' actions across a wide range of issues. We are also working closely with UK Concrete, and The Concrete Centre, to explore how the Low Carbon Concrete Routemap can be made more applicable to precast concrete products.

As shown in the report, the sector's performance, and the quality of KPI data we collect, continues to improve. Precast and masonry carbon emissions stayed low in 2021, at around 10 kg CO₂/t. The share of renewable energy consumption in precast and masonry product factories saw a significant rise, now making up over 10% of all energy consumed on manufacturing operations and mobile plant. Almost half (44%) of grid electricity used in our factories in 2021 came from green renewable sources. Audits also reveal a significant rise in low carbon product solutions across the precast & masonry sector with the use of low carbon cementitious materials increasing by 35% year on year.

Our new Sustainable Construction Strategy is still being developed and is on track to be published in 2023. Climate change mitigation, adaptation & resilience, as well as principles such as circular economy, social capital & well-being, will be at the core of that strategy.

Phil Ball *Director of Operations at H+H (UK) and Chairman of the Precast & Masonry Sustainability & Environment Committee*

Note:

Members of MPA Precast and MPA Masonry can use this sector data capture exercise and the targets set by the industry to help demonstrate conformance to the Responsible Sourcing of Materials standard (BRE BES 6001) with regards to stakeholder engagement, etc. Third party certification auditors are welcome to contact MPA to gain confirmation that annual KPI data has been supplied.

Some data items can only be estimated due to technical and legal restrictions.

Cover photo credit: Sterling Services Ltd.

Progress towards charter targets & objectives

Auditing, Certification & Management Systems

- 37 manufacturers audited under the Precast Sustainability Charter in 2021.
- 94.3% of all precast & masonry product factories certified to Quality Management Systems standard ISO 9001.
- 89.4% of all factories certified to Environmental Management Systems standard ISO 14001.

Road to Net Zero Carbon

- Factory CO₂ emissions down by 50% since 2010.
- Cradle-to-Gate CO₂ emissions down by 52% since 1990.
- Use of low carbon cementitious materials in precast & masonry rose by 72% since 2017.

Energy Efficiency

- Well over a tenth of all energy used in precast & masonry manufacture is now from renewable resources (including REGO).
- 31% of all energy used in architectural & structural precast factories is renewable.
- Over a quarter of all energy used in precast paving production is renewable.
- 52.4% of precast & masonry production in 2021 was certified to Energy Management Systems standard ISO 50001.

Natural Resources & Circular Economy

- Waste generated in precast and masonry product factories down by 14% since 2012.
- Waste to landfill 60% lower compared to 2012 levels.
- Of all reinforcing steel traced back by members, around 63% originated from UK steel mills.
- 88.5% of precast & masonry production in 2021 was certified to Responsible Sourcing Standard BES 6001.

Product Data & Digitalisation

- EPD software and training provided to members to enable our precast & masonry manufacturer to develop verified Environmental Product Declarations (EPDs) and embodied carbon data.
- Around 27% of precast & masonry manufacturers covered by product specific 3rd party verified EPDs.
- 50% of manufacturers have precast or masonry product BIM objects and/ or Product Data Templates.

Sustainable Communities

- 74% of precast & masonry production is covered by certified H&S Management Systems (e.g. ISO 45001).
- 88% of companies made charitable donations and/ or offered employee time voluntary work.
- 95.7% of reported employees were covered by formal training and development policy in 2021.

Sustainable Consumption & Production Systems

MPA Precast/ 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 a companies' ability to develop the necessary skills to stay competitive and able to adopt new technologies and solutions.

UKAS-accredited management systems

In 2021, **91.8%** of members' production was covered by ISO 9001. This is almost identical to the baseline year (2012) and is mainly attributable to new sites acquired by some of our members where the management systems are being introduced. **90.1%** of precast and masonry produced was covered by an ISO 14001 environmental management system compared to **88.9%** in 2012.

Responsible Sourcing certification to BES 6001 saw an increase, reaching **88.5%** in 2021 compared to **71.1%** in 2012. There were no environmental incidents leading to convictions in 2021.

Product data and digitalisation

Precast & masonry were one of the first product sectors to produce generic sector Environmental Product Declarations (EPD) and BIM product data template (PDT) data covering most manufacturers in the UK. Currently, around **27%** of our members are covered by certified 3rd party EPDs. This is likely to rise to 70% when our sector EPDs are renewed and some of our members start generating their own product EPDs using MPA's EPD software (based on One Click LCA). More than **50%** of our members have developed BIM objects and/or PDTs for their products.

