

TOOLKIT

An estimated 50,000 tonnes of plastic packaging is created every year in the construction industry for the array of products used and much of this is either sent for energy recovery or landfilled. Very little is recycled. Most of the packaging is single use and comes in various forms such as stretch wrap, buckets, bags, tubs, bands etc. This packaging has an environmental and cost impact and for this to be reduced, there is a need for better data, guidance and case studies. This includes ways to eliminate and optimise the packaging and ensuring that the product is still protected, the potential of using different materials and how to manage it on site for recycling. A whole supply chain approach is required to manage plastic packaging waste better in the construction industry, which is a much-neglected issue.

The ZAP Toolkit explores scalable solutions to help combat the prevalence of avoidable packaging plastic waste in construction and improve recycling. Case studies from real-world construction projects explore these solutions and the toolkit details positive actions the whole sector and supply chain can undertake to reduce and recycle plastic packaging. The toolkit provides a means for those working in the construction sector to start their journey on taking action on plastic packaging, resulting in reducing environmental impacts and cost savings. With this toolkit, there is now no reason not to act!

The UK construction sector produces **35,000 tonnes** of plastic packaging waste **EVERY YEAR**.

This is the equivalent of enough construction stretch wrap to go around the earth's circumference more than **170 TIMES***.



*Based on a 0.4x300m roll of 23mu construction film at 1.5kg per roll

What is packaging?

“A physical format, constructed from specific materials, designed to facilitate the delivery of a product, from where it is made to where it is used, keeping it in good order, informing the consumer/ user, and aiding in its use.”

How is packaging used in the construction industry?

It is seen as functional, but valueless once used

There is a use of problematic materials including plastics, metals and composite materials that are not easily or readily recycled.

There is a prevalence of single use packaging

- Pallets
- Stretch wrap
- Bands
- Protectors
- Boxes
- Tubs

Materials are often plastic, but also paper based, metal, and wood

Construction site packaging waste

Packaging waste may account for between **5% and 50%** by volume of a construction project's total waste, with an average of **34% by volume**.

The volume of packaging increases as projects progress, with most packaging waste being produced at 70-100% completion (when a lot of the fit out and interior work is happening).

By tonnage, timber accounts for 59%; paper and cardboard (25%) and plastics (16%).

<https://www.bresmartsite.com/products/smartwaste/>

How much plastic packaging waste from construction is there?

Plastic waste coming from construction per year (UK, 2021)

50,000 tonnes

A **45% Increase** 2019-2021

35,000 tonnes of this is likely to be packaging *(for scale, that's approximately the same weight as 184 Boeing 747's)

What happens to this plastic waste?

There is no specific data for what happens to plastic packaging in construction – only overarching figures. These suggest:

44% is sent for recycling

42% for energy recovery

14% remainder to landfill

https://plasticseurope.org/wp-content/uploads/2021/09/Plastics_the_facts-WEB-2020_versionJun21_final.pdf

Click on a page title to go to that page

Use the navigation bar at the bottom to return to



the contents page

For whole supply chain

- [Plastic types found in construction packaging and recyclability \(graphic\)](#)
- [Full table of plastic types found in construction](#)
- [Examples of commitments and targets in the construction sector](#)
- [Waste policy updates: brief for construction industry](#)

[Click here to read our initial report on findings of key products and packaging, waste management routes, barriers and enablers and current best practice](#)

For contractors

- [How to measure and get better waste data](#)
- [Segregation on site](#)
- [What should be asked of contractors and sub-contractors?](#)
- [Contractor/sub-contractor checklist \(pre-works\)](#)
- [Contractor/sub-contractor checklist \(on-site\)](#)
- [Single-use plastic justification form](#)
- [Case study – One Bin pilot | EMERGE Recycling and Morgan Sindall](#)
- [Case study – Protec Closed Loop Remanufacturing Scheme](#)
- [Contractor plastic packaging recycling pilot | Mace and Protec](#)

For designers

- [Case study - Marlborough Sports Garden](#)
- [Circular economy brief](#)
- [Designers actions](#)
- [Example prelims](#)

For clients

- [Example prelims](#)
- [Case study - Marlborough Sports Garden](#)
- [Case study – One Bin pilot | EMERGE Recycling and Morgan Sindall](#)
- [Case study – Protec Closed Loop Remanufacturing Scheme](#)
- [Contractor plastic packaging recycling pilot | Mace and Protec](#)

For manufacturers

- [What can manufacturers do - packaging hierarchy](#)
- [What should manufacturers do - mission statement and checklist](#)
- [Case study – product plastic packaging reduction | Bereco](#)
- [Case study – product plastic packaging reduction | Mueller](#)
- [Case study – product plastic packaging reduction | Velux](#)

Plastic is prevalent throughout the construction supply chain, including packaging. There are five main plastic types found in construction packaging, with varying levels and ease of recyclability.

You can see the full table of plastics found in construction by clicking [here](#).



PETE (PET)

Polyethylene terephthalate

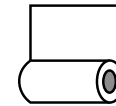


Recyclable? Yes
Ease of recycling - Easy
Packaging such as: Banding



PE - HD/PE-MD

Medium/high density polyethylene

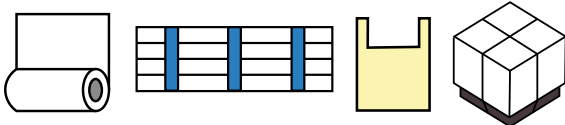


Recyclable? Yes
Ease of recycling - Easy
Packaging such as: Shrink wrap



PE - LD/PE-LDD

Low density polyethylene

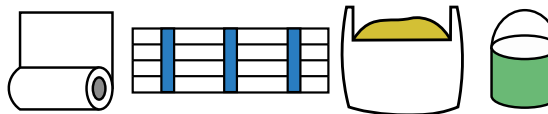


Recyclable? Yes
Ease of recycling - Easy
Packaging such as: Shrink wrap, banding, bags, hoods



PP

Polypropylene

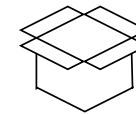


Recyclable? Yes
Ease of recycling - Easy
Packaging such as: Shrink wrap, banding, woven bags, buckets












PS/EPS

Polystyrene/Expanded polystyrene



Recyclable? Not common
Ease of recycling - Manageable
Packaging such as: Polystyrene packing materials

