

# **Circular Economy Thinking in Construction**

## **A view from UK manufacturers**

**Jane Thornback**

**Sustainability Policy Advisor**  
**Construction Products Association**

**Member, GCB Circular Economy Working Group**

## CPA – Manufacturers + Suppliers

- Umbrella Trade Association for UK based construction product manufacturers and suppliers
- Membership – 24 major companies + 35 sector trade associations
- Greater in value than the car industry and aviation industry combined
- An industry profile of:
  - Annual output of £ 47 billion.
  - Employs over 300,000 people directly across 20,000 companies
  - Represents over 1/3 of total construction output
  - Represents about 10% of total manufacturing output

<http://www.constructionproducts.org.uk>

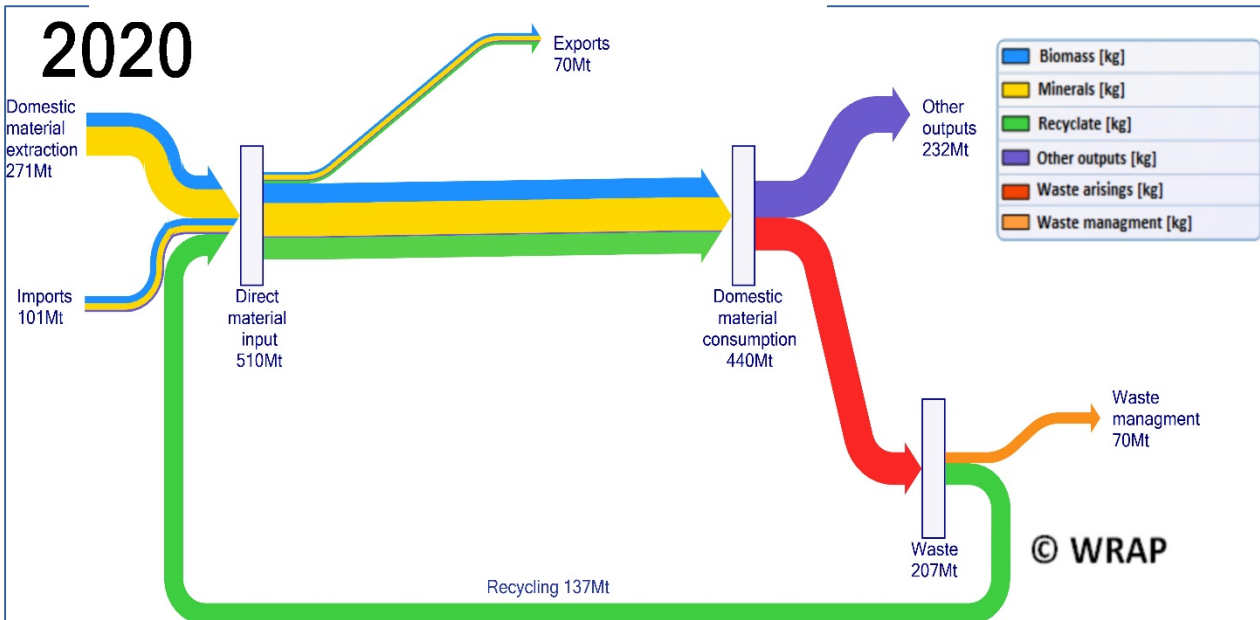
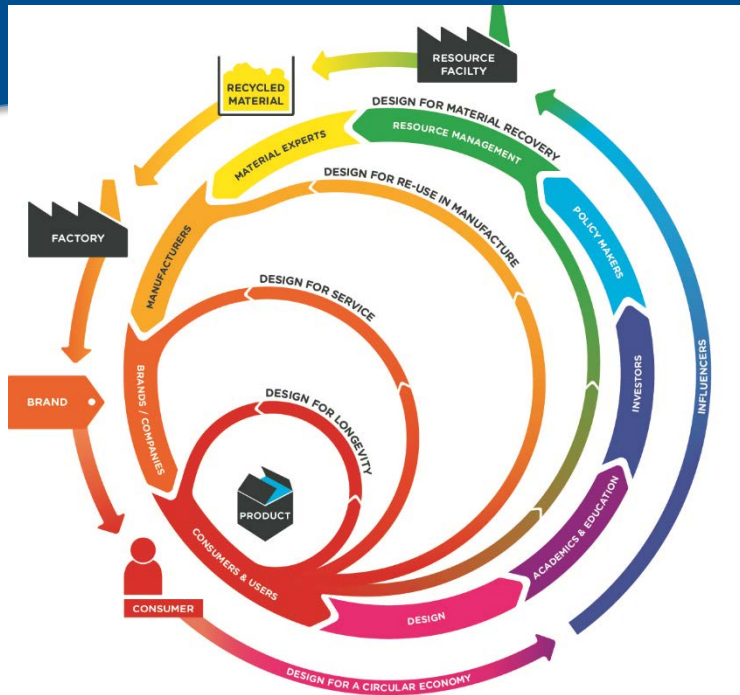
## CPA Trade Association Members

