

REAPs

Resource Efficiency Action Plans
Bricks, Blocks & Concrete

1st Progress Report



Chairman's Statement

Welcome to the first REAP Progress Report. It has been a challenging but rewarding journey since our early scoping meetings in 2012, through to the major milestone of our Westminster launch.

The sector Resource Efficiency Actions Plans (REAPs) are where we present key objectives and targets and we are now delighted to publish this, our first progress report.

This REAP initiative is a collaboration between the clay and concrete sectors and in this report we have outlined our progress in each of the lifecycle areas. If more detail is required on the manufacturing aspects of the REAP each sector also publishes Sustainability Performance reports; links to these are provided at the end of this report.

As well as presenting progress on the published action plans, the working group are also focused on emerging and developing aspects related to the resource efficiency agenda, for example the circular economy, an approach which has in the main been applied to consumer goods with a short lifecycle. The publishing of the European Union Circular Economy Strategy demonstrates the significance of this model to the construction sector. This activity will inform the future development of the REAPs, particularly regarding construction and demolition waste as well as building design.

To date, manufacturers have focused on making progress in what is termed 'manufacturing actions', the stage of production in which they have greatest influence. Going forward the working group plans to further develop downstream-actions, strengthening links and thereby supporting the wider supply chain.

Collaboration is a key theme throughout this initiative, and I would like to thank the Brick Development Association (BDA), British Precast, British Ready-Mixed Concrete Association (BRMCA), The Concrete Centre, Mineral Products Association (MPA), Lucideon (formerly Ceram), BuildUK, Construction Products Association (CPA), National Federation of Demolition Contractors (NFDC) and many more for the contributions of their representatives and members.

We invite our stakeholders, many of whom were involved in the initial consultation that informed the REAPs, to provide us with their feedback on this report, and we welcome their suggestions on any aspects that may help to inform the future development of this resource efficiency initiative.

Dave Manley, Chair of the Resource Efficiency Working Group



Resource Efficiency Action Plans have been an important tool for construction product material sectors to examine the ways in which they can reduce environmental impact through the supply chain. Over the past decade nearly a dozen sectors have produced a REAP, with many of the stakeholder partnerships continuing to meet to implement actions. As the concerns for improving resource efficiency evolve to embrace the emerging concept of a circular economy – where materials continue indefinitely to flow through the economy without being wasted – these stakeholder groups are very well placed to evolve REAPs into Circular Economy Action Plans, CEAPs perhaps! Manufacturers have taken many steps to innovate in product and process to reduce carbon emissions, improve water and material use and reduce waste. They will, I am sure, embrace the new challenge of contributing to the delivery of a circular economy.

Jane Thornback
Sustainability Policy Advisor
Construction Products Association



Resource Efficiency Action Plans

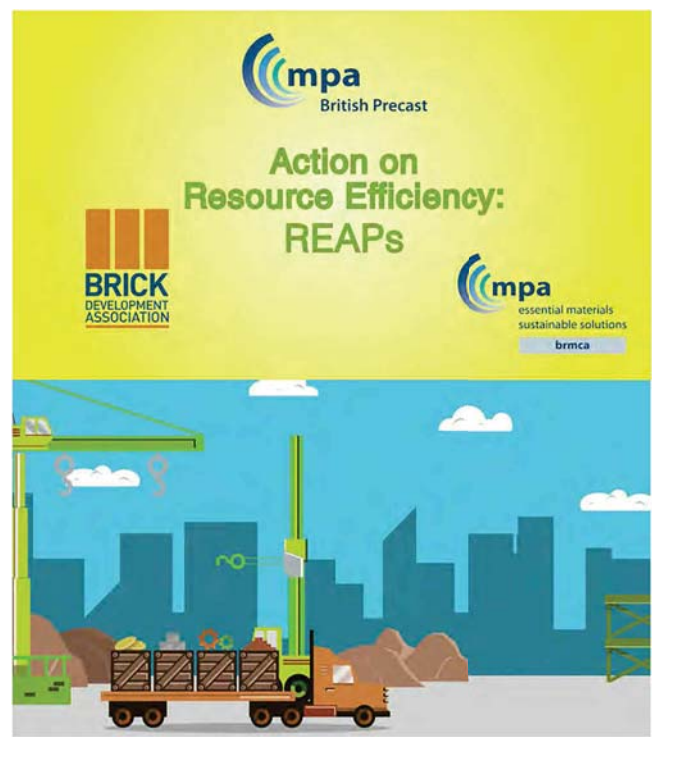
Introduction to REAPs

The resource efficiency action plans (REAPs) were developed by manufacturing sectors, in conjunction with WRAP and industry experts, to assist their supply chains in identifying and creating an actionable strategy for improving resource efficiency. The plans identify the key challenges and actions that each sector and its associated supply chain need to address in order to make improvements in resource efficiency.

The framework used to establish the actions, and as the structure for this report, is based on the lifecycle of a construction product as defined by EN 15804: 2012.

Manufacture; Logistics & Packaging, Design for Use and Reuse, Construction and Demolition.

To increase the awareness and understanding of REAPs, MPA - The Concrete Centre and Brick Development Association have collaborated to produce a video. This video is available on the respective industry websites and the Supply Chain Sustainability School.



