



Circular economy in construction

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- The linear economy
- Drivers for resource efficiency
- Value in materials
- The circular economy
- Basic circular economy principles
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- Examples
- RIAS awards
- Zero Waste Scotland resources

Linear economy



RISKS

Higher commodity prices

Waste

Environmental impact

Earth overuse

Resource scarcity



Source



Produce



Sell



Use

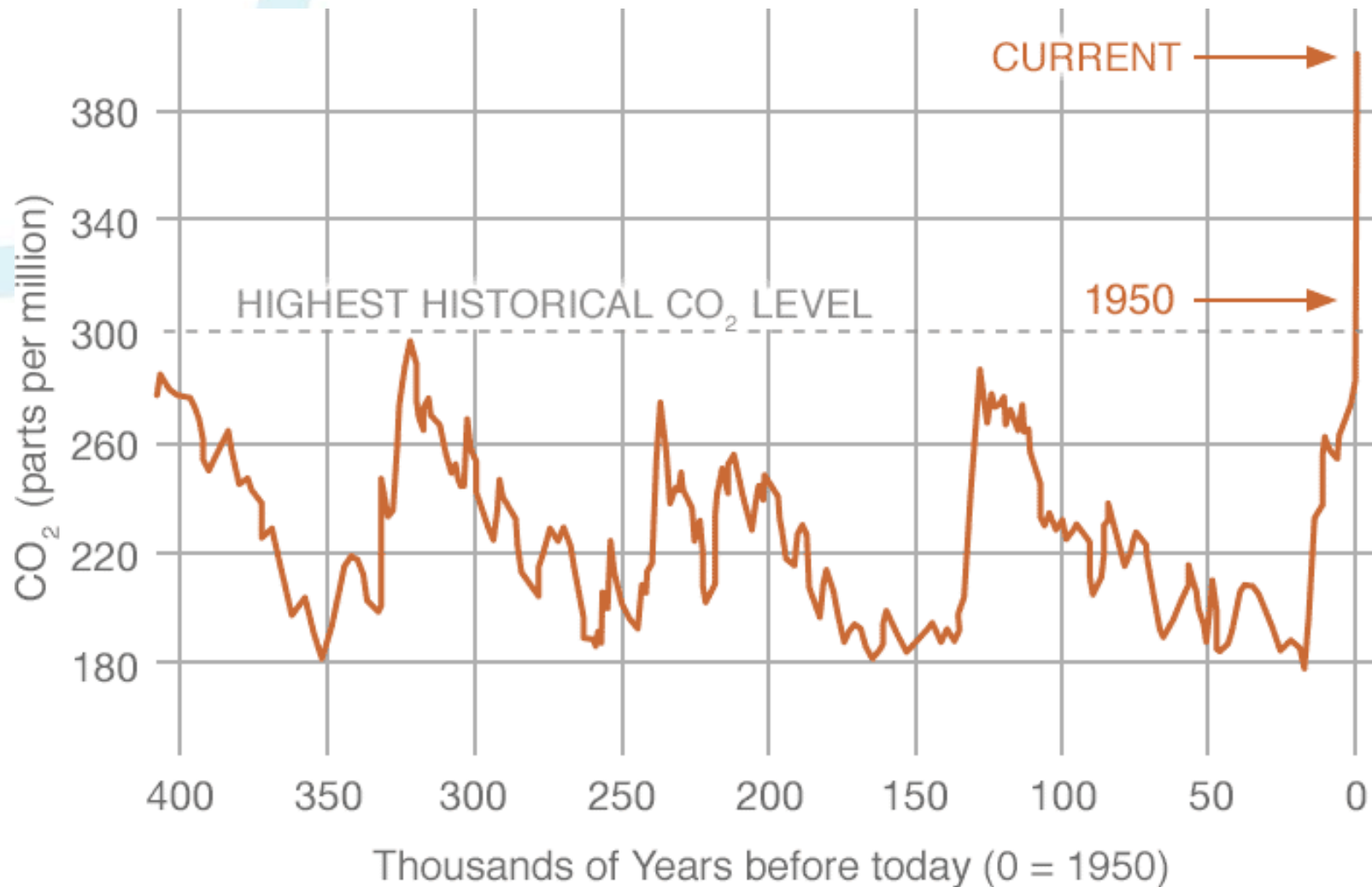


Incinerate/Landfill

CO₂ at record levels



Highest level reached May 2019: **415.26ppm**