- Association of Specialist Fire Protection
- Bathroom Manufacturers Association
- Brick Development Association
- British Adhesives and Sealants Association
- British Aggregate Association
- British Ceramic Confederation
- British Coatings Federation
- British Electrotechnical & Allied Manufacturers Association
- British Plastics Federation
- British Rigid Urethane Foam Manufacturers Association
- British Woodworking Federation
- Builders Merchants Federation
- Clay Pipe Development Association
- Contract Flooring Association
- Council for Aluminium in Building
- Door & Hardware Federation
- Energy and Utilities Alliance
- Engineered Panels in Construction
- European Phenolic Foam Association
- Finishes and Interiors Sector
- Glass & Glazing Federation
- Guild of Architectural Ironmongers
- Lead Sheet Association
- Metal Cladding & Roofing Manufacturers Association
- Mineral Products Association
- National Association of Rooflight Manufacturers
- Roof Tile Association
- Roofing Industry Alliance - National Federation of Roofing Contractors
- Society of British Water and Wastewater Industries
- Steel Lintel Manufacturers Association
- Steel Window Association
- Structural Timber Association
- Timber Trade Federation
- UK Steel Association
- Wood Panel Industries Federation

# Construction materials – how much wasted?

- Construction - generator of large Construction and Demolition (C&D) waste streams – about 30% of waste in the EU.
- In UK, in 2012, estimated that:
  - 45.85 million tonnes of C&D generated
  - 44.8 million tonnes of which was non-hazardous.
  - 38.8 million tonnes of this was recovered, i.e. recovery rate of 86.5%
- Comprises full range of materials - glass, plastic, concrete, bricks, wood, plasterboard, asbestos solvents, metals
- Why are these valuable resources continuing to be wasted? ££££
- What role for manufacturers in reducing waste?
- Looking to the future must consider risks to availability of materials

# Circular Material Flows



## Construction products – how fit with current CE thinking?

- Much of the thinking re CE to date has been on short-lived consumer electronic goods  
**Question: Are construction products the same?**
- Construction products - components – of buildings & infrastructure
- The final product is the office block, school, house, hospital, railway, road etc
- Final product is complex and hugely variable – in size, longevity and fashion
- Long life (decades, maybe centuries) of both products and buildings
- Repercussions of the above on CE thinking in construction:
  - Material flows - **the long time period between cradle and End of Life**
  - Business models such as leasing
  - Measurement of circularity
  - Interaction / collaboration between all professions in the construction lifecycle of a building or infrastructure

## Key Questions

What is role and influence of the construction product manufacturer in the material flows associated with buildings and infrastructure?

What parts of the construction lifecycle can manufacturers affect?

What materials that we see in the construction and demolition waste figures can be influenced by changes made by manufacturers in the design of their products and in their manufacturing processes?