Manufacturing Actions

At the manufacturing stage of the product lifecycle it is essential that raw materials are used efficiently and waste is minimised.

The first step in using raw materials efficiently is to approach product design in such a way that the desired function and quality is achieved with minimal consumption of raw materials. Manufacturers should then consider whether any of the necessary virgin materials can be replaced by a recovered or recycled material.

Resource efficient manufacturing begins with careful management of raw material extraction through to the production and sale of the building elements.

Information on the sustainability performance of each manufacturing sector linked to the clay, concrete and masonry products are available (see inside back page), including aggregates, bricks, cement, clay blocks, fly ash, ground granulated blast furnace slag (GGBS), mortar, precast concrete and masonry, ready-mixed concrete and steel reinforcement.

Material Efficiency & Substitution

The brick, concrete and masonry sectors are committed to the responsible sourcing of materials and in 2015 almost 90% of our products were accredited to responsible sourcing standard BES 6001.

- BRMCA has issued guidance to members on the use of recycled and secondary aggregates
- The Concrete Centre has updated guidance 'Specifying Sustainable Concrete' (see www.concretecentre.com/publications). This document provides specifiers with guidance on the specification of recycled and secondary materials as cement replacement and aggregate
- British Precast is developing guidance to members on the use of recycled or alternative materials, and any applicable regulatory framework relating to the processing of wastes to enable them to be used as a raw material. This guidance will enable members to make informed decisions on what materials can be used as substitutes for virgin materials

- The brick sector collates information on the use of MARSS materials (materials sourced from alternative, recycled and secondary sources) and regularly researches opportunities to increase their use. The most recent MARSS report, carried out by Lucideon in 2011 shows that on average, MARSS materials accounted for 9% of brick making materials

Energy & Carbon Reduction

Carbon dioxide emissions from manufacturing are heavily regulated and energy reduction is already a business priority. One of the primary common actions identified in the REAPs was to set clear and achievable targets for 2020 and these have been built into the sector sustainability commitments.

- The precast sector 2020 target is to reduce factory CO₂ emissions and energy consumption by 20% and 10% respectively from a 2012 baseline. By 2015, factory carbon emissions dropped by 11.4% (to 12.6kg CO₂/t) and energy consumption reduced by 7.5% (46.8kWh/t) compared to 2012. Around 49% of British Precast members' production is covered by ISO 50001
- The brick sector 2020 target is to reduce carbon emissions in the production of bricks to 22.5kg CO₂ per m² brickwork, from the 2011 baseline of 23.7kg CO₂ per m² brickwork
- The ready-mixed concrete 2020 target is in line with the Concrete Industry Sustainable Construction Strategy target, which is to reduce CO₂ emissions, as a proportion of product output by 30%, from a 1990 baseline. 2015 performance data for the concrete industry states 73.8 kg CO₂ per tonne of concrete produced, which represents a 28% reduction from the 1990 baseline