Natural Resources & Circular Economy

The 2021 data show mixed results in terms of resource efficiency and employment of secondary or recycled/ low carbon materials. Factories' water consumption and waste generation increased compared to previous years, but stayed below 2012 levels. This could be due to a marked change in the tonnage proportions of different product groups offering KPI data. The addition of new members since 2019, with new products not covered in previous reports, may have also affected results. The use of low carbon cementitious materials increased significantly in 2021. The proportion of British-made rebar, mesh and strand also increased, accounting for almost two-thirds of all reinforcement used by members.

Water use

Mains water and groundwater use in 2021 was **82.01** litres/t and **45.3** l/t respectively. This is slightly lower than in 2012 (**82.29** and **46.8** litres/t respectively) but higher than in 2018 and 2019. This could mainly be due to the marked change in the proportions of product groups covered in the survey as the proportion of products with water consuming processes seem to have increased.

Waste minimisation

Factory waste rose in 2021. But at **34.35** kg per tonne of product, waste generated is still below the 2012 baseline for factory waste (**39.8** kg/t). Waste to landfill remained low in 2021, at **0.69** kg/t compared to **1.67** kg/t in 2012.

These results are different to waste averages reported in the last few years due to changes in the proportions of different product categories in our 2021 datasets. Our audits in 2021 continue to show increased efforts by factories to address waste generation and water

consumption. Data seems to show a rise in off-site recycling: around **31.81%** of factory waste was recycled on site and **63.56%** was taken off site for recycling and use in other applications.

Secondary and recycled aggregates use

The amount of secondary and recycled aggregates available for use in precast concrete products rose slightly in 2021. Recycled/ Secondary aggregates constituted around **13.6%** of all aggregate use in precast and masonry factories in 2021 compared to **12.6%** in 2019 and **20.3%** in 2012. Members who frequently use RCA continue to refer to the difficulty in sourcing secondary & recycled aggregates, mainly RCA, due to increased demand.

Use of low carbon cementitious materials

Use of low carbon cementitious materials saw a significant rise in 2021, constituting around **24.1%** of all cements used. This is compared to **18.6%** in 2019 and **17.9%** in 2020. The rise seemed mainly associated with the use of limestone fines as its use increased sixfold since 2019. Fly ash, CEM II blended cements, and GGBS use have also risen compared to previous years. The rise in using low carbon cementitious materials is detected across most product sectors, including structural precast.

An average of **149 kg** of cementitious material was used per tonne of precast concrete in 2021. This is higher than previous years due to the difference in product groups' proportions in the 2021 datasets.

Reinforcing steel

Around **63%** of all reinforcing steel (rebar, strand, etc) used by our members originated from British rebar manufacturers (UK based mills). This is slightly higher than the percentage reported in our 2020 report (**60.3%**). The rest of the rebar, mesh and strand was sourced from mills located in the EU (**17.7%**), Turkey (**7%**), and other parts of the world (**12%**). Very little was imported from Eastern Europe (<**0.1%**).

Sustainable Communities

The precast and masonry sectors maintained a high competence and training record in 2021, increasing production covered by UKAS-accredited Health & Safety management systems while maintaining high levels of coverage of employees under formal training and development systems.

Health & Safety

Production covered by UKAS-certified Health & Safety management systems has risen slightly to **73.9%** compared to **72%** in 2019. The precast sector's LTIFR rate is now **6.5** per million hours compared to **9.8** in 2012.

Ethical business standards

Around **83%** of companies responding have formal Code of Business Ethics policies, **93%** reported having an Equal Opportunities policy and around **93%** have already introduced measures to ensure compliance with Anti-bribery and Corruption legislation. Nine out of every 10 companies have an Anti-trafficking & Slavery statement.

Respect for people & local environment

39% of sites operated formal local liaison schemes in 2021. Around **88%** of member companies made charitable donations that year and employees offered an average of **111.3** hours of voluntary work per company.

Competence and Skills

95.7% of reported employees were covered by formal training and development policies in 2021. An average of **15.2** hours of training per employee was provided.