**We need to understand and find out the answers**

# Managers of material flows

- Circular economy is about system flows and processes, continually
- Manufacturers have control or influence over some of the parts of materials flow in the built environment
- They may have little or no influence over End of Life scenarios of either a building or a product - indeed it may be sufficiently far in the future that they or their company no longer exist.
- Already have a complex web of architects, designers, contractors, subcontractors, manufacturers, demolition experts
- For materials to flow around an economy we must add an additional web of recyclers, reclaimers, repairers, markets for secondary material flows, collection logistics, etc
- **How can the flow of materials become a financially robust market?**

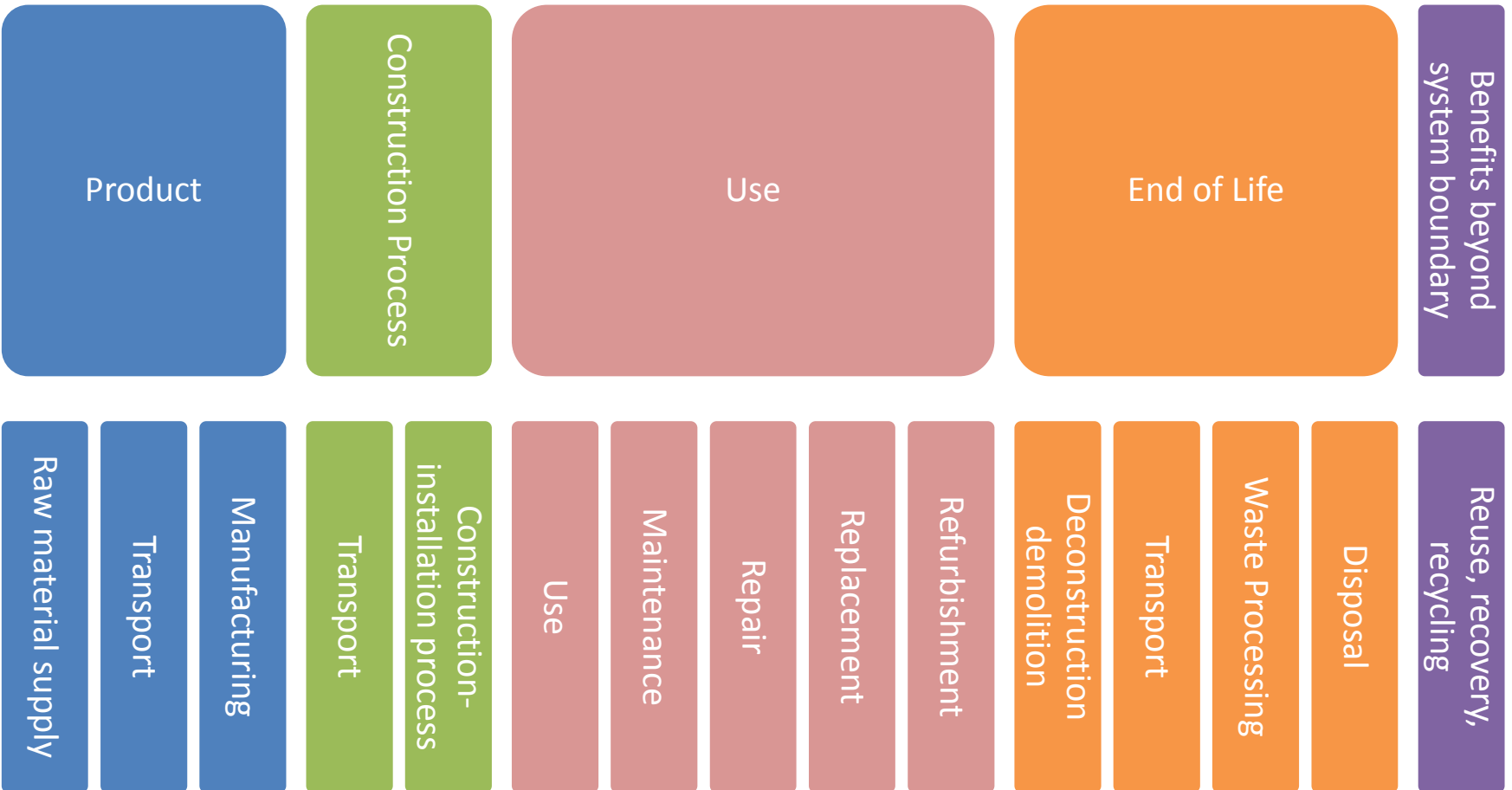


## Construction Product Manufacturers & flow control!

What part of material flow do they have control and influence over in the construction lifecycle?