Plastic types, their use in construction and recyclability						
6 types of plastic account for 90% of plastics used by the construction sector [i]						
symbol		Full name	Re-cyclable[iii]	Ease of recycling[iv] (in pure form)	Waste management in construction and examples	Typical Construction[v] Uses (many construction products are made from a composite of several types of plastic making recycling difficult)
	PETE (PET)	Polyethylene Terephthalate	Yes	Easy	Recycling for catering/site facilities more common. Can be segregated for recycling but does not often happen. Otherwise sent for energy incineration /landfilled	Recycled PET carpet. Packaging such as banding. Water bottles.
	PVC	Polyvinyl chloride	Yes	Difficult	Recycling of UPVC window frames and vinyl flooring via Recofloor and Recovynil. Also some piping recycling. Otherwise sent for energy incineration /landfilled	Single ply membranes, Flooring, Tubing, piping, ducting, and guttering, door and window frames and other external profiling such as cladding, soffits and fascia boards, flooring and cabling, waterproofing and linings
	PE -HD/ PE-MD	Medium/ high density polyethylene	Yes	Easy	HDPE is a very common waste product on construction sites and worth focussing on reducing; can be segregated for recycling but does not often happen. Some examples for hard hat recycling. And waterproof membranes. Otherwise sent for energy incineration / landfilled	Tubing, piping, ducting, and guttering, waterproofing and linings, shrink wrap, hard hats
	PE-LD/ PE-LDD	Low density polyethylene	Yes	Manageable	LDPE packaging film is a very common waste product on construction sites and worth focussing on reducing; can be segregated for recycling but does not often happen. Otherwise sent for energy incineration /landfilled	Packaging such as bags, bandings, stretch wrap, shrink wrap, hoods.
	PP	Polypropylene	Yes	Manageable	Depends on the product; but recycling is generally very limited. Some limited recycling of carpets and PPE recycling e.g. Reconomy, Bryson. Also temporary protection recycling. Easier to recycle PP films	Carpets, Tubing, piping, ducting, and guttering, Packaging such as shrink wrap, plastic banding, plastic buckets, woven PP bags
	PS	Polystyrene	Yes	Manageable/ Not collected often	Not usually recycled, sent for energy incineration / landfilled. Difficult to transport economically due to its volume	Packaging
	EPS	Expanded polystyrene	Yes	Difficult / Not collected	Not usually recycled; no take back schemes for insulation. Sent for energy incineration /landfilled. Older EPS may contain Persistent Organic Pollutants (POPs) which should be destroyed.	Thermal and acoustic insulation, packaging

Symbol		Full name	Re- cyclable[iii]	Ease of recycling[iv] (in pure form)	Waste management in construction and examples	Typical Construction[v] Uses (many construction products are made from a composite of several types of plastic making recycling difficult)
	PA	Polyamides	Yes	Manageable	If used as paint and adhesives application will be bonded to substrate and possibly affect the recycling of the product. If used in textiles (nylon) maybe some small scale recycling	Paints (exterior treatments/industrial), adhesives, textiles
	PC	Polycarbonate	Yes	Easy	Not usually recycled, sent for energy incineration /land-filled	Transparent roofing sheets, interior linings, light fittings
	PMMA	Poly methyl methacrylate	Yes	Difficult	Not usually recycled, sent for energy incineration /land-filled	Transparent sheet, windows, smart screens
	PUR	Polyurethane	Yes	Manageable	Not usually recycled, sent for energy incineration /land-filled. PUR insulation (pre 2004) may include ozone depleting substances which should be recovered	Thermal and acoustic insulation
	PES	Unsaturated polyester	Yes	Easy	Not usually recycled, sent for energy incineration /land-filled	Fibre reinforced plastics, sanitary-ware, tanks, pipes, gratings
	S	Silicone	Yes	Manageable	Not usually recycled, sent for energy incineration /land-filled. Residue of sealant in tubes etc can affect their recycling	Sealants, adhesives, lubricants, paints
	ABS	Acrylonitrile Butadiene Styrene	Yes	Easy	Not usually recycled, sent for energy incineration /land-filled	Light rigid, moulded products such as pipe, enclosures, and hard hats and helmets, LEGO
	OTS	Other Thermo-set	No	Difficult	Not usually recycled; chemical recycling is required for most, sent for energy incineration /landfilled	Powder coatings

[i] Authored by Alliance of Sustainable Building Products, 'Plastics in Construction Introductory Guide', ASBP, London, 2021, p. 5, <https://asbp.org.uk/wp-content/uploads/2015/12/Intro-guide-v2-April-21.pdf> (accessed 7 July 2022)

[ii] JM. Cullen, MP. Drewniok, A. Cabrera Serrenho, 'The P Word', Resource Efficiency Collective, University of Cambridge, 2020, p. 15, <https://www.refficiency.org/publications/the-p-word/> (accessed 7 July 2022)

[iii] JM. Cullen, MP. Drewniok, A. Cabrera Serrenho, 'The P Word', Resource Efficiency Collective, University of Cambridge, 2020, p. 15, <https://www.refficiency.org/publications/the-p-word/> (accessed 7 July 2022)

[iv] JM. Cullen, MP. Drewniok, A. Cabrera Serrenho, 'The P Word', Resource Efficiency Collective, University of Cambridge, 2020, p. 15, <https://www.refficiency.org/publications/the-p-word/> (accessed 7 July 2022)

[v] Authored by Alliance of Sustainable Building Products, 'Plastics in Construction Introductory Guide', ASBP, London, 2021, p. 9, <https://asbp.org.uk/wp-content/uploads/2015/12/Intro-guide-v2-April-21.pdf> (accessed 7 July 2022)

Manufacturing

Forterra - Bricks and blocks manufacturer

Reduce total volume of plastic packaging by at least 50% by 2025 (targeted saving of 976 tonnes of plastic per year).

<https://www.forterra.co.uk/sustainability/product/>

Knauf - Manufacturer

Its new packaging will contain at least 30% recycled plastics.

<https://www.knauf.co.uk/about-us/news/2021/10/24/17/05/knauf-continue-to-improve-sustainability-credentials-with-recycled-plastic-packaging>

Saint Gobain - Materials manufacturer and distributor

100% recyclable packaging by 2030.

<https://www.crystals.saint-gobain.com/sustainability#>

Wienerberger - Brick manufacturer

Commitment of 30% less packaging by 2023, compared to 2019 levels (180 tonnes avoided).

Construction

Bellway - Major housebuilder

Has asked suppliers to ensure that there is at least a 25% reduction in the use of single-use plastic by July 2023.

<https://sustainability.bellwayplc.co.uk/resource-efficiency>

John Sisk - Contractor

Aim to eliminate the use of single use plastics in all their operations by 2023.

<https://sustainability.bellwayplc.co.uk/resource-efficiency>

Kier Living - Construction company

Plastics Pledge with their supply chains to reduce packaging waste.

<https://www.kier.co.uk/corporate-responsibility/kier-living-plastic-pledge/>

Other

Future Homes Hub

Commitment to identify the scope for recycling and take-back or circular packaging systems. Trial and establish how to roll out.

https://irp.cdn-website.com/bdbb2d99/files/uploaded/FHTF%20Report_COMPACT_update_Dec%202021.pdf

Travis Perkins - Builders merchant

Require their suppliers to have a minimum 30% recycled content in their packaging.

<https://www.travisperkinsplc.co.uk/sustainability/environment/waste-management/>

There have been a number of waste and resources policy developments recently that may directly or indirectly affect the construction industry. In the UK government's 2018 [Resources and Waste Strategy](#) – which laid out the intended direction of travel post-Brexit – it was outlined that construction and demolition waste would be consulted on and potentially fall under an Extended Producer Responsibility (EPR) scheme by 2025. Given government delays, this is not likely to happen in the near future, but other waste and resource policy progress outlined below may nonetheless impact the industry.

Packaging EPR

[The UK Producer Responsibility Obligations \(Packaging Waste\) Regulations 2007](#) will run until 2024 and require companies which handle packaging to take responsibility for reducing the environmental impact of packaging waste, depending on turnover and packaging amount. From 2024 they will be replaced by the Packaging EPR regulations.

EPR is a regulatory mechanism used by government to ensure that producers pay the full cost of collecting and recycling the packaging that they place on the market, at the end of its life.