Manufacturing Actions

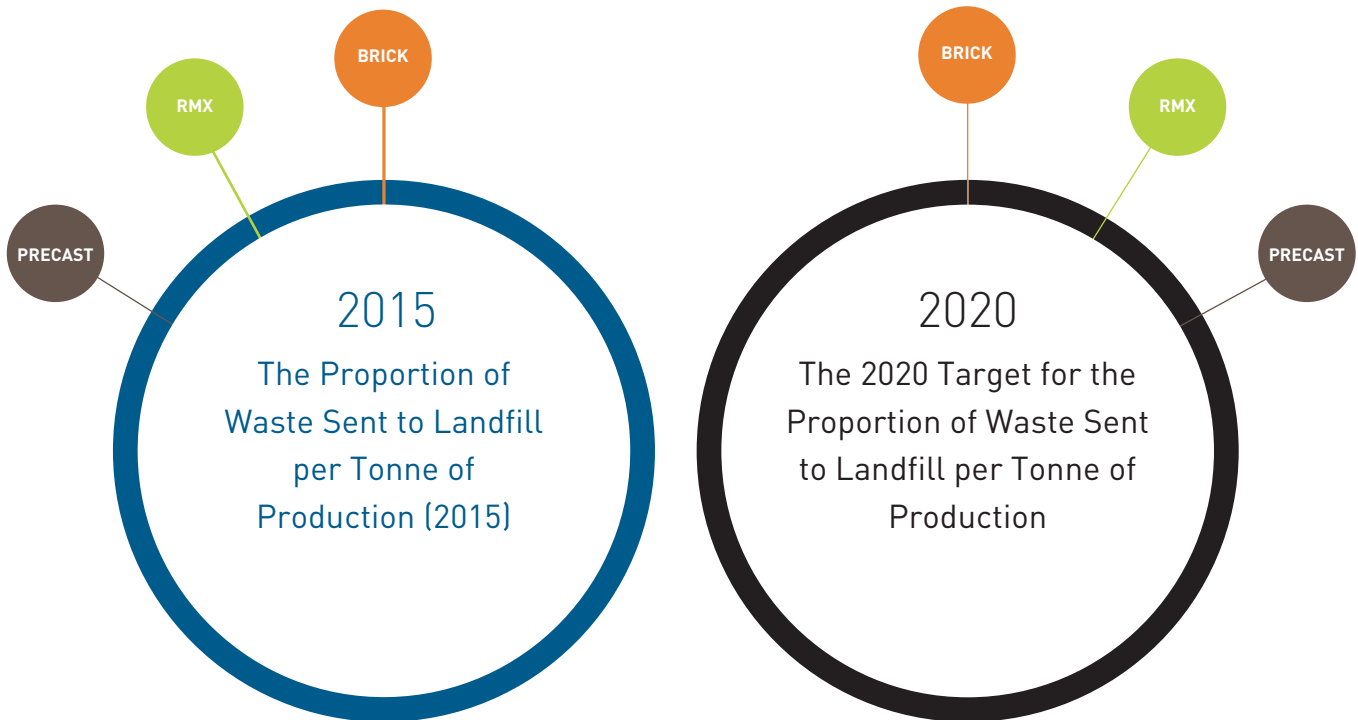
Waste Minimisation

The brick, concrete and masonry sectors have a proven track record in eliminating or minimising waste within their manufacturing processes. In addition, the cement and concrete sectors also use recovered materials and by-products from other industries within their production processes.

- A majority of raw materials that are used in the manufacture of brick can be crushed and reused either within the same process or as a raw material for other products. Unfired clay can be recycled back into the production process and fired bricks can be recycled as engineering material within the quarry. In 2015, 0.94kg per tonne of production was sent to landfill. The sector target is to reduce this to 0.48kg per tonne of bricks produced by 2020
- The precast sector has made considerable progress in waste minimisation. Between 2008 and 2015, the sector has reduced factory waste to landfill by over

80%. The sector target is to reduce landfill waste to less than 0.5kg per tonne of precast concrete and masonry produced, a figure achieved by precast in 2015. Sharing best practice has helped members to identify where reductions can be made as well as the potential economic benefits

- The ready-mixed concrete sector's 2020 target is in line with the Concrete Industry Sustainable Construction Strategy 2020 target. This target is to achieve a 90% reduction from the 2008 baseline, which would represent 500g (0.5kg) of waste per tonne of concrete produced. The longer-term aspiration is for zero waste to be sent to landfill. In 2014, 0.24kg waste per tonne of ready-mixed concrete production was sent to landfill. The figure for the concrete industry in the same period was 1.1kg/tonne, which represents an 80% reduction since 2008



| BRICK | RMX | Precast | 2015 |
|-------|------|---------|---|
| 0.94 | 0.8 | 0.48 | kg Waste Generated and Sent to Landfill |
| 1000 | 1000 | 1000 | Tonne of Production |

| BRICK | RMX | Precast | 2020 Target |
|-------|------|---------|---|
| 0.48 | 0.5 | 0.5 | kg Waste Generated and sent to landfill |
| 1000 | 1000 | 1000 | Tonne of Production |

Manufacturing Actions

Water Reduction

The sectors have taken a cross-sector approach to water management as there are similar challenges faced in the extraction and manufacturing process. The Mineral Products Association (MPA) has developed an overarching policy on water management which has been used as a basis for the forthcoming BDA policy.

These water policies are based on common principles:

- 1) Minimising water consumption
- 2) Prioritising use of the most sustainable water sources available
- 3) Protecting the environment through good water stewardship

This policy has stated a number of measures, and the schedule is to review baseline data for these measures in 2018, with the aim of setting targets.

- The precast sector has a target of 20% reduction to mains water by 2020 (compared to a 2012 baseline) and progress reports are available within sector reports. British Precast has also worked with Waterscan to provide members with a simple tool which can calculate the potential volumes available based on areas and the location in the UK
- Mains and non-mains water - used in the clay extraction and brick manufacturing process - is monitored by brick manufacturers. Maximising the opportunities for diversification to non-mains, including harvested, water supplies, and water re-use wherever possible are key aims to reducing reliance on potable water supplies in the manufacturing process. In 2015, mains water use per tonne of product manufactured has shown a 5% reduction against 2014 performance and a 17% reduction against the 2011 baseline. Achievement of the 2016 mains water consumption target in 2014 has been maintained

CASE STUDY 1

Aggregate Industries' wet cast paving and walling site needed to find a solution for processing 380 tonnes of wet waste and developed a low-tech but highly effective solution.

The wet waste was placed in bulk bags and placed over drip trays to allow the bags to leach the water. After 24 hours the waste concrete was semi solid and could be transported to adjacent sites that could use it as recycled concrete aggregate.

The water, low in sediment, could be used in the mixer process on site. It is expected that 170,000 litres of water per annum will come from this source.

There are now plans to build a bespoke filter tray system to store the leached water into a bespoke tank system which removes, with the help of filters, the sediment content.

This solution has already been introduced at other wet cast sites to save water and increase the recovery of recycled concrete aggregate.

CASE STUDY 2

Wienerberger's Smeed Dean Factory features a combined water recycling and sand recovery system, designed to reduce reliance on mains water sources and reduce the cost of input materials (sands and water) in the brick manufacturing process.

Water is a key component of the brick manufacturing process, especially at a soft mud site. Moisture is added to the raw material mix to make the clay malleable, it is then pressed into sand-lined moulds to form the bricks' shape and texture. The moulds are reused in the manufacturing process, but must be cleaned and re-lined with sand before they accept another batch of clay.