- Material resources used
- Design of the product - for longevity, disassembly, ecodesign etc
- Design of the manufacturing process – reduce waste (energy, water)
- Design of the packaging – optimise, reusable or recyclable materials
- Liaise with contractors to reduce wastage at construction site
- Maintenance and repair to some degree, depending on lifespan
- Possibly some connection to End of Life

# CEN/TC 350 Life cycle stages

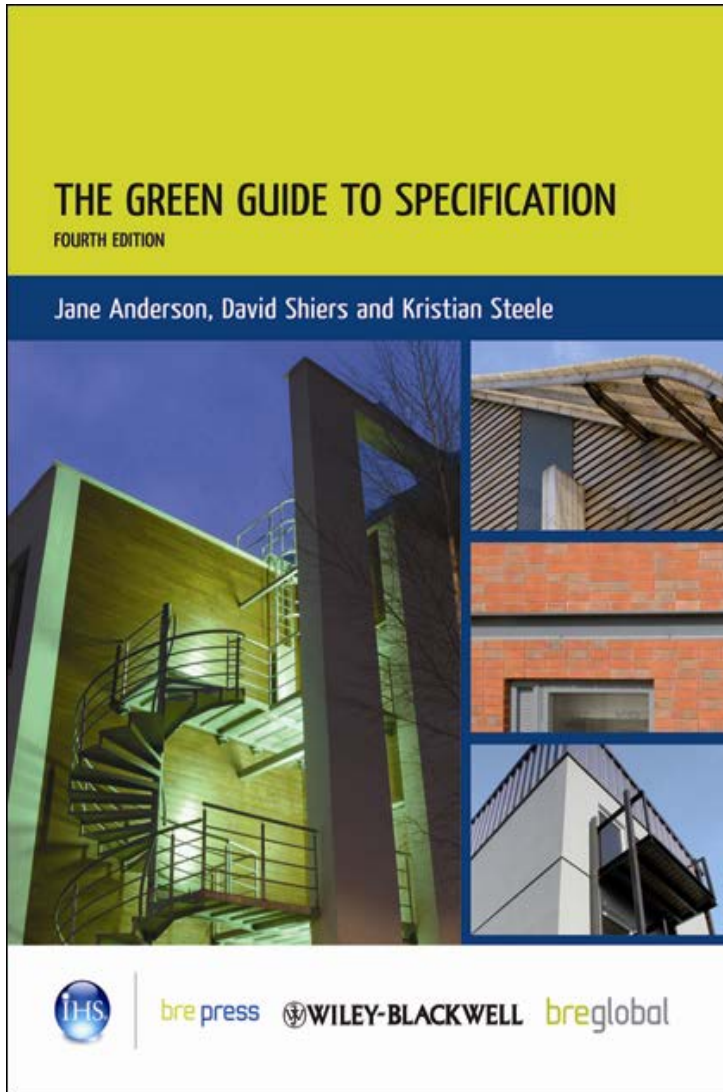


# What is happening in the manufacturing sector?

- Lot of focus in past 10-20 years first on waste reduction, then on resource efficiency
- Most UK sites now have closed loop recycling back into production of product
- Many have their own waste targets; some have a packaging target
- The big companies / trade associations have sustainability strategies with numerous targets, indicators, reporting
- Some are looking at supply risk and future uncertainties of raw materials
- Some have successful commercially viable take back schemes
- Ten sectors have produced Resource Efficiency Action Plans (REAPs) – developed with representatives from across the supply chain
- Many have LCA's and EPD's; some are certified to responsible sourcing schemes

# Measurement

- LCA well established as basis of measurement
- 20 years of LCA due to BRE Green Guide
- National standards harmonised into European standards
- Any European regulation has to use European standards
- CEN 350 – Measuring the Sustainability performance of construction works including construction products & now infrastructure
- EN 15804 – measurement methodology for producing an Environmental Product Declaration
- An EPD includes embodied carbon data, water data, recycled content, etc
- Currently assessing new indicators for resource efficiency
- BIM and product information
- **Q: What more needs to be developed?**