The new measures are more complex and for some will be significantly more expensive than the current UK packaging producer responsibility regulations they replace.

EPR in general is an environmental policy tool used worldwide to embed the 'polluter pays principle' and encourage movement towards a circular economy, where materials are more easily recovered, recycled and reused.

Packaging EPR is intended to incentivise obligated producers to use less packaging and more easily recyclable materials, reducing the amount of hard-to-recycle packaging placed on the market. This is done by making them responsible for funding the collection and recycling of their packaging when it becomes waste, with hard-to-recycle materials attracting higher EPR costs.

Businesses in the construction industry who will be directly impacted by this new legislation will be brand-owners, importers, pack/fillers of goods, online marketplaces and those hiring or loaning supply chain reusable packaging. The largest cost impact will be felt by other industries who sell packaging that is disposed of in local authority/household waste streams, but businesses supplying building materials may nonetheless see their compliance costs increase, and in turn pass this cost on to their customers.

Plastic packaging tax

The Plastic Packaging Tax (PPT) came into force in April 2022 and is charged at £200 per tonne on packaging that is predominantly plastic by weight and does not contain at least 30% recycled plastic content.

Manufacturers of packaging in the UK and importers of packaging (filled or unfilled) into the UK are directly liable to pay the PPT, but costs are likely to be passed along the supply chain. There is a 'de minimis' for those producers who import or manufacture less than 10 tonnes of plastic packaging in a given 12-month period.

If a business's plastic packaging is subject to the tax, you need to accurately calculate the weight to find out if you are liable and need to report. If there are multiple operators in the manufacturing supply chain in the UK, the liable party will be the business that undertakes the last substantial modification before pack/filling. The importer is defined as the company on whose behalf the packaging enters the UK, and/or the first company to commercially exploit it.

It is likely that the overall cost of construction materials packaged in plastic will/has increased in part due to the above, as importers and manufacturers seek to pass costs along the supply chain.

Digital waste tracking and carrier/broker/dealer reforms

Waste transport and management legislation has been introduced in a piecemeal fashion over the last 30 years. Government consulted last year on the introduction of mandatory digital waste tracking and reforms to the carrier/broker/dealer regime. This means that in due course the regulations will be tightened and harmonised, ensuring waste from, for instance, construction sites is managed by bona fide and regulated waste companies.

Digital waste tracking

There are an estimated 200 million tonnes of waste produced in the UK each year, but currently no single or comprehensive way of tracking it as legislation relating to transport, management and waste description has been introduced separately. The consultation sought views on how best to centrally and digitally track all waste at every stage, reducing the reliance on paper-based systems and the potential for illegal activity.

Once the decisions are implemented and legislation laid down in the next few years, waste operators in the construction industry can expect new requirements. These will likely include obligations to, for instance, digitally input where construction waste has been picked up and deposited and under what waste code.

<https://www.gov.uk/government/publications/digital-waste-tracking-service>

Carrier/broker/dealer regime

The current carriers, brokers and dealers (CBD) regime requires any person or business that transports, buys or sells waste in England to be registered with the Environment Agency. A waste carrier is someone who transports controlled waste, which would apply to most construction and demolition waste. Waste brokers arrange for others' controlled waste to be handled and dealers sell it on. Construction and demolition waste must always be handled by a person who is registered at the 'upper tier' of the regime.

The estimated cost of waste crime in the UK is £1.1 billion. This is mainly comprises lost legitimate business revenue, loss of Landfill Tax through misclassification of waste and costs to the public sector for clearing and disposing of abandoned and fly-tipped waste.

[The consultation](#) was published in 2022 and sought views on moving from a registration to a permit-based system, the activities these permits should cover and associated exemptions and the introduction of a technical competence test. Again, those dealing with construction and demolition waste should expect to see more stringent requirements in the future.

It can be difficult to get accurate data on the amount and types of packaging materials arising onsite; which means that it is difficult to reduce, recycle etc. Here are some recommendations of how this could be done better.

1: For key products ask the manufacturers/suppliers what types of packaging are used (this may include primary, secondary and tertiary packaging) and how much per load/product etc (some of this may be available in Environmental Product Declarations). If you are undertaking whole life carbon/embodied carbon assessments, you should know the amount of materials that are to be used for the building and could therefore work out roughly the types and amounts of packaging that may be on site. Note, this could be difficult for some products, dependent upon how they supplied e.g. if through a builders merchant. Some manufacturers/suppliers may be collecting this data due to their obligations under the Packaging Regulations. Compliance schemes such as Ecosurety and Valpak may also have useful data.

2: Work closely with the companies that are providing the waste services on site to the contractor. At the very minimum waste should be coded, via waste transfer notes, where possible with the relevant European Waste Catalogue Codes. 17 02 03 is for plastics (though may also be for non-packaging plastic) and 15 01 02 for plastic packaging. Note: if packaging is in the mixed skip (with the code 17 09 04), then coding it as mixed waste doesn't help that much. If possible, visual assessments of the different proportions of materials in the container could occur on site or by the waste company to gain a better idea.

3: Detailed waste audits can be undertaken, with analysis of what type of materials are in a container. This could be done on site or by a waste company. Ideally they should be done periodically to get good data samples of what is happening at various stages of construction. An example of this is the [One Bin Case Study](#). Developer Thakeham, alongside their waste partner, did a detailed plastic stream analysis to give them a better understanding of the most significant types of plastic disposed of and how the different types of plastic waste are processed (over 60 different uses of plastic were identified and 77% of the materials in their plastics skip was from packaging). <https://thakeham.com/thakeham-joins-forces-with-biffa-to-start-a-plastic-revolution/>

Data

Consider measuring packaging waste in volume rather than tonnes, it is likely to be much more significant. This is due to a high volume to weight ratio, which is likely to increase management costs (e.g. increased skips and collections).

Find out how much packaging waste is costing you.

Ask the waste management contractors what is happening to the plastic waste.

Focus on getting a detailed understanding of key packages/products where there is likely to be more plastic packaging e.g. fit out.

Segregation on site

Top tips

1: Discuss the potential benefits of segregating out plastic waste in appropriate containers with your waste management provider. Consider if this will provide cost savings (or even a revenue if there is a direct relationship with a reprocessor).

2: If plastic waste is being segregated, then it is important to monitor it to ensure that it is kept free from contamination (i.e. other materials).

3: Appoint a waste champion on site, who is incentivised to reduce contamination and ensure appropriate segregation of waste materials. They should be able to advise others of what is required.

4: Ensure there are appropriate inductions and tool box talks to make sure workers understand the waste management system on site, the segregation requirements and why managing and reducing plastic waste is important. Run a campaign (some contractors link in with Plastics Free July).

<https://www.plasticfreejuly.org/changemaker-toolkit/>

5: For segregation of waste, use simple signage and visuals wherever possible. Depending on the workforce, translation maybe required.

6: Think about the placement of the containers on site. If they are too far from the work face, and it takes time to get to them, then they may not be used.

7: Have appropriate bins in the right areas. It maybe that segregated plastic bins are only needed in certain areas or at certain times when there is a higher volume of plastic waste generated.

8: Incentivise the site and project managers. Without their support, it will be harder to deliver real benefits.

9: Ensure there is good dialogue with the subcontractors, they will often know of ways to reduce waste.