At the Smeed Dean site, water is sourced from an on-site borehole and supplemented by rainwater harvested from the factory roof which drains into the enclosed, recycling water system. After use in forming bricks and washing moulds, the remaining water is pumped back to the starting pond via a series of settling weirs. On the way, it passes through a sand filtration system, enabling the recovery and reuse of the moulding sands, with any remaining sediment being removed as the water passes through the settlement weirs.



Manufacturing Actions

Biodiversity

Protecting and enhancing the state of nature and biodiversity is a key aim for the brick, concrete and masonry sectors, as extraction sites provide valuable habitats during operation and it is even possible to increase biodiversity above the pre-extraction baseline with well-designed restoration plans. Concepts such as Natural Capital are becoming increasingly important and are being explored through the BDA & MPA Sustainability Committees.

CASE STUDY 3

The MPA members have a legacy of high quality management and restoration of mineral sites as reflected in the MPA's Restoration Awards scheme over the past 40 years. As part of the MPA Biodiversity Strategy and awards scheme, supported by Natural England, industry exemplars across a range of categories are recognised: Landscape Scale Restoration, Innovation, Planned Restoration and Individual Contribution.

The 2015 winner of the Innovation Category was Cemex, for the conservation of turtle doves and twite. In the case of the twite, the population of this songbird in England has fallen by more than 90% over the last 20 years. CEMEX's Dove Holes quarry in Derbyshire has the cracks and fissures needed for safe nesting. The partnership between CEMEX and the RSPB aims to provide both breeding and feeding grounds, and a better future for the twite.

Image courtesy of Tim Mellling



Image courtesy of Peter Welch



CASE STUDY 4

Brick Development Association member Wienerberger undertook to improve the overall biodiversity of Warnham Quarry at Langhurstwood. The site contains a mixture of mature and ancient woodland, and semi-heathland.

The manufacturer worked with a land management consultant to create a Biodiversity Improvement Plan, under which several actions were taken: in the maintenance of semi-heathland, the removal of shrubs supported a variety of wildflowers and insects; small areas of woodland were cleared to allow sunlight to reach the forest floor, creating patches of complete and dappled light (many native trees have self-sown in these areas, including Hornbeam, Ash, Rowan and Birch); the banks of the



settlement pond were planted with native trees, stabilising the soil and connecting the water with the surrounding woodland.

The maintenance and evolution of these habitats is an ongoing process which requires careful stewardship alongside the extraction of clay for brick manufacturing. Species recorded at the site include buzzards, roe deer, lizards, and numerous species of damselfly, spider, grasshopper, beetles, bees and butterflies.



Logistics and Packaging

The predominantly local supply network for brick, concrete and masonry products means that delivery distances are short and therefore the energy used during delivery to construction sites is relatively small.

Manufacturers and hauliers seek the optimal balance of load size and fuel efficiency as well as reducing empty miles. Similarly there is also a balance to be struck between resource efficiency and maintaining high safety standards when investigating the potential to reduce the use of pallets and packaging materials.

- The precast concrete and masonry sectors are active within the Building Products Delivery Working Group, a group that comprises manufacturers, building merchants and hauliers and logistics experts. This group has completed an assessment to consider the lifecycle of a pallet, with the aim of ensuring that health and safety issues, such as load and stacking capacity are understood, before considering any guidance on re-use
- Ready-mixed concrete is delivered using concrete mixer trucks. Members of BRMCA have been investing in the latest equipment, that as well as providing improvements in fuel efficiency, also have the latest safety measures to protect vulnerable road users. The new mixers have an improved field of vision for drivers and a low-entry cab to reduce the risk of slips, trips and falls
- The brick, concrete and masonry sectors are collecting data on transport miles and transport utilisation. This provides data on average delivery miles, and also on the carbon impact of transportation
- In 2015 the average delivery distance for all concrete was 46 km (or 28.8 miles). The average delivery distance for all raw materials for concrete was 72 km

CASE STUDY 5

Mineral Products Association (MPA) of which BRMCA is part and British Precast are affiliated, launched its Cycle Safe campaign to prevent collisions between cyclists and lorries in 2011 and introduced a vulnerable road user (VRU) safety policy in 2012 that also refers to driver training and vehicle equipment requirements. The policy applies to all vehicles delivering on behalf of members which are over 3.5 tonnes GVW.

To achieve clarity and consistency, construction and haulage interests facilitated by TfL have developed a national VRU Standard for Construction Logistics (known as CLOCS) which is now being rolled out across the construction sector. MPA and MPA members have been leading contributors in the development of the CLOCS standard, and the MPA policy adheres to CLOCS.



CASE STUDY 6

As part of Forterra's commitment to reducing carbon emissions the company implemented 'dynamic drive-over weighbridges' at its production sites. By gathering accurate data, it was possible to improve logistics planning. This led to improved load optimization and carbon emission reduction, simultaneously ensuring regulatory compliance on vehicle weights. The solution used by Forterra can weigh vehicles of any axle configuration and length, including drawbar trailers. When a laden truck arrives at the weighbridge the driver inputs the vehicle and trailer identity numbers. These are checked against a database and a ticket printed showing the axle weights and the legal limits for that vehicle. If they are exceeded, a warning is printed out enabling action to be taken. Just a few months after the implementation of the new technology, efficiency improvements were already being achieved with around a 10% increase on load size being achieved in some divisions.