## Environmental Issue

Climate Change\*

Water extraction

Mineral extraction

Stratospheric ozone depletion\*

Human toxicity

Ecotoxicity to freshwater

Higher level nuclear waste

Ecotoxicity to land

Waste disposal

Fossil fuel depletion

Eutrophication\*

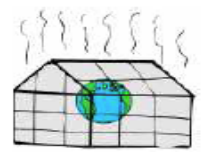
Photochemical ozone creation\*

Acidification\*

# M350 - Environmental Indicators

## Impact indicators

- Climate Change
- Ozone depletion
- Acidification of Land and Water sources
- Eutrophication
- Photochemical Oxidation
- Depletion of fossil fuel resources
- Depletion of mineral resources



## Input Indicators

- Renewable 1<sup>y</sup> energy
- Non-renewable 1<sup>y</sup> energy
- Renewable 2<sup>y</sup> fuels
- Non-renewable 2<sup>y</sup> fuels
- Secondary materials (other than fuels)?
- Net Water



## Output indicators

- Hazardous waste
- Non-Hazardous Waste
- Radioactive Waste
- Material for recycling
- Material for Energy recovery
- Components for reuse
- *Exported energy*



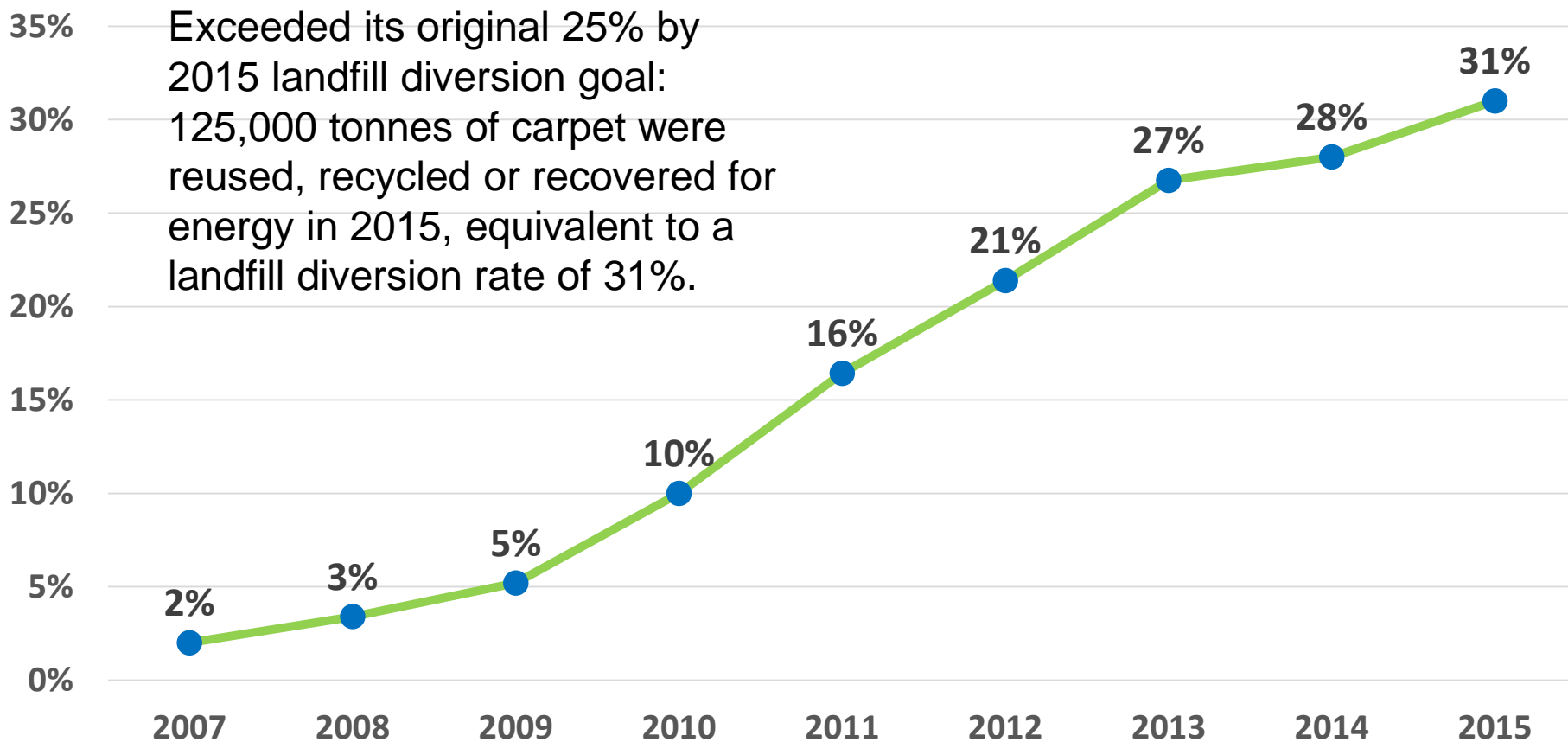
# Resource Efficiency Action Plans

Ten REAPs published:

- Paint
- Clay Bricks and Clay Blocks
- Pre Cast Concrete
- Ready Mixed Concrete
- Mineral Wool Ceiling Tiles
- Insulation
- Plasterboard (Defra Roadmap)
- Windows (Defra Roadmap)
- Flooring
- Joinery/Timber



# Carpet landfill diversion 2007 - 2015



[www.carpetrecyclinguk.com](http://www.carpetrecyclinguk.com)

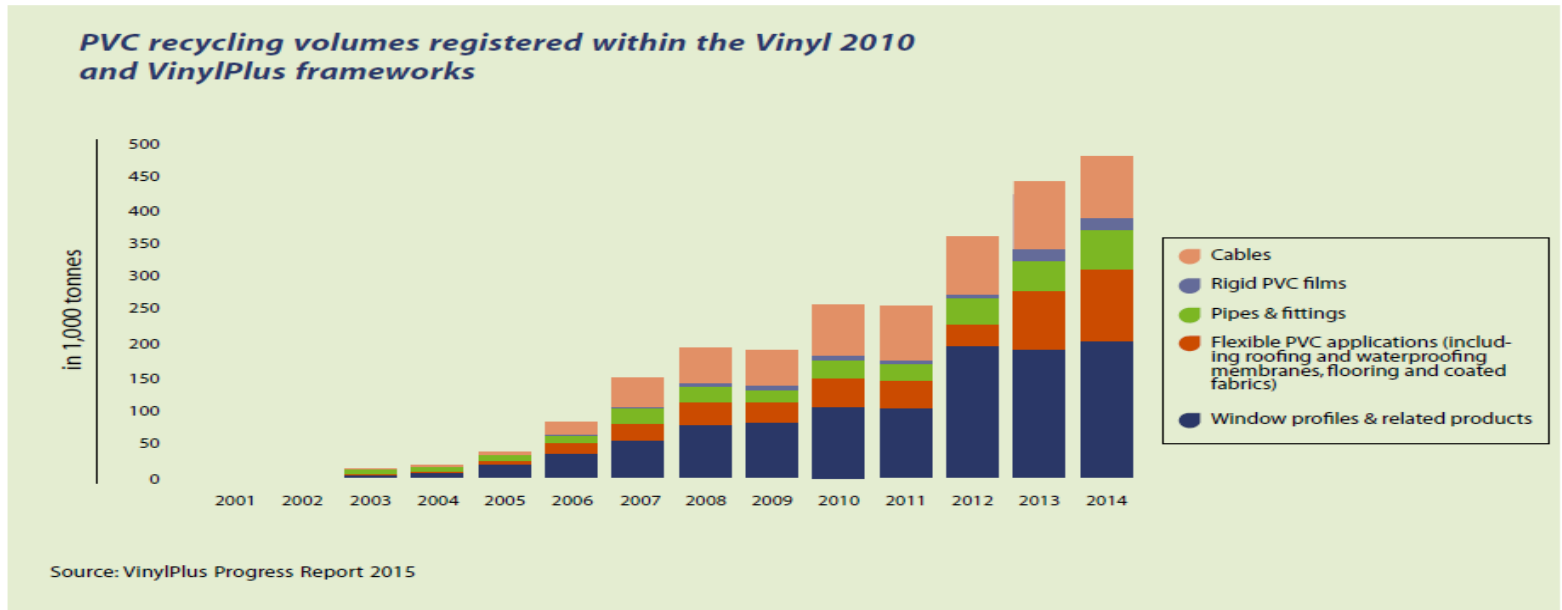
**CARPET RECYCLING UK**  
recovering carpet value



# Recovinyl Recycling Scheme

- PVC industry - long-established recycling scheme throughout the EU
- Very strong in the UK window industry with a network of recycling companies. It continues to extend its collection processes.
- Recyclers have a range of techniques to clean contaminated material for re-use in new products.