10: Make sure lessons are learnt; record what worked well and what didn't and take these learnings to the next project.

Mission statement

Set out company and client mission statement – example below.

We are committed to the reduction of packaging waste generated from site construction activities. As a business our goal is to achieve a positive reduction in the amount of waste sent to landfill.

This should firstly be done by reducing packaging where possible, followed by increase in reuse and recycling.

The contractor/sub-contractor shall be expected to support and assist the client/main contractor in achieving waste reduction targets.

Packaging waste management and plastic waste reduction

Where possible, single use-plastics shall be eliminated from the packaging of all materials delivered to site.

Prior to starting on site, all contractors/sub-contractors shall complete a single-use plastics audit on their package of works. Where no alternative to single use plastic is practicable and/or available, sub-contractors shall raise this for review and approval prior to bringing such material on site via a justification form. The details of the contractor's arrangements will be put forward for inclusion in the Site Waste Management Plan and the Environmental Management Plan within the Project Delivery Plan.

If plastic is the only route to go it is encouraged to aim for plastics with a recycled content.

Where possible, reusable packaging (e.g., Velcro wraps, reusable boxes and pallets) shall be used for protection of materials.

Closed loop waste recycling schemes shall be implemented where available for materials such as plastic piping, materials used for temporary protection, etc.

Where pallets or stillages (i.e., any products used for packaging) are used, these shall not enter the waste stream and shall be removed off-site (as part of a take back scheme with the supplier of the materials). Returnable multi-use pallets shall be specified from suppliers.

Once on site

Waste transfer notes – Provide copies of waste contractors waste carrier certificate and waste transfer notes and monthly reports - broken down by waste group - plastics and plastics packaging being one of them.

Maintain records of plastic waste arisings and volumes/tonnages of material recovered and reused. This should be used to track total amounts of plastic waste, amount recycled and reused, and diversion from landfill rate.

Requirement to participate in waste reduction workshops, share examples of waste reduction and on-site material reuse.

No excess materials are permitted to enter the waste stream. Tools and equipment shall be repaired.

Share best practices – e.g., Bolle safety glasses etc. Provide data for case studies to show industry best practice.

What should be asked of contractors and sub-contractors

Contractor/sub-contractor checklist (pre-works)

Can be used alongside waste management plan

Date of completion _____

Completed by _____

Done? Y/N	Action	Details/notes
	Written and approved a reduction of packaging mission statement.	
	Completed a single use plastic audit on package of works.	
	Where no practicable and/or available alternative to single use plastic packaging is available, it shall be reviewed in the single use plastic justification form .	
	Where plastic is used, plastic with recycled content has been used where practicable. Aim for minimum 30%.	
	Reusable packaging for protection (e.g. Velcro wraps, reusable boxes, pallets) has been considered before single use alternatives.	
	Closed loop recycling schemes have been considered before other alternatives.	
	Pallets and stillages are able to be removed as part of an approved take back scheme.	

What should be asked of contractors and sub-contractors

Contractor/sub-contractor checklist (on-site)

Can be completed at intervals throughout works

Date of completion _____

Completed by _____

Done? Y/N	Action	Details/notes
	Copies of waste contractor waste carrier certificates provided.	
	Waste transfer notes and monthly reports broken down by waste group provided.	
	Maintain up to date records of plastic waste arising.	
	Maintain up to date records of volumes of material recovered and reused.	
	Tracking of total amounts of plastic waste, amount recycled and reused, and a diversion from landfill rate.	
	Tools and equipment repaired instead of going into waste stream.	
	Participation in waste reduction workshops and sharing of best practice.	

What should be asked of contractors and sub-contractors

Single-use plastic justification form

Where a contractor proposes to use single-use plastics, such as for packaging and protection, alternatives are to be sought which are either reusable, or part of a closed loop recycling process. Where single-use plastics cannot be avoided, details are to be provided in this form along with details of alternatives reviewed.

This is to be completed at (e.g. contractor start up workshop) _____

Project Name		Works Package	
Contractor Name		Package Number	

Approval sought by

Name		Position	
------	--	----------	--

Justification for single-use plastics

Include justification by comparing alternative materials/systems in terms of quality, function, environmental benefit, cost (direct and indirect), programme implication and any other relevant information. Continue on separate sheets if required.

Plastic use	Proposed Alternative	Alternative to be used? Y/N	Justification if alternative not to be used

Summary

The SMI Hub (Sustainable Materials Innovation Hub) supported EMERGE Recycling—an award-winning social enterprise that provides a wide range of commercial recycling and waste services—as part of a research collaboration with Morgan Sindall, a key player in UK construction. The overall aim was to look for opportunities to increase Morgan Sindall’s plastic recycling operations through collections from construction sites, providing a template that could be extended to other construction companies.



The motivation stems from the prevalence of plastics in construction, both as packaging and as building materials. The UK construction sector is the second largest consumer of plastic in the UK, producing 50,000 tonnes of plastic packaging waste each year. Plastic waste from construction sites is typically disposed of in mixed waste skips. The contents of these skips are difficult to separate and causes contamination of the plastics, making them less recyclable. It’s estimated that around 40% of construction plastic ends up in landfill. Whilst plastic is a vital building material, single-use plastic waste is problematic and can be avoided or reduced in the following areas:

- **Plastic packaging**
- **Unused material from over-ordering and offcuts**
- **Improper storage and handling**
- **Over-specified project design**
- **Workforce food packaging and utensils**

In collaboration with Emerge, the SMI Hub conducted a pilot scheme for collecting & sorting plastic waste from a Morgan Sindall construction site: the National Squash Centre, which will become the House of Sport on the Etihad Campus. The Hub used its polymer science expertise and equipment to evaluate construction plastics that could be collected, providing insight into the types of plastics, market value, and end-of-life fate using current recycling infrastructure.

At the beginning of the pilot, a 660 litre bin marked up as “Plastics only” was dropped off at the House of Sport site. The site was at late phase of construction (mechanical and electrical fit-out) to maximise potential collection of plastics. The bin was left in place for a week, during which time the SMI Hub team visited the site to take photos of the contents of the 660-L bin and the general waste skip. Afterwards, the bin was taken to Emerge’s site in Openshaw and the contents were sorted and evaluated. The overall method and approach was inspired by the SMI Hub’s sister project titled “One Bin to Rule Them All”, which evaluated plastics in household waste.

Data analysis

After sorting, items were categorised using their labels/resin code (if present) or infrared spectroscopy (if no resin code present). The data was analysed to breakdown the composition of the items collected.

In addition to the above analysis of the bin contents, the photographs of the general waste skip taken throughout the trial provided further insight. For example, plastic foams and PE/PP flexibles were present in the skip, which implies that bespoke training of site staff and designation of key targets for segregation (e.g. “flexible plastic” or “foams”) might improve collection volumes. Another key finding was significant amounts of cardboard in the skip, which could easily be collected alongside construction plastics and help improve the value gained from each collection cycle.