Temperatures at record levels



 **Met Office**

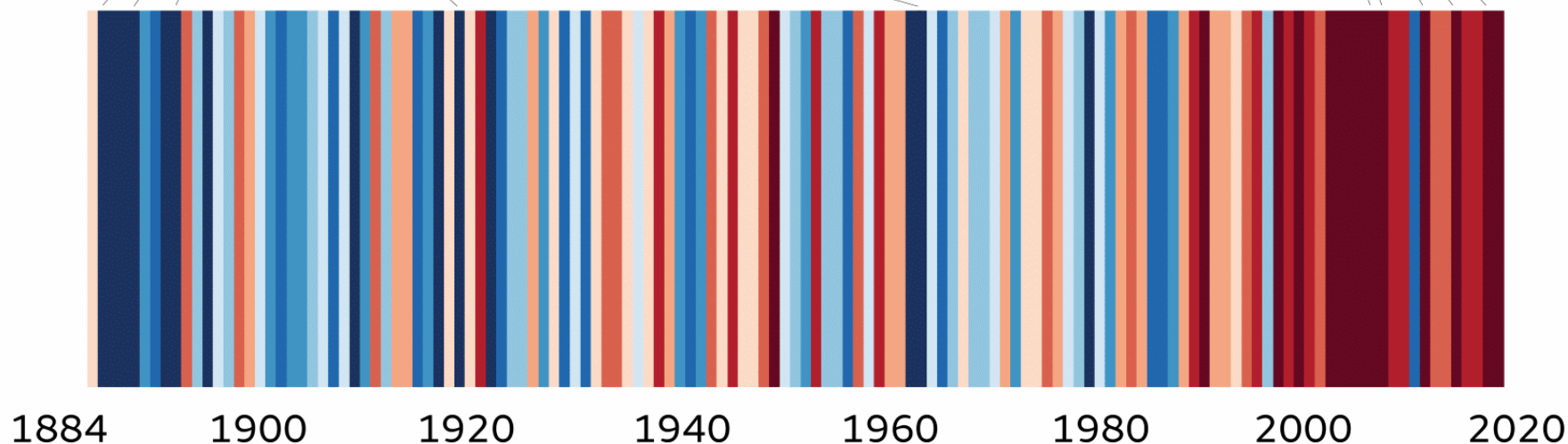
UK annual temperature

5 coolest years

1892, 1888, 1885, 1963, 1919

5 warmest years

2014, 2006, 2011, 2007, 2017

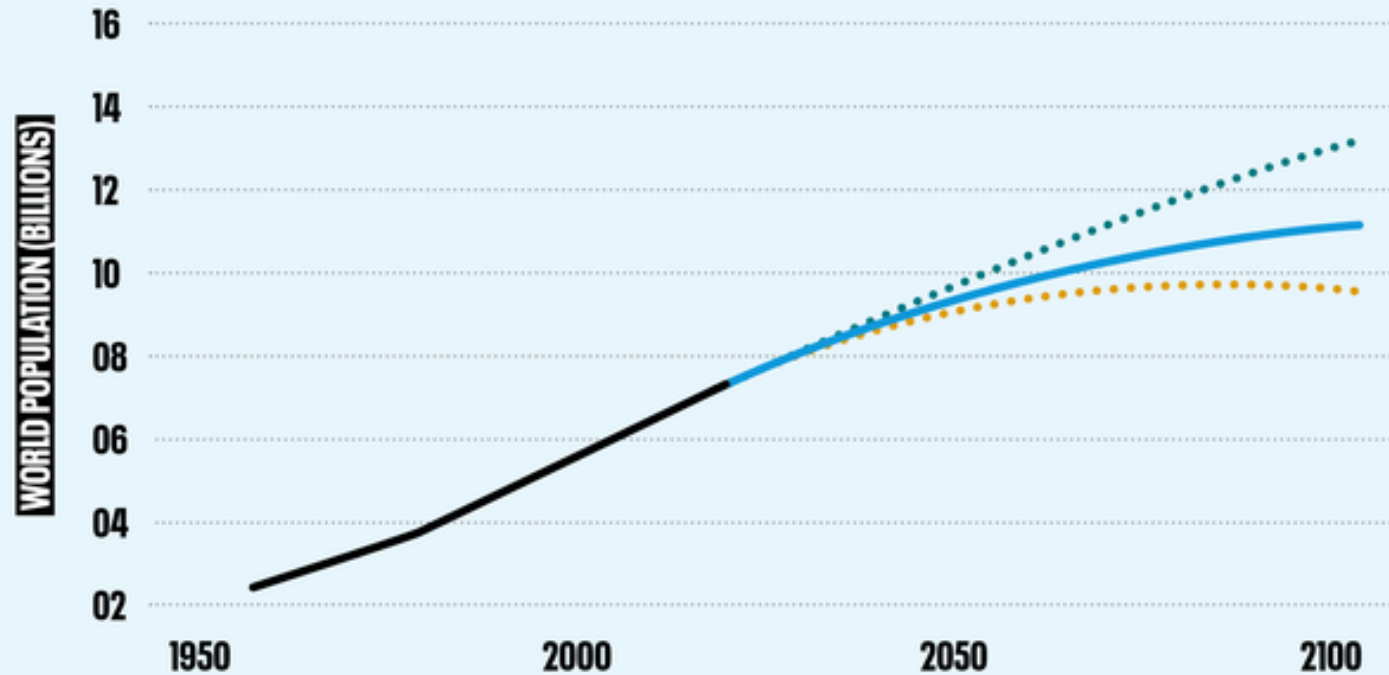


Resources are under pressure



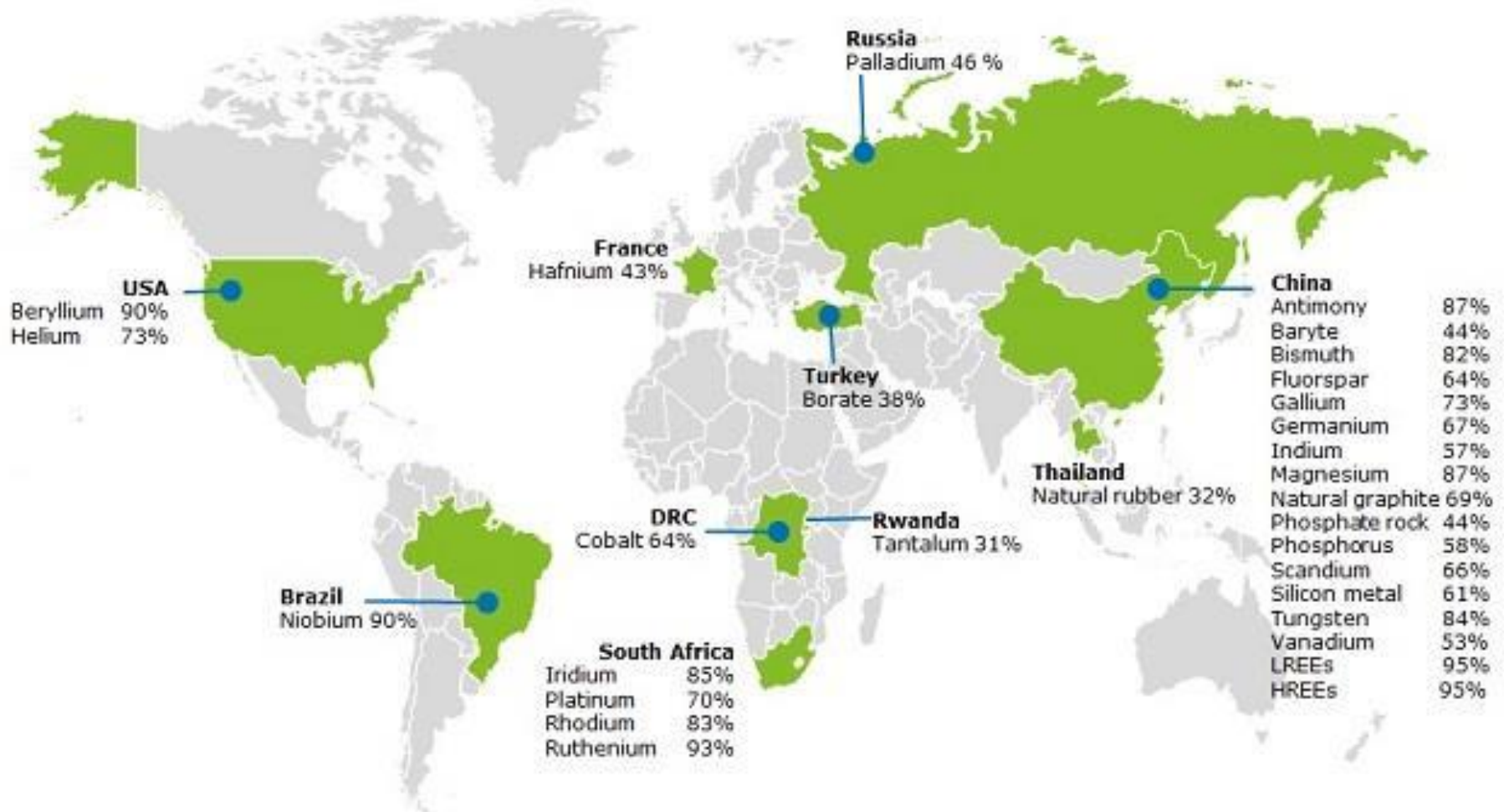
UNITED NATIONS POPULATION PROJECTIONS TO 2100: 95% CERTAINTY RANGE

 median projection



Source: United Nations World Population Prospects 2017

Increasing risk of access to resources



Source: http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

Price volatility

McKinsey Commodity Price Index
Nominal price index: Jan 1980 = 100



Source: http://www.iipnetwork.org/McKinsey_tool_commodities

Key impacts of the construction sector

The construction sector accounts for **50% of the UK's resource consumption**¹ with embodied and operational carbon from the sector accounting for **40%** of the country's total emissions².

At a national level construction now accounts for over **50% of our waste**³.

The sector plays a key role in Scotland's economy with its activities contributing **10% (£7 billion)** gross value added (GVA).

Construction employs around **10%**⁴ of the workforce.