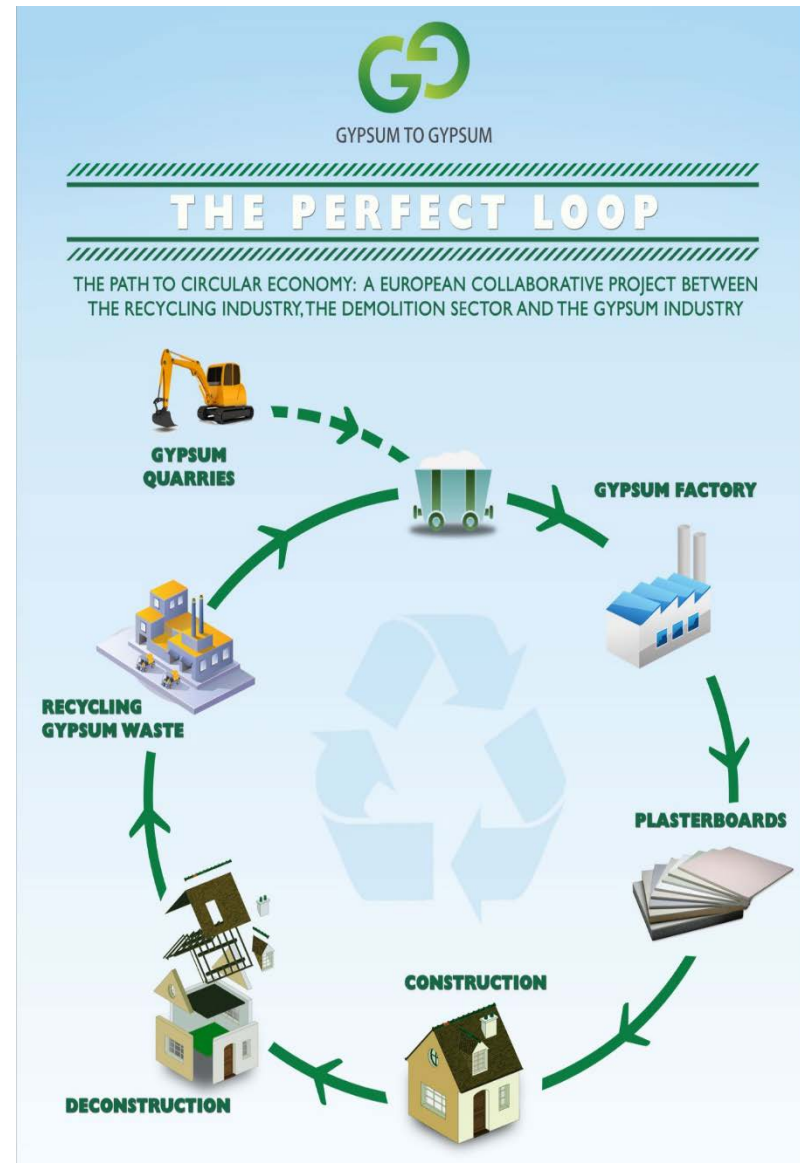
<http://www.recovinyl.com/>



# Gypsum to Gypsum

- EU Life funded project
- 3 Years - 2013 to 2015
- 17 collaborating organisations/companies – demolition sector, recycling industry & Gypsum industry
- Detailed look across the construction lifecycle of how to improve recycling of plasterboard