Plastics vs non-plastic

- By weight the bin contents were 90% plastic
- Non plastic items included masking tape and screws

Rigids vs non-rigids

- By weight, 96% were rigid plastics and 4% were non-rigid plastics
- Non rigid plastics included over shoes, bubble wrap and bags – identified as mostly PE (96%, the remaining 4% was PVC)

Rigid plastics sorted by type (by volume)

- Most of the rigid plastics were a mix of colours (including white)
- 69% HDPE, mostly from mastic tubes, which are likely source of contaminated plastics
 - 26% PVC
 - 4% Other
 - 1% PS

Project learnings

There is potential for and value in a new collection service from construction sites:

- The majority of flexibles identified were PE, which hold recycling value as long as they are separated – best practice would be to restrict flexible PVC to minimise contamination of the PE.
- Lots of cardboard mixed into general waste skip – potential quick win to collect this along with plastic.

Limiting which materials arrive on site and segregation at source may be best means of maximising value in collection by minimising contamination.

- Influencing subcontractors and procurement to restrict/specify materials brought onto site – this can be tricky if tradespeople have supply chain issues for products.
- From the findings, key targets for segregation via separate bins might be: PE flexi, PVC pipes, rigid plastics, and cardboard.

Future Research/ SMI Hub perspective

Though the trial was promising, a larger sample size (more sites and/or longer time) would provide more insight on the distribution of collected waste over: (1) the different stages of a project and (2) the different types of buildings (offices, commercial, residential)

For example, the pilot was conducted during mechanical & electrical fit-out, which is flexible- and cardboard-heavy as items are delivered using a “box-per-room” model

- Need input from a local/UK-based plastics reprocessor – they did not respond to queries. This would help close the material loop and provide further insight on market values for plastic waste.

The success of this project was emphasized by Morgan Sindall, whose engagement in this project is in good alignment with their participation in the ZAP Project.

“The ZAP project has given Morgan Sindall Construction the opportunity to get involved with the SMI hub at the University of Manchester. The University’s support to SMEs including Emerge has enabled this collaboration to take the construction industry wide problem of disposal of plastic packaging waste and prove feasibility of recovery. The segregation of flexible plastics for recovery from construction sites and utilisation of a not-for-profit enterprise that supports communities could be a blueprint for the sustainable management of this problematic waste stream.”

*Jane King, Environment Improvement Manager
Morgan Sindall*

Overall, the project was successful in demonstrating the feasibility for collection of plastics (and other materials such as card) from construction sites. Direct engagement between all three parties—the SMI Hub, Emerge, and Morgan Sindall—was crucial to translate the project results to future steps for longer term collaboration. Establishing collection and recycling of waste plastics and card between Emerge and Morgan Sindall would add to their existing partnership involving collection of wood from construction sites (see Emerge’s [Touch Wood Initiative](#)). This case study is a stepping stone toward new business models that create circular closed material loops for the construction sector.

Summary

Proplex Standard is a twin-wall, impact-resistant temporary building protection material used to protect most floor finishes. Proplex Standard is available in translucent or black, in sheets or rolls and in several thicknesses and weights that can be selected based on site traffic and project duration.

Through their Proplex ClosedLoop Re-manufacturing Scheme, Protec take back the used Proplex sheets they manufacture into a fully integrated, UK based, manufacturing and recycling centre. Here they guillotine, remove excess dirt and contaminants from the waste; shred, wash, dry then reprocess the used sheets into raw materials. These raw materials go straight back into the manufacturing cycle where they are re-manufactured into new post-consumer Proplex sheets.

Protec are also able to take back other plastic waste and reprocess it into clean recycled polypropylene. Project partner MACE have been working with Protec on a pilot to take back plastic packaging waste from a construction site and reprocess it.

[Click here to see the case study of the pilot.](#)

Reprocessing stages

1. Collect

- When it's done its job, Proplex can be consolidated into bulk bags, tied in bales and stored in bins and skips
- Protec collect and take it back to their integrated recycling and manufacturing centre
- Material is weighed to collect accurate data for environmental reporting



2. Recycling

- Material is cleaned
- Chopped up into small pieces
- Excess dirt is shaken off
- Large rubbish is removed by hand
- The pieces are shredded
- Shredded material is washed
- This is now raw material
- The raw material is melted down with remaining impurities filtered off
- Cooled and chopped into pellets
- What's left is clean recycled polypropylene

3. Remanufacture

- The polypropylene pellets are mixed with additives to achieve required performance and structure
- This is melted down
- The molten material is shaped
- The surface is treated
- Protec and customer logos are printed on
- The sheets are cut to size and roll off the production line ready for their next job

CASE STUDY

Contractor plastic packaging recycling pilot | Mace and Protec (Page 1 of 2)

Summary

Protec are able to use their reprocessing plant to not only reprocess their own Proplex product (see previous case study) but all manner of flexible construction packaging waste.

Large scale contractor Mace and Protec embarked on a Pilot project on site at 40 Leadenhall, a new 37 story mixed use tower in central London. The aim was to segregate and bale flexible packaging waste on site, which would be collected by Protec for reprocessing into clean, recycled, and reusable polyethylene at their Sheffield facility.

The aim of the pilot was to increase recycling rate of plastic construction packaging from site.



Process

- Flexible PE packaging is segregated on site into separate bins.
- A designated person loads the baler, on loan from Protec, with the packaging, and bales it.
- Protec collect the bales and take them to their reprocessing facility to be turned into new product.

Cost analysis

The hire rate (based on 52 weeks) is £85 a week. Note, the weight of the baler may need considering if it is to be moved up the building by hoist or goods lift.

It would not be financial viable if someone or the site dictates that the baler needs a dedicated operator. Otherwise, depending on the volume of waste produced, this can save money through the use of less bins and associated waste management costs



CASE STUDY

Contractor plastic packaging recycling pilot | Mace and Protec (Page 2 of 2)



Key considerations

A key person or persons needs to be chosen to be trained on using and made responsible for the baler.

A suitable storage place for bales pre collection needs to be considered.

Consideration needs to go to the step/s between removal of packaging and it going in the baler. In this case, a segregated bin system.

The baler needs to be near an electrical power source.

Lessons learned

A key lesson was the position of the baler in relation to works and the segregated bins is a crucial consideration.

During the early stages the baler was neither near the main bin store, or current works. This added an additional level of logistics for the person responsible for baling.

The decision was made to move the baler to areas with more works, which also had the segregated bins. This increased use of the baler considerably, allowing much more packaging to be taken back by Protec.

Q&A

Q: Does the packaging waste need to be clean/uncontaminated before being baled?

A: No, it is cleaned on site at Protec's facility through a series of processes.

Q: Does the packaging waste need to be free of print/inks (i.e. logos, product details, etc)?

A: No, it can be reprocessed with printing inks on it.

Q: Does the product need to be baled before it is collected by Protec?

A: Technically the product can be reprocessed unbaled, but for logistics it should be baled. This decreases space taken up in collection and allows it to be easily loaded into the reprocessing system.

Q: What happens if another type of material ends up in the bale?

A: The material goes through a series of processes. A hand picker takes out any large contaminants (other materials, bits of wood, etc) with machine processes filtering out other contaminants from screws and nails to incorrect polymer types.

Note: it is best to avoid as much contamination as possible.