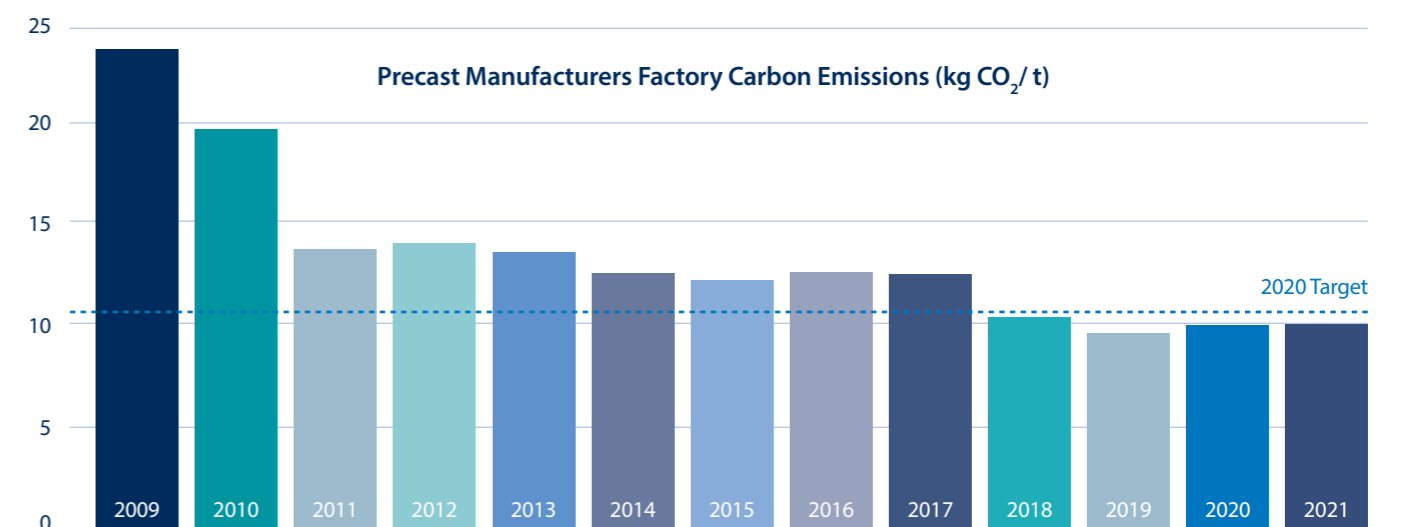
Climate Change & Energy (including transport)

The precast and masonry sector's consumption of fossil fuels continues to drop. Precast factory energy consumption was around 54.4 kWh/t in 2021 compared to 62.7 kWh/t in 2012. The share of renewable energy, not subject to Feed-In-Tariffs, has almost quadrupled since 2019. Around 44% of all electricity used by precast and masonry factories in 2021, almost 85,425 MWh, was from green renewable resources.

Energy derived from fossil fuels (including grid electricity) rose slightly to **46.8** kWh/t. In 2021, almost a third (**31%**) of all energy used in architectural and structural precast (precast wall units, bridge beams, cladding, etc.) was from green electricity. Over a quarter (**26%**) of all energy used in the manufacture of paving products was also from renewable green electricity. The percentage of precast and masonry produced under certified energy management systems (ISO 50001) remained unchanged from 2019, at **52.4%**.

Factory carbon emissions stayed low in 2021, at around **10.03** kg CO₂/t. The overall reduction in factory carbon emissions from 2010 levels was around **50%**. The environmental audits carried out by MPA in 2021 identified further measures made by many precast and block manufacturers to address factory carbon emissions and energy consumption. Switching to greener forms of energy, deployment of energy-efficient equipment and lighting, and electric mobile plant were the top three measures identified in audits.

Most companies supplied transport data for 2021. Results show that the average lorry carried just over **22.7** tonnes of precast and masonry product per delivery. The average delivery distance in 2021 was around **100.9** km.



Net Zero Ambitions in Action

With the rise of the Net Zero carbon agenda, the precast sector is employing a wide range of measures to enable a Net Zero future for construction.

1. A Net Zero carbon roadmap

In 2020, the concrete & cement sector became the first construction material sector in the UK to introduce a Net Zero carbon roadmap with a target of becoming a “carbon negative” industry by 2050. With the rise of the embodied carbon agenda, the precast and masonry sector has been actively exploring short-term carbon targets. Through a series of desktop research projects, assessments and workshops, the sector is examining a wide range of short-term scenarios exploring how carbon reductions at factory, mix design and product geometry levels can lead to sufficient reductions to embodied carbon during this decade. Several embodied carbon initiatives, such as RIBA’s Climate Challenge 2030 targets, LETI embodied carbon banding, and the Low Carbon Concrete Routemap, are being explored as part of this exercise.