<http://gypsumtogypsum.org/>

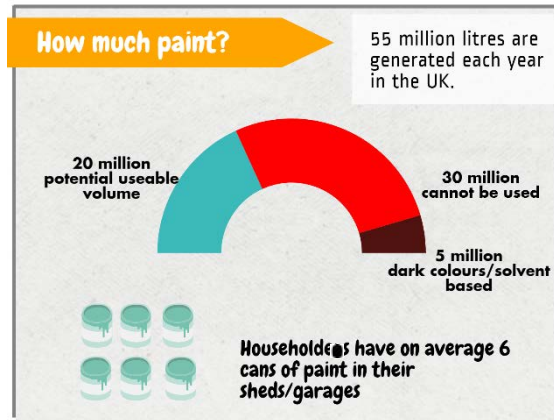


# PaintCare – creating a circular economy for decorative paint in the UK

## Project Key Facts

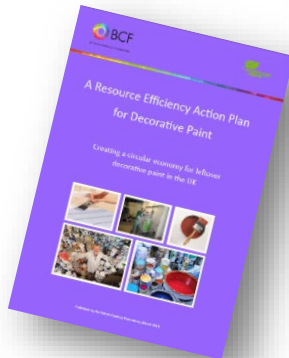
- Launched May 2015
- Wide Stakeholder group
  - paint manufacturers & remanufacturers
  - retailers
  - waste companies
  - local authorities
  - community reuse organisations
  - central government
- Steering committee + 3 working groups
  - WG1 = stats, consumers & markets
  - WG2 = regulatory issues
  - WG3 = collection and remanufacture

## The Quantities



## Objectives & Challenges

- Increase reuse/remanufacturing from 2% to > 25% of annual volume of leftover paint
- Prevent 20 million+ litres of paint being landfilled
- Increase percentage of HWRCs that accept paint
- Encourage the creation of a network of 10-15 remanufacturing hubs
- Stimulate a market for remanufactured paint
- Remove regulatory barriers (waste, REACH)
- Identify a sustainable long-term funding model, with the paint remaining and being used in the UK



## Big Challenges re recovery of products/materials

- Often a low commercial value of materials/products (apart from metals) at demolition.
- Lack of widespread functioning secondary market mechanisms.
- Problematic logistics of moving and storing materials.
- Constraints of existing waste legislation
- Complex materials and products which are increasing in use can be difficult to reuse
- Legacy wastes and contaminants
- Changes in legislation may mean that recovered material no longer complies with certain regulations e.g. REACH
- Fashion dictating the longevity and durability of products



## Policy Drivers – Europe

- Construction Products Regulation
  - BWR 3 Hygiene, health and the environment
  - BWR 7 Sustainable use of natural resources
- Resource efficiency opportunities in building sector COM(2014) 445
  - Focus on resource use and reduction of environmental impact of buildings
- Closing the loop - An EU action plan for the Circular Economy COM(2015) 614/2
  - Ecodesign focusing on issues such as reparability, durability, upgradability, recyclability,
- Product environmental footprint (PEF)
  - Stimulating the use of “green” products by a harmonised communication
  - LCA methodology (not construction specific)
- ISO TC59 / SC17 : Sustainability in building construction
  - Environmental declaration of building products and environmental performance of buildings
- CEN TC 350 : Sustainability of construction works
  - European standardisation LCA – EN 15804

## Opportunities

- Taking the lesson learning from demolition back to product designers and building designers. Why are materials in the waste stream?
- Use sector trade associations to consider the specific issues around different material flows and liaise with those in the lifecycle
- Link architects and manufacturers earlier in the design phase to improve material use
- Persuade contractors to collaborate with manufacturers
- Explore the options for business models for long lived products and buildings
- Measurement -- mature landscape—CEN 350 Module D – assessing End of Life scenarios - what more is needed?
- Develop new methods for product and material disassembly at End of Life – the pieces in between
- Explore the opportunities of 3D printing, smart monitoring, BIM and biomimicry for better use and flows of materials

## Conclusions

- Construction products are not like short-lived consumer goods
- Not the final product - the building is
- Need to adapt our CE thinking in Construction to take account of this
- Need better clarity of Manufacturers role in material flows
- A lot already going on in the product world – find out about it – Ask sector trade associations
  
- Material flows in a circular economy will require changes by clients, designers, contractors, specialist contractors, recyclers, industrial symbiosis professionals, the demolition industry, markets etc

**Change the culture of construction to one of collaboration and problem solving**



# Thank you

[Jane.Thornback@constructionproducts.org.uk](mailto:Jane.Thornback@constructionproducts.org.uk)

[www.constructionproduct.org.uk](http://www.constructionproduct.org.uk)