CASE STUDY Marlborough Sports Garden

Key intervention

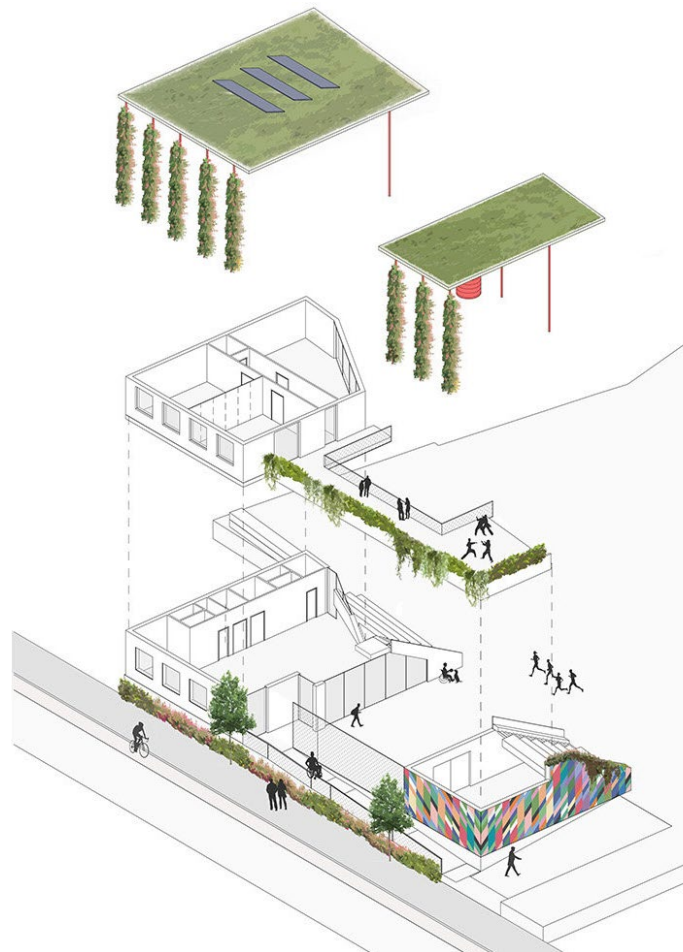
Creating a set of stringent prelims for the construction contract to eliminate all avoidable packaging, reduce plastic packaging, and increase reuse of packaging materials.

[Click here to see the example prelims.](#)

Summary

Working with Cullinan Studio and the Bankside Open Spaces Trust (BOST), the redevelopment of the Marlborough Sports Garden in London is acting as a case study to understand the ability to design out packaging waste in construction and operation and how to specify and procure responsible packaging stewardship.

Cullinan Studio has been appointed to transform Marlborough Sports Garden into a colourful, state-of-the-art mixed sports facility, promoting health and wellbeing, and which is freely available to local school pupils, other children and young people, particularly those who are living in poverty. Cullinan Studio shares BOST's ambition to apply circular economy thinking to the design and will work together to find how local people, particularly young people, can get involved in all stages of the project.



Project design

Central to the design is that every space and every object does more than one thing. A new, flexible entrance, events, café and training building becomes a climbable structure, as both seating for spectators and step exercises for classes and individuals – raising aerobic potential and viewpoints at the same time. Slides provide a fun way down as a reward for stepping up. High perimeter fences can host climbing plants, banners and giant posters.

Tall props hosting climbing plants will create a distinctive frieze on Union Street, announcing Marlborough Sports Garden to the city. Bold and colourful signage, with supergraphics on walls, ground surfaces and soffits, will define spaces whilst bringing a sense of fun and energy to the Garden.

Project team

Architect - Cullinan Studio

Client - Bankside Open Spaces Trust

Structural Engineer - Engenuiti

M&E / Sustainability Engineer - Cundall

Planning Consultant - Claire Treanor Consulting

Project Manager - Bristow

Cost Consultant - Bristow

Landscape Architect - Turkington Martin

CDM/Risk Management - Goddard Consulting

Developer - London Borough of Southwark in partnership with Bankside Open Spaces Trust

Vision

Marlborough Sports Garden is a public open space which is managed by Bankside Open Spaces Trust.

BOST is creating a new community hub that will deliver key objectives of eating well, exercising more and developing a love for and proficiency in many sports.

The community building has received planning permission with a design that meets both BOST's and Southwark Council's high targets for environmental, social, and economic sustainability. Addressing plastic pollution and its impacts on health align well with BOST's overarching mission.

Circular economy principles

In 2022, BOST commissioned Cullinan Studio to design the community building and sports ground improvements to Circular Economy Principles. Key to this was the early establishment of BOST's core aspirations: Adhering to BOST's Sustainability Policy, Minimising 'new' materials during construction, Minimising energy consumption during construction and operation, Choosing 'Green' suppliers and achieving Truly Zero Waste.

BOST and Cullinan Studio became partners in the ZAP research specifically to inform strategies to eliminate plastic packaging waste in the project. BOST have challenged designers and suppliers to think differently about the life cycle of materials.

Truly zero waste

BOST's own Circular Economy Statement does not refer to 'waste', recognising that there is use in everything, unless hazardous. The design and supply team have therefore been instructed to refer to excess material as 'arising'. These are to be reduced by careful consideration at specification stage, including products and their packaging. There will be a requirement for the contractor to have a Green Foreman who ensures that excess materials are reused on site or redistributed within the local area and monitors and collates certified evidence for material journeys. No skips or rubble sacks will be allowed on site.

BOST requested innovative proposals for arisings. Examples are use of gabions as planters, in bike shelters and building cladding to hold arising materials such as rubble which create habitats and increase maximise biodiversity. Community making programs will mould plastic arisings to create useful and reusable products for the project such as plates for the café and artwork to tell the story of plastics, its uses and misuses.

The ZAP project focuses on ensuring that plastic packaging is reduced during construction but BOST also wants to expand this into the operational phase, following the example of zero waste ventures such as [SILO](#) in Hackney, with goods delivered with no packaging. BOST also became a member of BASIS which seeks to make sports more sustainable and help eliminate waste.



Circular economy design strategy

Cullinan Studio has been leading the designs for the Marlborough Sports Garden (MSG) in collaboration with engineers, Engenuiti and Cundall, landscape designers, Turkington Martin, and project managers, Bristow.

The team has embraced the challenge of BOST's circular economy brief through prioritising reuse of materials and this has influenced the layout and appearance of the building. For instance, the structural grid was organised to suit the reliably available sizes of reclaimed steel columns and reclaimed timber beams. The entire design from structure to internal linings has been devised for disassembly at the end of life to allow materials to be easily separated for re-use. Furthermore, material passports will be created to assist with future re-use.

The ZAP research specifically focuses on the plastic packaging that some of the project materials and products will be wrapped in for protection, transport, or safety reasons.

Managing plastic arisings

Great strides have been made to consider the end use of materials and equipment in a circular way. Thinking about how to reuse temporary works and packaging requires an additional level of thinking.





Firstly, when researching building elements questions should be asked of manufacturers about the type of packaging products will arrive in. This type of information is not often discernible in EPD information, so further interrogation is required:

- Images of the product packaging layers, including transport layer.
- Material description of all packaging elements including plastic type, percentage of recycled content including metrics for size, weight, and carbon.
- Details of any take-back schemes offered.
- Details of ease and means of recycling and how, if at all, the manufacturer tracks the packaging journey.

There are companies showing leadership on packaging. See them [here](#).

Likely plastic arisings for MSG

Items to be quantified before reaching site and plan devised for reuse in accordance with BOST requirements.