1 Circular economy guidance for construction
economy principles at the project brief

2 Carbon impact of the built environment
Environment Waste Discover Data tool (waste
and demolition, 2017). 4 Profile

Digital Technology

The MGI Industry Digitisation Index for Europe

2015 or latest available data

Relatively low digitisation



Relatively high digitisation

● Digital disruptors within relatively less-digitized sectors



Sector	Overall digitisation	Assets		Usage		Labour			Share of value added, 2013 %	Share of employment, 2015 %
		Digital spending	Digital asset stock	Digital transactions	Digital interactions	Digitised business processes	Digital spend per worker	Digital capital deepening		
ICT									4.5	2.7
Media					1				1.2	1.1
Finance and insurance					1				5.4	3.0
Professional services									6.3	6.0
Wholesale trade									6.5	5.3
Advanced manufacturing									4.4	4.2
Chemicals and pharmaceuticals		2							1.9	2.3
Utilities									2.3	1.0
Oil and gas					4				0.2	0.1
Basic goods manufacturing					4				8.1	7.8
Mining									0.8	0.4
Real estate	●								12.1	1.0
Transportation and warehousing	●								5.0	5.2
Retail trade	●				3				4.4	8.8
Personal and local services									6.3	7.8
Government	●								6.5	7.1
Education	●								5.3	7.7
Health care	●								7.4	11.1
Entertainment and recreation	●								1.3	1.7
Hospitality									3.0	4.7
Agriculture		6							1.7	4.2
Construction									5.3	6.8

Cluster descriptions

- 1 Knowledge-intensive sectors that are highly digitised across most dimensions
- 2 Capital-intensive sectors with the potential to further digitise their physical assets
- 3 Service sectors with long tail of small firms having room to digitise customer transactions
- 4 B2B sectors with the potential to digitise their customer interactions
- 5 Labour-intensive sectors with the potential to provide digital tools to their workforce
- 6 Highly localised and fragmented sectors that lag across most dimensions

1 Value added as proxy for GDP; 15 countries used as proxy by EU-28.

2 EU-28.

NOTE: The level of sector digitisation measures digital assets, usage, and labour by sector. It does not refer to the intensity of digital competitive threat in a sector.

SOURCE: EU Klems; Eurostat; OECD; McKinsey Global Institute analysis

Key relevant policy drivers

- Climate Change (Scotland) Act 2009
- Extended Producer Responsibility
- Building Regulations
- *Making Things Last*, Scotland's Circular Economy Strategy
- *One Planet Prosperity*, SEPA Regulatory Strategy
- The Waste (Scotland) Regulations 2012 - targets/landfill bans
- Scottish Landfill Tax (SLfT)
- EU Construction and Demolition Waste Management Protocol
- 2 voluntary Procurement construction-related criteria
 - *EU GPP criteria for Office Building Design, Construction and Management*
 - *EU GPP criteria for Road Design, Construction and Maintenance.*
- ICE Demolition Protocol


Variable Economic value of waste



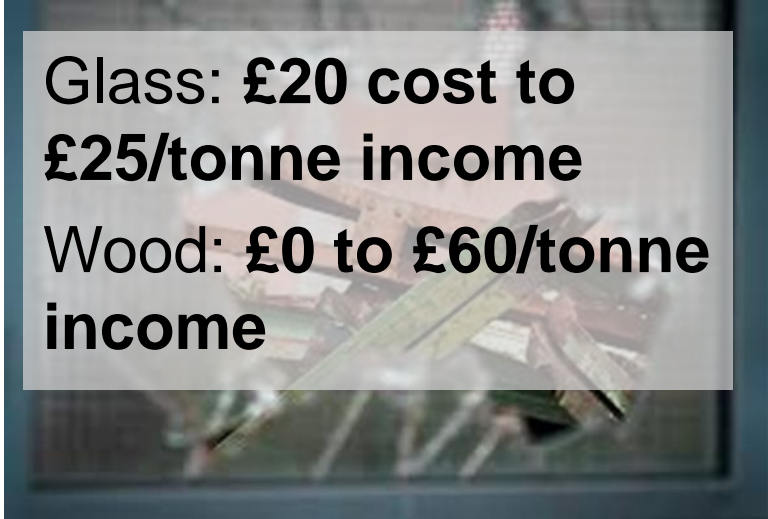
low grade (contaminated)
mixed plastic:
<£100/tonne cost

The image shows a large pile of low-grade, contaminated mixed plastic waste, including various colored plastic bags, bottles, and debris.

Segregated high grade
plastic: **£500/tonne
income**

The image shows a large pile of segregated high-grade plastic waste, consisting of uniform blue plastic granules.