2. Equipping the industry with accurate & verifiable carbon footprints & assessments

The concrete and cement industry has invested in providing access for our members to use One Click LCA. One Click LCA is a software used to develop Environmental Product Declarations (EPDs) and Whole Life Carbon Assessment (WLCA) in the construction industry and is approved for use for a number of assessment initiatives and schemes such as Greater London Authority carbon assessments and BREEAM.

All members of MPA Precast and MPA Masonry have free access to use the software and develop accurate and customised carbon footprints and verified EPDs. Precast manufacturers are already using the tool to experiment with their mixes and develop projections of their likely future carbon emissions with higher levels of accuracy.

3. Commitment to provide accurate carbon & environmental assessments

With the rise of the embodied carbon agenda, there has also been a rise in inaccurate carbon reporting. Two of the main challenges for the masonry sector currently are the method used in many calculators to assess transport GHG emissions (A4) and the rate used to assess the carbon impacts of concrete blocks’ wastage on site (A5).

MPA Masonry recently provided evidence for an amendment to the IStructE’s embodied carbon calculator where the assumed site delivery distance was reduced from 300km to 100km. MPA Masonry is also conducting a study exploring the wastage rates of masonry blocks on site. The study findings should help improve the methodology currently used in Whole Life Carbon Assessments (WLCA) to estimate construction A5 emissions. Preliminary findings from a desktop assessment indicate that the wastage rate for concrete blocks may range between 3% to 5%, compared to 20% currently used in some carbon assessments.

4. Rewarding success and sharing best practice

The last few years saw significant change in how carbon is addressed by precast manufacturers. Our audits reveal substantial effort by members to reduce manufacturing carbon emissions and employ low carbon cementitious alternatives. One example is Techrete (UK) Ltd.

Techrete launched a “Net Zero emissions by 2030” strategy in 2021. Techrete have been investing in renewable energy solutions, such as solar arrays and geo-thermal heating, and introducing low carbon reinforcement and limits to cement in their mixes. The company is investing in low carbon binders, including novel cements, and are planning to produce precast facades with thinner sections, reducing carbon emissions per m² of façade.

This is just one exemplar, and MPA Precast has provided workshops to enable members to share best practice in decarbonising precast concrete.

Left photo credit: Ste Murray Photography.

Key Performance Indicators (KPIs)

This table summarises member companies' performance and progress in 2021 against the previous Precast Sustainability Charter Scheme 2012 baseline.

Strategy objective	Key Performance Indicator (KPI) Target (2012 baseline)	2012	2021
Sustainable Consumption & Production	Production tonnage (sites) covered by UKAS accredited Environmental Management Systems	88.9%	90.1% (89.4%)
	Production tonnage (sites) covered by UKAS accredited Quality Management Systems	91.1%	91.8% (94.3%)
	Production tonnage (sites) covered by responsible sourcing certification	71.1%	88.5% (80.9%)
	Environmental convictions for air and water emissions against precast manufacturing sites	0	0
	Companies covered by EPD declarations	n/a	27%
	Companies covered by BIM objects/ PDTs	n/a	50%
Climate Change & Energy	Reducing overall fossil fuel energy (kWh/ tonne) use in production by 10%	62.7	46.8*
	Reducing CO ₂ emissions for production (kg CO ₂ / tonne) by 20%	14.3	10.03
	Production tonnage (sites) covered by ISO 50001 (energy management systems)	n/a	52.4% (39.1%)
Natural Resources & Environmental Protection	Reduction of factory waste by 10% (kg/ tonne)	39.8	34.4
	Reduction of factory waste to landfill (kg/ tonne)	1.67	0.69
	Increasing the proportion of alternative cement additions (as a total of cement content) to 25%	23.4%	24.1%
	Increasing the proportion of recycled/ secondary aggregates to 25%	20.3%	13.6%
	Reducing mains water consumption by 20%	82.3	82
Sustainable Communities	Increasing the proportion of employees covered by certified management systems (e.g. ISO 9001, etc)	95.6%	91.4%
	Increasing tonnage (sites) covered by H&S management systems (OHSAS 18001, ISO 45001, etc)	64.9%	73.9% (61.8%)
	Reduction of industry Lost Time Injury Frequency Rate (LTIFR)	9.8	6.5
	Maintain percentage of relevant sites with formal local liaison schemes	28.1%	39.1%

*Energy from grid electricity associated with bioenergy, hydro, solar and wind was removed.

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MPA Precast and MPA Masonry are part of the Mineral Products Association, the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar, and silica sand industries.
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