RICS CE layers	Plastic packaging
Site 	Shrink wrap, bags, banding, buckets for external materials for fixtures, gabions, play surfaces, horticulture.
Skin 	Shrink wrap, banding for cladding panels, green roof layers, windows and doors, insulation, and breather/ VP membranes. (foil sausage- sealants to be used) (avoid EPS packers)
Structure	Take-back-tarpaulins for reclaimed steel and timber
Substructure	Aim for zero plastic packaging for mini piles and ground slab.
Services 	Shrink wrap, banding for electrical, plumbing, kitchen equipment (avoid EPS packers)
Interior space 	Shrink Wrap, Banding, Buckets for lining boards, flooring, fixings (avoid EPS packers)
Stuff/ contents	Aim for zero plastic packaging for reused furniture.
Temporary works	Aim for zero packaging for hoarding and protection boards

What are prelims?

Preliminaries (or 'prelims') may form part of tender documents used to obtain bids for construction works or for the supply of goods or materials. Preliminaries provide a description of a project that allows the supplier (often a contractor or subcontractor) to assess costs which, whilst they do not form a part of any of the packages of works required by the contract, are required by the method and circumstances of the works.

Using these prelims

These prelims are part of a set written specifically for the [Marlborough Sports Garden Project](#). These have been highlighted with their specific relevance to reducing packaging during construction.

The prelims have been developed with key stakeholders, and can be used or adapted for your construction projects.

1: Contractor to refer to BOST's Circular Economy Statement. Note that it does not refer to 'waste', recognising that there is use in everything, unless hazardous. Contractor is instructed to refer to excess material as 'arising'. Contractor to adhere to Employer's Requirements by using list of preferred suppliers. Where the contractor can offer alternatives, they should indicate in their tender submission providing evidence that the supplier will meet same or higher specification. Selection must include zero/non plastic packaging/ take-back schemes.

2: Contractor to nominate a CE (Circular Economy) Foreman (rather than a 'Site Foreman') who ensures excess materials reused on site/ redistributed within local area, monitors and collates certified evidence for Material Passports. All materials entering/ leaving site documented and approved by CE Foreman. As per 'standard' site foreman role, the contractors team report to the CE Foreman. The role is core to arisings management and the Foreman will be obliged to report to the Project Manager at regular minimum weekly intervals and to attend all progress meetings.

3: No skips or rubble sacks on site. The contractor should submit as part of their tender, evidence of experience of arisings management, which exceeds current standards; there should be emphasis on packaging take-back schemes, alternatives to plastic packaging and zero packaging where this is practical. Evidence of how arisings have been sorted and documented on previous projects should be submitted. Where the contractor does not have evidence or experience, BOST would welcome solutions on how this would be achieved.

4: BOST request innovative proposals for arisings. Examples are use of gabions as planters, in bike shelters and building cladding to hold arising materials such as rubble, which create habitats and maximises biodiversity. Community making programs will mould plastic arisings to create useful and reusable products for the project. The contractor should submit track record of community partnering projects and where it has innovatively reused arisings on site / local to the project(s) area.

5: A summation of relevant excavation and arisings quantities has been provided in the Appendices. The Contractor should use this to propose ways in which the arisings could be utilised, including plastic arisings. The Contractor should show how arisings will be sorted to ensure that hazardous waste is separated from usable arisings.

6: All fixings must be able to be dismantled and reused in order that the scheme can be dismantled and moved to another site in its entirety at End-of-Life. Contractor must avoid products, fillers etc which do not allow this. The Contractor to identify plastic based products and reduce these wherever possible.

7: Some arisings reuse opportunities have been identified by the Employer. Contractor to collaborate with Employer to investigate where excavation, demolition and construction can be safely reused on site or within SE1 via resurfacing/landscaping in nearby parks and gardens, brown roof construction, via [Community Wood Recycling](#) (e.g. Croydon CR0 3RL). Track record of reuse of arisings and organisations with which the Contractor has worked to be submitted. Contractor to use re-use resources e.g. the Alliance for Sustainable Building Products.

Example prelims (page 3 of 3) Marlborough Sports Garden

8: The Contractor to show how the scheme will exceed BREEAM Excellent for both New Construction (2018) and Refurbishment and Fit-Out (2014) by achieving material and 'waste credits' (in our scheme these are referred to as 'arisings'), which are:

- Mat06 (material efficiency)
- Wst01 (construction waste management) e.g. targets include achieving 3.2 tonnes/100m² of internal floor area for 'waste arising' from for new construction elements.
- Wst06 (design for disassembly and adaptability)
- Man03 (responsible construction practices)
- Mat03 (responsible sourcing of materials).

9: BOST and Contractor committed to the reduction of arisings generated from its activities. All Sub-Contractors shall be expected to support and assist BOST and Contractor in achieving their arisings reduction targets as outlined in the Site Arisings Management Plan and the Environmental Management Plan, compiled by Contractor.

10: No single use plastics to enter site arisings streams and Contractor to show how supply chain eliminates single use plastics. Contractor to show how it will work with Subcontractors to achieve this.

11: To reuse arisings, or efficiently utilise take-back packaging schemes, especially plastics, Contractor to always maintain all storage areas in clean and tidy condition, preventing construction dust from entering storage areas.

12: Arisings reuse, recycling and transport off site clearly identify in Traffic Management and Logistics Plan. The Plan should also identify donated /recycled materials and products and their transport/arrival on site. Also, to be identified in RAMS. Consider weighing stations, compactors to reduce transport, and show track record of utilising.

13: All plans to support areas identified in BREEAM standards, Closed Loop Schemes, Reusable Packaging (e.g. Velcro wraps, reusable boxes and pallets), Green Compass, Arisings Targets (including transport and certification) and others used by BOST – refer to appendices.

Packaging hierarchy

Most preferred

Elimination

Reduction

Optimisation

Reuse

Recycle

Energy from waste

Disposal

Least preferred

Elimination

Removing packaging altogether; reducing unnecessary layers; eliminating the use of adhesives and tapes; limiting the use of labels. For construction products, examples include the delivery of bulk items instead of using bulk bags, and use of edge protection rather than full protection e.g. kitchen units.

Reduction

Using larger pack sizes and reducing the amount of packaging per unit of product (if compliant with manual handling requirements); reduction of void spaces, fillers and padding, use of air as the packaging medium for certain components or removal of air from sealed packages.

Optimisation

Light weighting and downsizing by eliminating one or more packaging layers; replacing blister packs with smaller cardboard packs, use of strengthened thin-walled packaging; reducing the thickness; using spot weld blobs of adhesives rather than a continuous strip; minimise label size; shaping the pack to be transported efficiently; maximise pallet space.

Reuse

Structural packaging such as pallets, crates and sturdy plastic or cardboard boxes can be re-used. Reuse of bulk bags for storing re-usable materials; use of original packaging to contain product/ material off-cuts.

Recycle

Plastics (if clean) can be recycled into new products. Segregation (from other materials and possibly by plastic type, depending on the plastic reproprocessors) is the key to successful recycling, either onsite or at a waste facility. Plastic may also be replaced with lower carbon and easier to recycle material such as paper based.

Energy from waste

Plastic packaging waste sent for energy recovery (incineration)

Disposal

plastic packaging waste disposed of in landfill.

Mission statement

Set out company mission statement – example below.