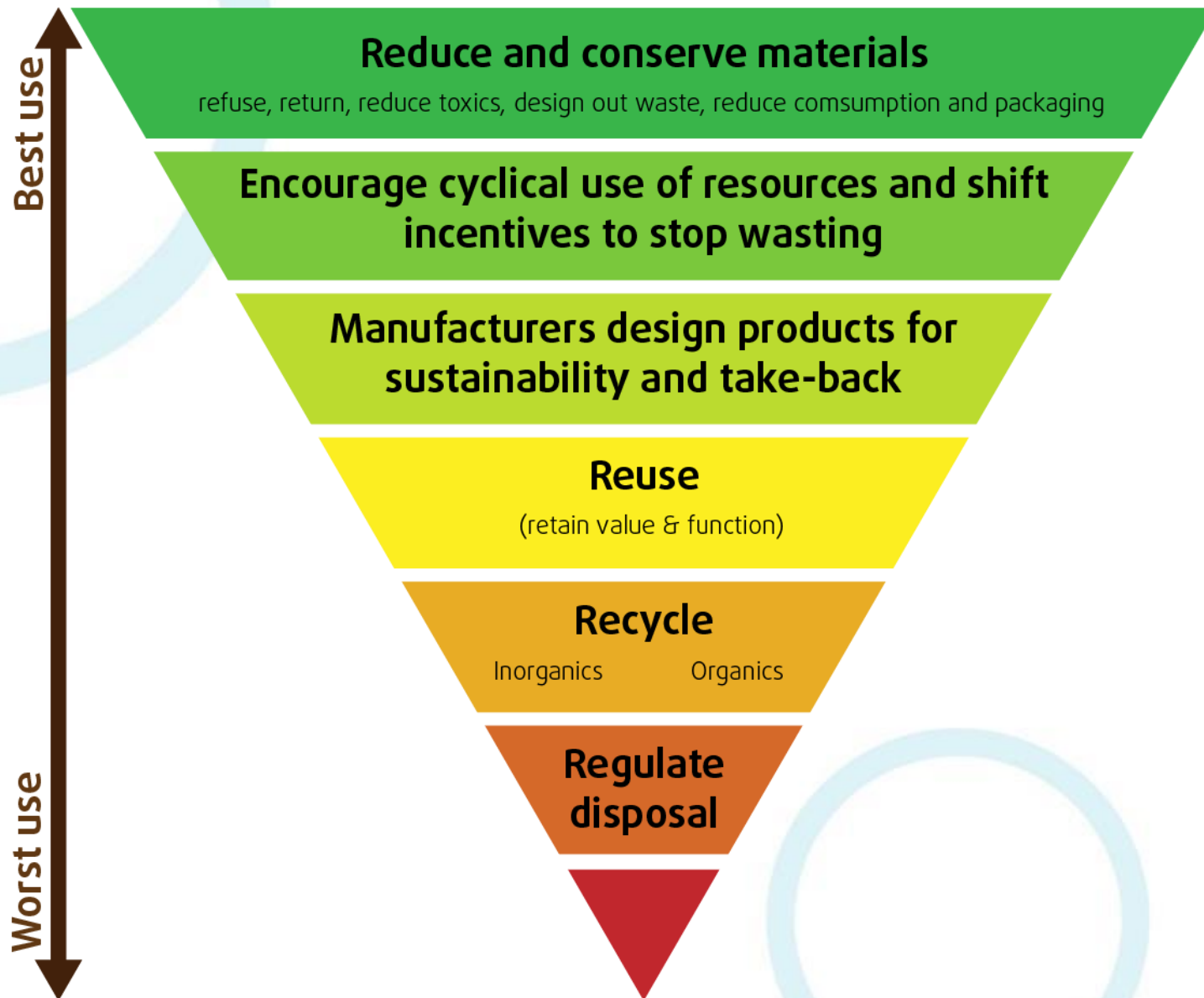
18/8 grade steel:
£880/tonne income
Scrap steel: **£100 to
£200/tonne income**

The image shows a large pile of scrap steel, including various sizes of metal pipes and structural components.