Design for Use and Reuse

When designing a building it is important that the most appropriate materials are used depending on the function they perform and the location of the building or infrastructure project.

It is important that the implication of specification decisions are known. For example, choosing a product with a high recycled content can lead to a higher environmental impact, if geographically the project is in an area where there is limited availability of high recycled content, and the transport impacts negate any environmental savings.

Brick, concrete and masonry products provide a durable, long-life structure, which is a fundamental aspect of whole-life performance.

- The construction industry has started to communicate lifecycle outputs in the form of environmental product declarations (EPDs), to enable specifiers to make an informed choice on embodied impact. Brick and cement have published generic EPDs and ready-mixed and precast concrete will publish generic EPDs in 2017. Generic EPDs are useful at early-stage design when considering the overall environmental impact and opportunities to reduce it using different building forms and construction approaches
- One of the most exciting uses of EPD data is within building information modelling (BIM). Manufacturers are developing life cycle assessments and EPDs for their products as a method to provide quantitative data to input into BIM, which will enable a more rapid, assessment of building performance
- The concrete sector is providing guidance to members on the latest update to the Responsible Sourcing Standard, BRE BES 6001. The guidance has been peer approved by BRE and is intended to help members understand the requirements at the different accreditation levels



Angel Building, London was an unloved eighties office in North London until its life was extended by stripping back the building to its concrete frame and a process of transformation turned it into a cool high-tech workplace.

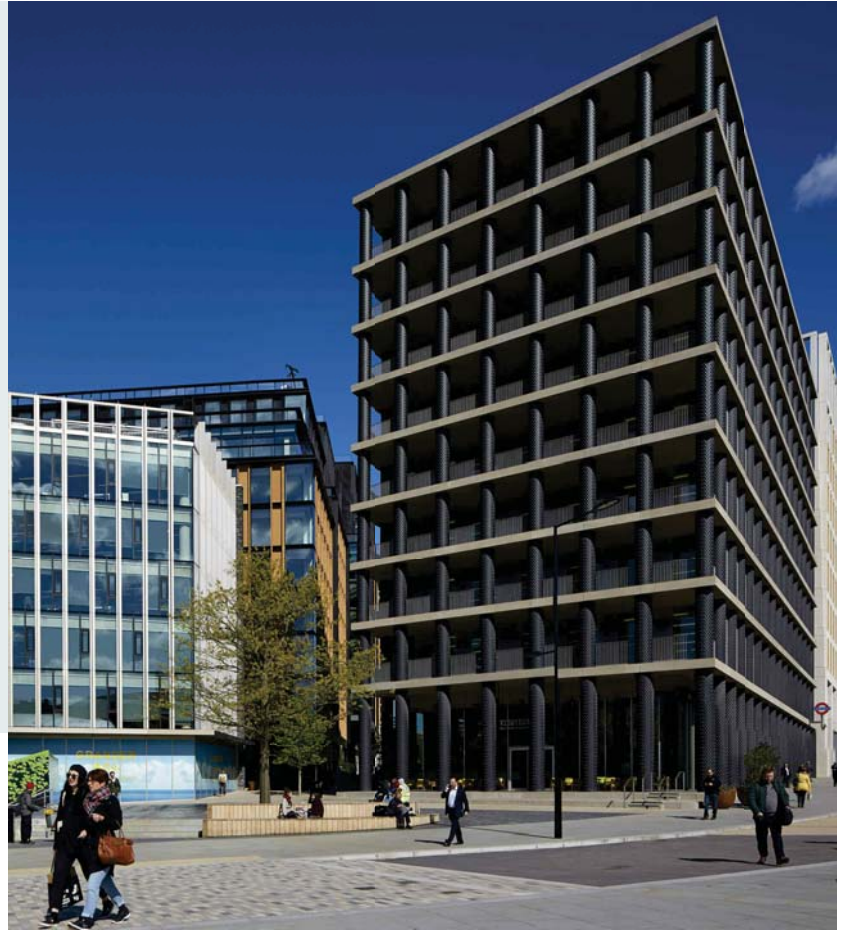
- BRMCA have published a range of documents to aid contractors in specifying the most appropriate mix (avoiding over-specification) for Housing, and also Agricultural Use. These are available to download from www.brmca.org.uk
- Both the Brick Development Association and The Concrete Centre provide Continued Professional Development (CPD) to specifiers to improve material efficiency in design. The Concrete Centre has published guidance 'Material Efficiency' and 'Whole-life Carbon and Buildings' that assist designers in specifying buildings with minimal environmental impacts over the lifetime of the structure. BDA has published guidance 'Good Practice and Workmanship', which aims to address over-ordering, reducing wastage rates on site and recommendations for material efficient structures

Design for Use and Reuse / Case Studies

CASE STUDY 7

One way to cut a building's whole-life carbon is to reduce the materials in its structure. At Pancras Square, Kings Cross post-tensioned (PT) concrete slabs enable developers to achieve commercially viable floor areas while satisfying planning restrictions on building height, client requirements on sustainability, and in this case the developer Argent's preference for high ceilings.