We are committed to the reduction of waste generated from manufacture and distribution of our products. As a business our goal is to achieve a positive reduction in the amount of waste sent to landfill.

We pledge to:

1. *Reduce our total volume of plastic packaging by at least 50% by 2025*
2. *Use reusable packaging wherever possible*
3. *Optimise packaging wherever possible*
4. *Use 100% recyclable packaging by 2030*
5. *Divert 100% of packaging waste from landfill*
6. *Accurately record and monitor packaging usage and wastage and use this data to make further positive changes*

Done? Y/N	Action	Details/notes
	Written and approved a reduction of packaging mission statement.	
	Completed an audit on product packaging, including during transport and logistics.	
	Consider where packaging can be eliminated and/or is surplus to requirements.	
	Where no practicable and/or available alternative to single use packaging is available, single use material options should be researched and justified.	
	Where plastic is used, plastic with recycled content has been used where practicable. Aim for minimum 30%.	
	Reusable packaging for protection (e.g. Velcro wraps, reusable boxes, pallets) has been considered before single use alternatives.	
	Closed loop recycling schemes have been considered before other alternatives.	

Product type

Wooden frame windows and doors

Supplier

Bereco

Packing aims/targets

As much reduction in plastic packaging as possible

Comments/notes

Bereco undertook extensive research to make their packaging as environmentally friendly as possible whilst ensuring any reductions or replacements didn't affect integrity of the product.

Bereco operate a zero carbon installation service for the home improvement market:

- No home visits for quotes to reduce travel emissions
- Online/virtual consultations only
- Only send surveyor on point of order
- Use [Reconomy](#) waste management service to provide skips, with up to 97% of material being recycled

Packaging materials currently used

- Metal paint pots
- Tissue paper (handles)
- Paper tape
- Paper based boxes
- Shrink wrap
- Plastic pallet bags
- Wooden pallets (custom)

Successful substitutes of previous materials

- Plastic paint pots swapped for metal
- Plastic handle wrappers replaced with tissue paper
- Plastic tapes replaced with paper tapes
- All boxes became plastic free in 2018
- Operate a pallet take back scheme



Barriers and challenges

Plastic shrink wrapped pallets

- This keeps product in place and protects the product
- Bio based wrap didn't work, it can degrade when it comes into contact with moisture, becoming tacky, flaky, or leeching polymers into the product

Plastic bags. These keep product free of dust and protect it from the elements when stored outside

- Best option was 30% recycled content bags, which can be recycled again
- No bag take back as there is no storage option

Plastic bags also stop friction in the transit

- Investigated wool as an alternative but it was cost prohibitive
- Cork needed an adhesive that could damage the window coating
- An option was to keep product spaced out on L shaped stillages, but cost prohibitive due to reduced load capacity

PE straps

- Tried to source a natural alternative but none had been tested

CASE STUDY

Manufacturer plastic packaging reduction | Mueller Europe

Product type

Copper tube for plumbing, heating, and industrial applications

Supplier

Mueller Europe Ltd

Packing aims/targets

Removal of all unnecessary packaging

Comments/notes

Mueller are currently undertaking an EPD that will detail more about the packaging and look at the whole life carbon of the product as a whole.



Packaging materials

- Tapes
- Single use slings
- Strings and strapping
- Stretch wrap
- End caps
- Plugs
- Shrink wrap
- Sleeve bags

Successful substitutes

- Plastic tapes have been replaced with paper based tapes that can be recycled
- Traditionally, plastic end caps were added to the end of the tube lengths for protection. These have been removed, with no increased damages to product or complaints.

Reductions 2019-2021

- Single use slings - 23% reduction
- Stretch wrap - 75% reduction
- End caps - 98% reduction
- Plugs - 60% reduction
- Shrink wrap - 100% reduction
- Sleeve bags - 50% reduction

Barriers and challenges

Despite extensive search, there is currently no replacement for the single use plastic slings and strapping that are used to move the bundles of tube around.

These are single use due to safety. It is deemed that one use reduces the strength of the sling which then becomes no longer fit for purpose.

Bulk packaging and transport

Muellers product is transported in bulk, and a large amount of packaging is not required (comparatively to other product types).

This affirms that bulk is best, rather than smaller individually packaged quantities which at very least would increase existing packaging, and may increase need for different types of packaging, e.g. bags or wrapping.

Product type

Roof window

Supplier

Velux

Packing aims/targets

2030 packaging target:

- Single material packaging
- Zero plastic
- 100% recyclable



Packaging materials

- FSC certified paper based materials
- Plastic shrink wrap for internal logistic transportation (customers do not experience this)

Successful substitutes

All window packaging elements have been replaced with FSC certified paper based materials up to the point of logistics.

- 2 years from concept to implementation
- All packaging can go in 1 bin
- Based on cost calculation, this system is cheaper
- Weight difference in trucks is small. New concept is slightly heavier
- A quality report was undertaken tracking claims and damage. Claim rates have not risen over 1 year

Some hot glue is used, but this is kept within the 5% impurity level paper mills can handle. Velux aim to keep this to 3%

Carbon saving

13% reduction in carbon footprint for packaging

Barriers and challenges

- The key challenge was to develop a concept that had the needed properties – soft enough to absorb energy from drops and handling, but still strong enough that could provide the ability to stack it during its transportation flow
- The pallets are shrink wrapped which is needed to secure the units themselves, although it relatively minimal
- In general there was a concern with fibres scratching the glass, aluminium surface or sash lacquer
- Creating a no scratch system was difficult, some windows are particularly sensitive with things like UV films - If needed, coatings used instead of films on the glass
- Material costs were particularly dynamic
- The Velux system and production was built to handle EPS (expanded polystyrene) - had to make sure it could handle the cardboard honeycomb

Acknowledgements



The ZAP project was awarded funding by the Ecosurety Exploration Fund. The fund was first launched in November 2019 with a view to providing a visible funding route for companies, charities, not-for-profits, academic institutions and the public sector working on projects addressing the environmental challenges presented by packaging, batteries or e-waste. Applicants could apply for up to £150k for projects that could be completed over a 12-month period. The fund has now completed and has supported eight projects in total, with some recently reaching fruition including the innovative CellMine and BOSS 2D technologies.

The project is led by the Alliance for Sustainable Building Products (ASBP)

With support from project partners: Bankside Open Space Trust (BOST), Cullinan Studio, Mace and Morgan Sindall.



Project team

Dr Katherine Adams, ASBP
Larry Tate, ASBP
Jack Harrison, BOST
Helen John, BOST
Carol Costello, Cullinan Studio
Georgia Allen, Mace
Lynne Potter, Mace
Jane King, Morgan Sindall

With support from

Simon Corbey, ASBP
Richard Broad, ASBP
Daniel Bianchi, Cullinan Studio
Tia Duong, Cullinan Studio

Special thanks to

Gareth Morton, Ecosurety
Louise Goodfellow, Ecosurety
Nicola Harrison, Bereco
Kirsty Cox, Bereco
Darryl Croft, Protec
Jim Riley, Protec
Guilhem De Hoe, University of Manchester
Michaela Kiernan, University of Manchester
Mike Swain, Pack IDS Ltd.
Andrew Surtees, Mueller Europe
Anthony Barron, Thakeham Homes
Simon Gandy