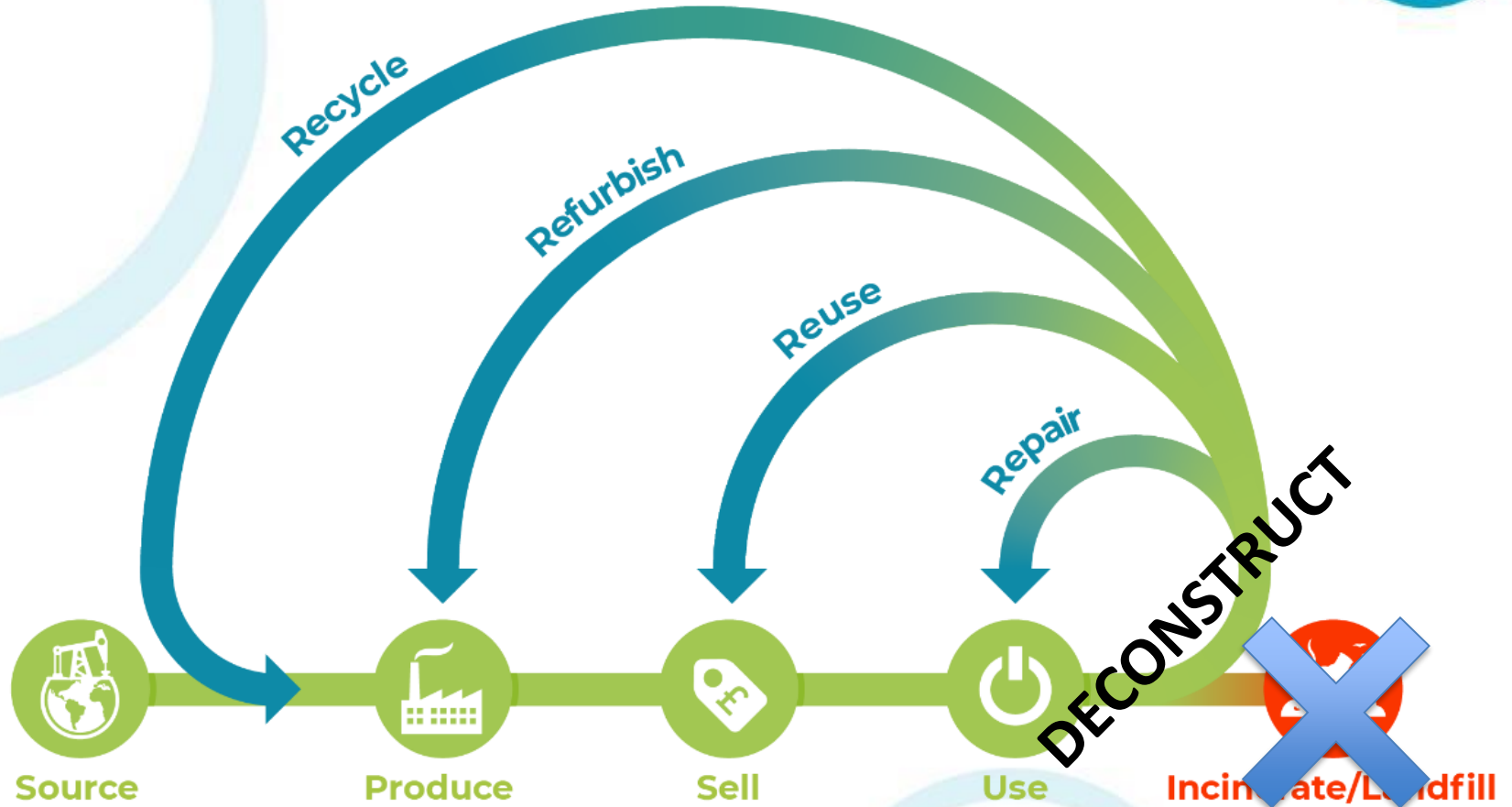
Glass: **£20 cost to
£25/tonne income**
Wood: **£0 to £60/tonne
income**

The image shows a pile of waste materials, including glass and wood, which are being processed for recycling.

Waste hierarchy



Circular economy



- create jobs
- reduce costs
- increase supply chain resilience

- improve economic stability
- decrease carbon footprints
- improve environmental quality

Basic principles

- Material selection (non-bonded, composite, renewable natural material, reused, recycled content, recyclable)
- Build for accessibility - maintenance, repair and refurb
- Design for longevity, flexibility, adaptability, low impact & healthy use
- Design for easy assembly, disassembly & recoverability
- Design out waste and design for resource efficiency



The Queens Park London Olympic Stadium used surplus gas pipeline for the structure and 104,000 tonnes of recycled crushed concrete for a temporary platform.

Design maintenance, repair or replacement



Locating services at skirting level behind cup and screw skirting



Floorboards held in place by screwed down strips



Installing windows with a good space tolerance allows them to be easily replaced

Progress to date



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[↻ Sign In](#)



- ☒ I am looking for...
- ☐ I have extra of...

Material: All Materials ▼

in: City or Postcode



Search

Construction Material Exchange

Search for surplus materials in your area



Materials for re-use

Do you have construction materials you don't need but don't want to pay for disposal? Post a listing to the Construction Materials Exchange to find someone who can make use of what you don't need.

Create an account today to start posting your materials.



[Create an Account](#)



Find a re-use match

Looking for construction materials that might be available for reuse in your area? Members of the Construction Materials Exchange can list material available as well as material needed.

Search the listings in your area, express interest & find a match.



[Search Material Listings](#)



Hints & tips

Finding a re-use match on the Construction Materials Exchange saves you landfill charges and helps to reduce waste, helping us all to contribute to a zero waste society for Scotland.

Want to know more on the tool and other related issues?



[Hints & Tips - Learn More](#)

Why register?

- ☒ Re-using materials can save you money by reducing waste management costs.
- ☒ Materials can be posted online and exchanged with another party for re-use.
- ☒ Re-using materials saves resources and minimises waste.
- ☒ Surplus material is re-used saving waste to landfill charges.
- ☒ Identify materials across multiple sites with a free Company Account.
- ☒ Generate reports on materials re-used.



Need to talk to someone?

Call us during office hours on:

0808 808 2268

No matches?

Check out the [Recycling & Re-use Directory](#) for more re-use information.



Search Material Listings



Aggregate (0)



Bricks and Concrete (1)



Glass (0)



Miscellaneous (0)



Packaging (0)



Paint (0)



Pallets (0)



Pipes and Cables (0)



Plaster and Gypsum (0)



Slates and Tiles (0)



Soil (1)



Wood (0)

Maximising re-use of onsite materials



About this guide

Project types covered

Legal requirements

Re-use opportunities

Challenges & solutions

Case studies

3

Benefits of Re-use

Re-using site won materials can play a key role in saving costs on a project by avoiding use of building materials and reducing waste disposal costs.