At Two Pancras Square for example, a 10-storey prestige office building, architect Allies and Morrison specified a concrete frame with bonded PT floor slabs. Because PT slabs are more structurally efficient than standard reinforced-concrete slabs, they can be thinner. This allows minimal floor-to-floor height, with maximized floor-to-ceiling heights. The building achieved a BREEAM rating of Outstanding.



Images courtesy of Edmund Sumner/VIEW



CASE STUDY 8

Volkswagen Car Showroom and Service Centre, London

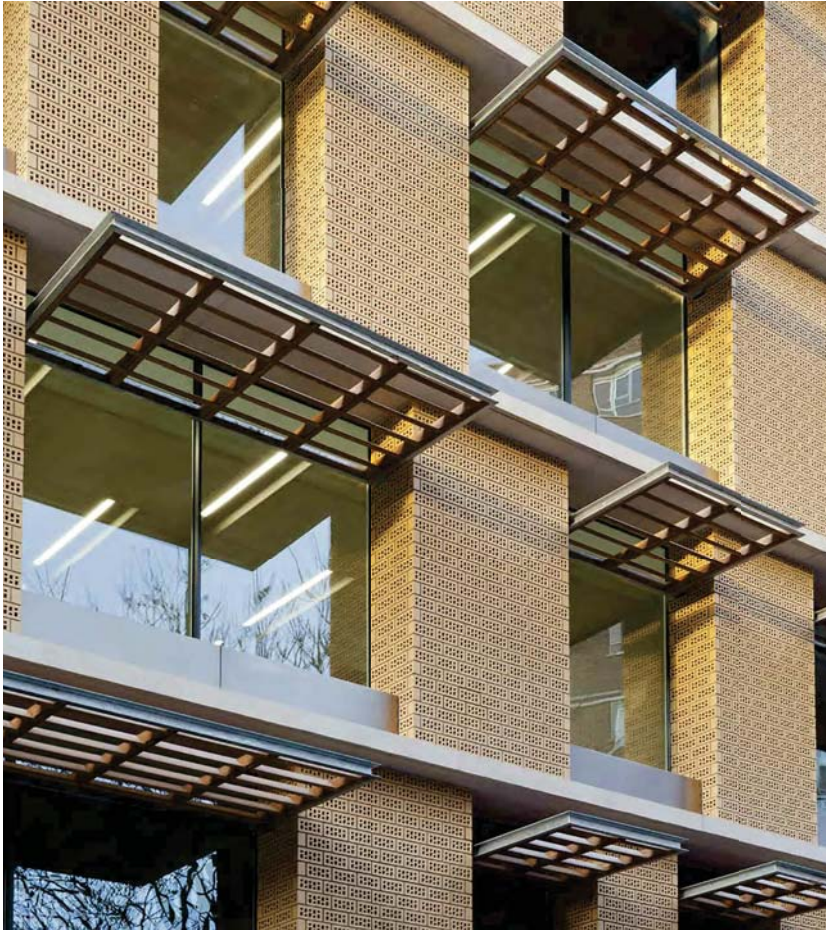
Over 1,500 precast concrete components, some weighing in excess of 18 tonnes were manufactured in six different off-site precast concrete factories with just-in-time delivery being coordinated to ensure that a fast onsite construction programme could be achieved for this four-storey building. The offsite precast solution also enabled significant reductions in deliveries and lorry movements, reducing traffic congestion and environmental impact. The wet-cast GT flooring units, preferred over other forms of flooring and spanning up to 16.0m, did not require any structural topping, which resulted in savings in material use equivalent to 3.5 tonnes per car parking space.

The use of BIM by the precast contractor, PCE Ltd, helped to achieve efficiencies in terms of structural design, accuracy of connections, quality, speed of construction, logistics and better clash detection of construction components. BIM can potentially enable further resource efficiency due to the reduced risk of over-ordering materials.



Images courtesy of PCE Ltd

Design for Use and Reuse / Case Studies



CASE STUDY 9

Gee Street is a long thin office building coupled with 6 apartments to achieve mixed use. The façade concept is for horizontal continuity to emphasise the building's length, with vertical discontinuity to reduce the appearance of height, a sensitive consideration in this historically warehouse populated area of Clerkenwell.

Perforated façade bricks allow additional natural cross ventilation. The office building has an experimental air-mixing, oversized ventilation system, with exposed concrete soffit for thermal mass. This should need neither cooling nor heating while the outside temperature remains between 0 and 28 °C, which is of course expected 11 months of the year in the UK.



Images courtesy of Rick Mather Architects



CASE STUDY 10

In recent years, Passivhaus has grown in popularity in the UK, a fact borne out by the sheer scale of Rick Mather Architects' Chester Balmore scheme in North London.

The scheme's neighbours and conservation officer were adamant that the project would have to be built with brick, outwardly at least. The development therefore used a variety of concrete, clay brick and other masonry methods to meet Passivhaus goals. The scheme was built by Willmott Dixon, which engaged Passivhaus specialist Architype to adapt the design.

To keep the construction process simple, Architype sought to reduce the number of trades on site by standardising construction details and minimising junctions between different materials, as well as using materials with which the contractors were familiar. Together they developed a modified brick-block cavity-wall construction capable of achieving the super-insulated levels required. The practice also eliminated all timber-frame elements from the upper floors of the blocks by developing a solution based on concrete floors. The party-wall was also constructed using in-situ concrete which was airtight and demonstrated excellent acoustic performance.