Seizing opportunities to re-use materials on-site can lead to a more cost efficient project outcome with improved performance for contractors and clients. Key benefits that adopting re-use on-site can deliver, include:

- Reduced waste disposal costs covering both transportation and disposal;
- Avoidance of primary material use reducing cost of build;
- Evidence to support external and internal environmental management systems e.g. BREEAM or ISO14001;
- Raised staff awareness of re-use opportunities for future projects; and
- Good publicity and industry recognition for achievements and potential to differentiate your business from the competition.

This guide highlights key materials and practices that can support a business plan and implement re-use of materials arising on construction sites.

Cost savings associated with re-use of site won materials can include:

- Reduced need to purchase new materials: cost savings associated with recovery and re-use of items from demolition, e.g. bricks, ornamental objects, high value materials;
- Savings from reduced waste management costs; and
- Positive publicity, e.g. contribution to local community projects or wider national community / sustainability initiatives.



Target audience

Although this guide has been specifically written for small and medium-sized enterprises (SMEs) who work independently on projects or who provide supply chain services to large contractors, it may also be applicable to larger organisations.

It is recognised that SMEs will be part of the wider project supply chain and this guide is aimed at all parties that might influence non-SMEs and others to re-use materials. Figure 1 gives an indication of the relationships and opportunities within a construction project.

Client

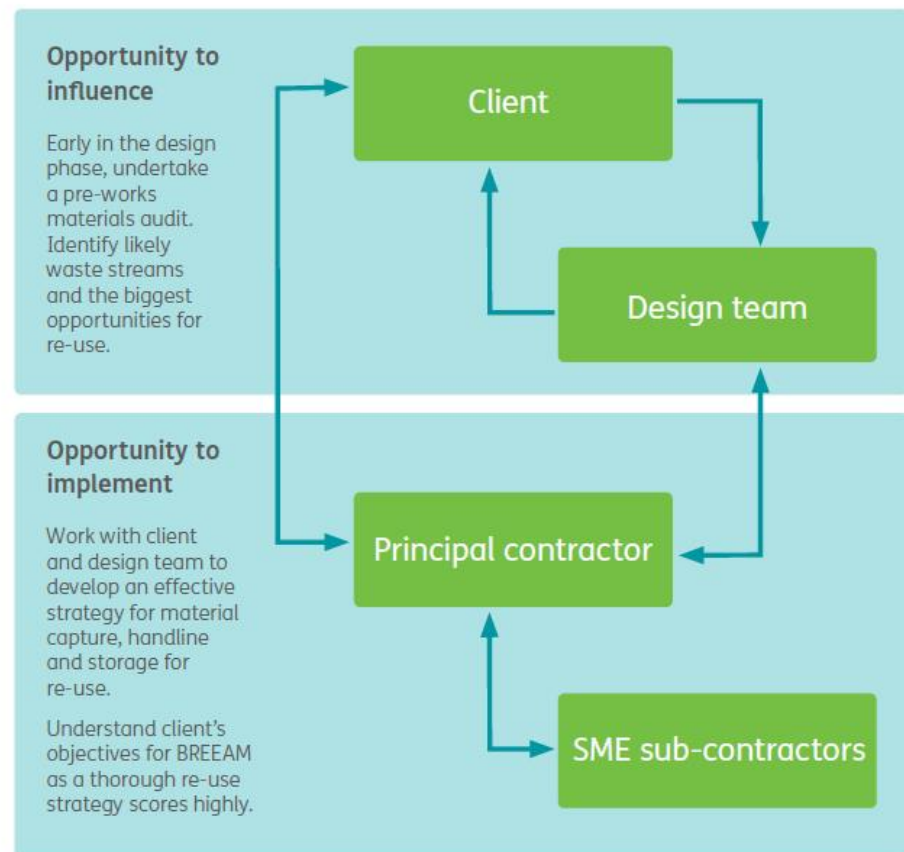
The client has an important role in driving material re-use and should understand the environmental benefits and financial savings that can be achieved through maximising re-use of site won materials. This guide will support the SME to help influence the client to identify the possibilities of re-use, and the true value of existing infrastructure and materials on-site.

Typically, taking action on reducing waste in projects can result in savings of up to 2% of the total construction project value. Addressing re-use opportunities is one of the key actions in achieving these savings and as such clients can help by introducing re-use targets on projects and using model procurement wording.

Design team

This guide contains examples of materials that frequently arise on construction sites during works, provides high level data to raise awareness of practical approaches to maximise material re-use and offers guidance for

Figure 1: Project relationships and opportunities





RIAS

Awards 2020



To be shortlisted for this award the project must demonstrate the following:

- 1) A collaborative approach has been taken by the client and design team to deliver a low embodied carbon building, ideally including contractors at an early stage
- 2) The design and procurement approach should have taken in to account the whole life cost (value) of the building throughout its decision-making, ideally including its future maintenance, repair, retrofit and deconstruction, and its influence on other society costs
- 3) The design should have taken into account the health and wellbeing of the occupants

In addition the design should have a strong focus on at least one of the following design objectives:

- Deconstructability
- Adaptability
- Long life/loose fit
- Lean/resource efficiency
- Design out waste
- Natural, healthy materials
- Carbon sequestration
- Design for material banks
- Use of recycled materials
- Use of pre-used or surplus materials
- The use and consideration of the "layers" concept.