Although originally a standard for new housing, certification of different building types and retrofits is now possible.

Construction

This stage in a building's lifecycle is often the most difficult for a manufacturer or material supplier to influence.

Engaging with suppliers early and ensuring that materials are fit-for-purpose and responsibly sourced, are the first steps to maximising efficiency of the project. This is then closely followed by good site management of materials, reducing waste generation.

From 1st December 2013 the regulations requiring all projects over £300,000 to have a Site Waste Management Plan (SWMP) were removed. For projects under formally established planning conditions or under the older versions of BREEAM, Code for Sustainable Homes or CEEQUAL, this may still be a requirement. BREEAM, new Construction 2014 refers to a 'Construction Resource Management Plan' as a similar means of planning for and reducing construction waste. This together with the recognised cost benefits of reducing construction waste will mean that some form of waste plan is likely to continue to be used by many contractors.

The focus for the brick, concrete and masonry sectors is to encourage closer liaison with key contractor groups. Representatives from the manufacturing sectors and the UK Contractors Group (UK CG, now Build UK) have participated in working groups on water, carbon, waste and responsible sourcing as well as holding regular meetings on wider industry issues.

- BRMCA have authored a document which offers best practice guidance on the correct concrete, placing, compaction and curing, due for publication in 2017. BRMCA also gives an annual award for Excellence in Customer Service, which promotes the benefits of early contractor involvement and close communications throughout the construction phase of a project
- The Concrete Centre work closely with the Post-Tensioning Association and CONSTRUCT to develop and disseminate guidance for best practice in design and construction including model specification guidance
- All sectors are active at an EU and National level with regard to the development of new design standards, to ensure that design codes do not become unnecessarily more conservative, and as a consequence encourage less material efficient construction methods

Clay bricks and concrete blocks combine to provide the majority of UK homes, in fact they represented 85% of UK registrations and completions in 2016 and 91% in England. Masonry cavity wall construction provides a cost-effective and robust solution that delivers homes that are fire resistant, energy-efficient and long-lasting.



Image courtesy of H+H UK

Demolition and End of Life

The end of life stage of a building provides opportunities for either re-using materials from the building or by recycling demolition waste into new product.

This aligns with the principal of the circular economy and the EU Action Plan for the Circular Economy has set a target for recycling/reuse of construction and demolition waste of 70% by 2020.

This EU target is aligned with the main areas of focus within our action plans which are:

- Both the BDA and The Concrete Centre have provided guidance to encourage the re-use of bricks, concrete and masonry. The BDA guidance note 'BDA Comment on the Use of Reclaimed Clay Bricks' and The Concrete Centre guidance 'Material Efficiency' and 'Whole-life Carbon and Buildings' can assist designers in ensuring that they design with end-of-life factors in mind
- Members of the REAP working group are engaged with stakeholders and thought-leaders to learn from and share best practice for deconstruction. This is at a European and National level, and includes organisations such as the Ellen MacArthur Foundation
- The brick, concrete and masonry sectors have collaborated with the National Federation of Demolition Contractors (NFDC) to promote the

reuse of demolition materials through their DRIDS programme. The sectors have actively been involved in the development of the data sheets relating to our products and are committed to working with the sector to identify new uses and routes for reusing materials

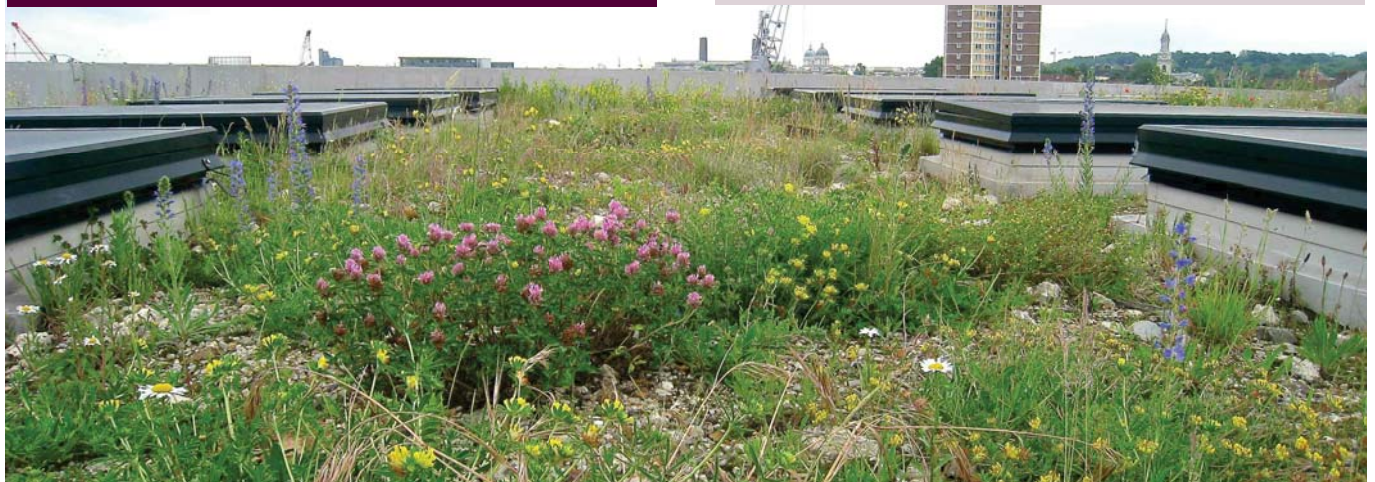
CASE STUDY 11

In keeping with the final stage of the circular economy we must look to close the loop and recover as many materials from demolition projects as possible. In an ideal world this would be through recovery of materials so that they can be re-used and for some materials this is the case, however the materials covered by this report tend to be recycled rather than reused and so we need to ensure that we divert these valuable materials back into the construction cycle.