A Project will also be given special consideration if in addition to the above it:

- Involved the use of BIM or other digital technology to reduce waste,
- Used modern methods of construction (off-site) or modularisation
- Incorporated best practice site waste management planning throughout the project
- Involved the use of sustainable procurement clauses or delivery mechanisms (eg leasing)
- It is not an isolated one off build but the design, ways of working and lessons learnt have the potential to be replicated across Scotland

Designing Out Construction Waste

A guide for project design teams



European Union



gov.scot

EUROPE & SCOTLAND

European Regional Development Fund
Investing in a Smart, Sustainable and Inclusive Future

Procuring Resource Efficient Construction Projects Guide

Procuring Resource Efficient Construction Projects



Growth that doesn't cost the earth

Model procurement wording for public and private sector clients and contractors on construction projects



ACTION	Client Action – Strategy & Objectives	Procurement Clause – Strategic Brief/ Market engagement
	<p>series of procurement questions/ specification requirements that may be relevant.</p> <ul style="list-style-type: none"> Embedding of circular economy outcomes in procurement of infrastructure projects is increasingly being addressed. This includes a White Paper from the Major Infrastructure – Resource Optimisation Group (MI-ROG).²⁷ 	
Public Sector Clients	<p>The Procurement Reform (Scotland) Act 2014 applies to regulated procurements including framework agreements above financial thresholds of £50,000 for public goods and service contracts and £2,000,000 for Works contracts. The Sustainable Procurement Duty requires obligated public bodies to consider improving economic, social and environmental wellbeing and reducing inequality in their area, involving Small and Medium sized enterprises and Third sector bodies including supported businesses while promoting innovation. There may for example be opportunities for innovative waste reduction, recycling or re-use solutions, which may provide Community Benefits through the involvement of SMEs and Third sector organisations and related training and skills.</p> <p>The link from National Outcomes to organisational strategic objectives, those that are relevant to the procurement of construction projects to relevant procurement requirements which are then monitored and reported informs a project's intended outcomes and helps relevant reporting requirements, such as the Climate Change Reporting Duties. This includes a focus on waste reduction, re-use and recovery.</p>	

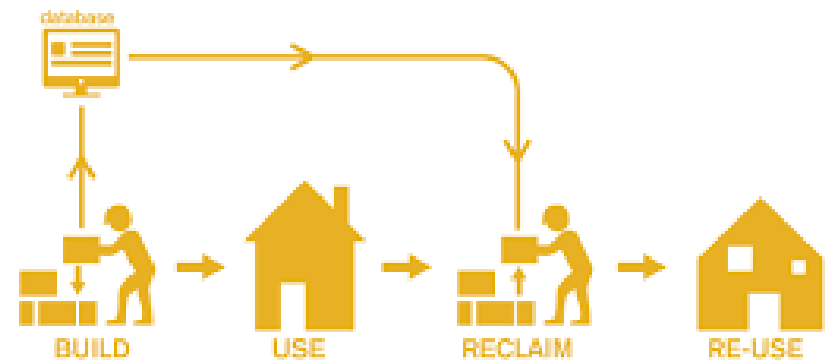
ACTION	Client Action - Outcomes	Procurement Clause – Advertising/Contract Notice
ACTION 2 PREPARATION & BRIEF	<p>Development of project objectives and intended outcomes takes place at this stage, so that you are able to clearly articulate these to the market in Advertising, Prior Information Notices and Contract Notices, as relevant.</p> <p>Consideration of waste reduction, re-use and recovery targets and KPIs will help inform the appropriate focus within design of the project/site and facilities. This includes agreeing the scope of Whole Life Costs beyond initial purchase price. Encouraging the use of the Designing Out Waste</p>	<p>"The Contracting Authority has included obligations within the specification and contract conditions relating to environmental matters including the (delete if not applicable):</p> <ul style="list-style-type: none"> use of the Demolition Protocol, Refurbishment Survey (or equivalent), with considered deconstruction in a way that maximising reclamation and re-usability of material which are relevant to the service to be delivered; (where applicable) design for deconstruction and flexibility of the building which is relevant to the service to be delivered; (where applicable) use of recycled aggregates, materials or building products which are relevant to the service to be delivered; the use of closed loop remanufacturing schemes where products can be refurbished or remanufactured at end of first life, which are relevant to the service to be delivered; forecast waste quantities and re-used and recycled content and set and agree targets for waste reduction from an early design stage (for instance

Buildings as Material Banks



BAMB
BUILDINGS AS MATERIAL BANKS

<https://www.bamb2020.eu/>



BUILDINGS AS MATERIAL BANKS

Online tools and guides

- [Measuring, monitoring and reducing waste](#) – Site Waste Management Plan
- [Maximizing re-use](#) - identify materials commonly wasted
- [Procuring resource efficient projects](#) – Construction Procurement Guide
- [Designing out waste](#) – our guide developed for design teams

Thank you.

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