The National Federation of Demolition Contractors have also identified this as an important issue and have introduced Demolition and Refurbishment Information Data Sheets (DRIDS) which help identify recyclable materials in demolition projects and put contractors in touch with outlets for the materials. DRIDS for our products are available from the NFDC, visit www.nfdc-drids.com, listed within the INERT product listing or search for:

I2 – Concrete; I3 – Bricks; I4 – Concrete Blocks;
I5 – Precast Concrete Products and I9 – Roof tiles.

The roof is constructed of crushed concrete from demolition material sourced from the site prior to construction.'



Demolition and End of Life / Case Studies

CASE STUDY 12

Early contractor involvement

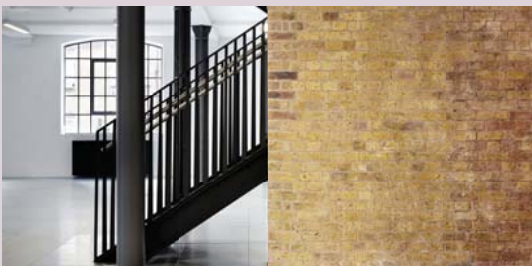
The M6 Link Road to connect Heysham and Morecambe to a new Junction 34 of the M6 includes a 4.8km dual carriageway with a combined footway and cycleway along its entire route.

The project was delivered by Costain, with product supplied by Tarmac. Early contractor involvement on this project was key to reducing the carbon footprint. The project team were able to agree on a design that reduced aggregate tonnage by nearly 25% and enabled a reduction of nearly 9000 m³ in ready-mixed concrete. This translates into a 21% saving of embodied carbon, in comparison with the original design.



Images courtesy of Tarmac

CASE STUDY 13



The scheme New Loom House, comprised the major renovation of a grade 2 listed building in Aldgate, London, for Helical Bar. The building, once a wool storage warehouse, was converted unsympathetically into offices in the 1980s. This scheme sought to explore the building's history, while also introducing new interventions to meet the requirements of a modern commercial building in London. The brief called for the refurbishment of over 100,000ft² of office space, a new café, the provision of cycle stores and shower facilities, as well as the relocation of the main entrance. This required forming a 12m wide opening in the masonry façade.



The requirement to re-use the existing brick, arising from the new openings, was established with the conservation office. Carefully removing and storing the 124 year old brick for re-use created a number of technical challenges. The variation in size and shape of the ungauged bricks meant that exceptional skill and expertise was required in the reclamation and laying process.

Sourcing the bricks from within the building was a sustainable decision that not only reduced the need for new bricks, but minimised the amount of demolition material sent to landfill.

References and Further Reading

The Clay Bricks and Clay Blocks REAP covers all products manufactured in fired clay, which are used in walling, landscaping and civil engineering applications. These products are manufactured by members of the Brick Development Association across 56 UK sites, which in 2016 produced 1.8 billion bricks. A full copy of the Clay Bricks and Clay Blocks REAP and the Brick Sector Sustainability Report can be found at www.brick.org.uk

The UK Precast Concrete sector (represented by British Precast members) employs over 12,000 people at over 500 production sites and produces over 20 million tonnes of precast concrete products including concrete blocks, pipes, cladding, pavers, structural elements and more. The REAP is an extension of the precast sector sustainability strategy and is an important milestone in working with the downstream supply chain. A full copy of the REAP and the Precast Sector Sustainability Report can be found at www.britishprecast.org

The UK Ready-Mixed Concrete Sector (represented by BRMCA members), comprises 800 plants producing around 14.2 million cubic metres of concrete per annum. Ready-Mixed Concrete is a factory-produced material, locally manufactured and transported in a flowable state ready for placing and compacting into any desired shape and size on site. A full copy of the REAP can be found at www.brmca.org.uk

BRMCA and British Precast are part of the Mineral Products Association, the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and silica sand industries. www.mineralproducts.org

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- Material Efficiency, The Concrete Centre, 2016
- Post-tensioned Concrete, The Concrete Centre, 2017
- Specifying Sustainable Concrete, The Concrete Centre, 2017
- Whole Life Carbon and Buildings, The Concrete Centre, 2016
- The latest Concrete Industry Sustainability Performance Report is available from www.sustainableconcrete.org.uk
- The latest Sustainability Matters Report is available from www.britishprecast.org
- Latest information on sustainability and ready-mixed concrete visit www.brmca.org.uk/sustainability.php
- The latest Brick Sustainability Report is available from www.brick.org.uk/wp-content/uploads/2017/02/brick-sustainability-report-2016.pdf
- A knowledge resource for circular economy thinking in construction is available from www.greenconstructionboard.org

REAPs

Resource Efficiency Action Plans

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