

Sustainable by Design

Specifying and procuring reclaimed materials
and components



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Introduction – Key Messages

- It is possible, and vital to cut construction CO₂
- But less is being specified and procured than in the past
- Government and industry changes are needed
- And there are ways in which we can lead and support increased reclamation and reuse now.

Difference between reuse and recycling?

Reuse a whole brick (high value product)

or

Recycle into aggregate (low value material)

Pushing Reuse 2009

2.1.1 *An example of reuse*

A brick wall built with lime mortar is carefully taken apart by hand and the old bricks are cleaned by hand and stacked on pallets ready for reuse as reclaimed bricks to create a new reclaimed brick wall. In this instance the advantages of reuse would be:

- the embodied energy of the brick would be saved,
- the environmental impacts of disposing of the brick would be reduced to almost nil
- the environmental impacts of creating a new brick would not be incurred.

2.1.2 *An example of recycling*

An old brick wall is knocked down to ground level using a machine, with the broken brick then being crushed and screened in a mechanical crusher to create an aggregate substitute. In this instance the disadvantages of recycling would be:

- the high embodied energy of the bricks would be lost, although some low embodied energy recycled aggregate would be created (i.e. "downcycling" would take place)
- the environmental impacts of recycling the bricks would be the carbon emitted and water used in crushing and screening the bricks
- the environmental impacts of creating new bricks (mainly extraction, water use, fossil fuel and some pollution) would need to be accounted for since the potential reclaimed brick was lost due to recycling.

salvo

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Specify to Reclaim

Reclamation Led Approach to Demolition



A report by **BioRegional Development Group**

July 2007

Plan: Reclamation Audit

Examples: We can do it.

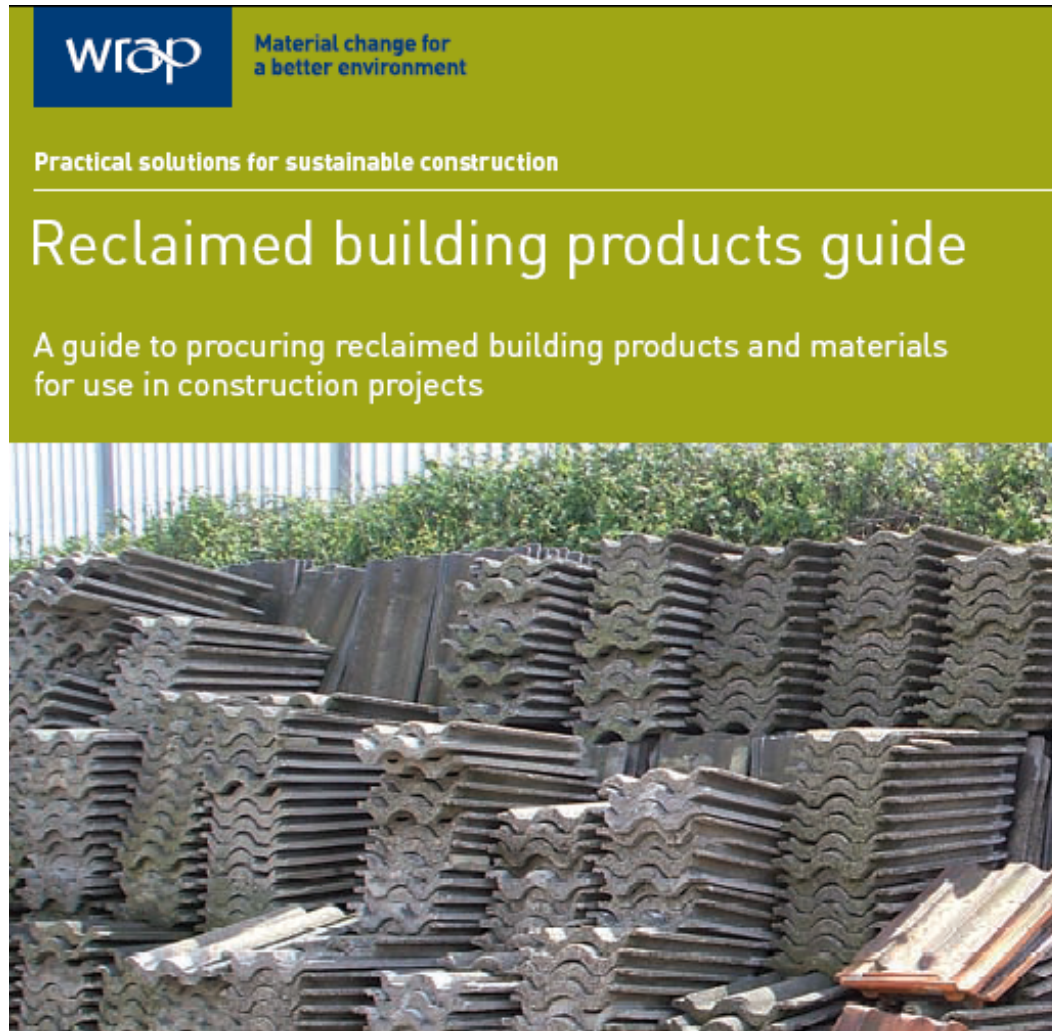
Require it: Contract,
Client, Champion

Time & Space: Yard

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Specify to Reuse



Why: Heritage, Carbon

What: Brick/inerts, timber, steel, fixtures and fittings

Case Studies

Suppliers: Salvage yards and reuse centres

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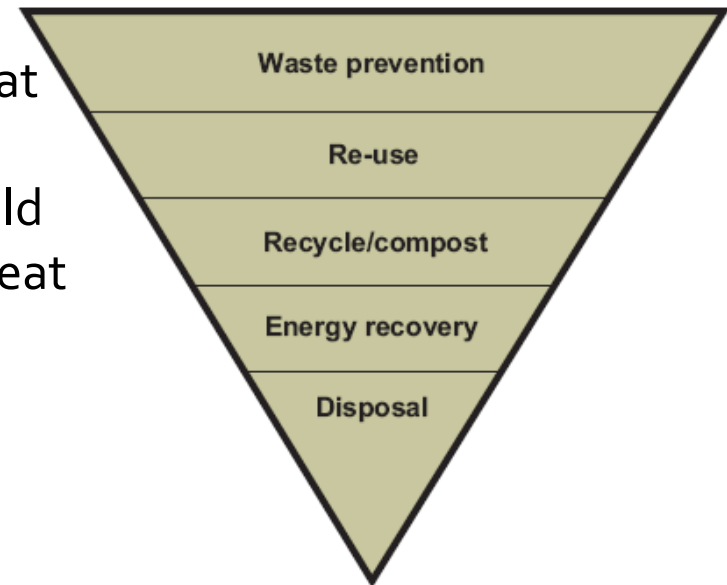
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UK Waste Hierarchy

Defra Waste Strategy:

As a society, we are consuming natural resources at an unsustainable rate. If every country consumed natural resources at the rate the UK does, we would need three planets to live on. The most crucial threat is from dangerous climate change. Our goal is to make the transition towards what the WWF and BioRegional call '**One Planet Living**'.

Now required to be enforced as part of the EU Waste Framework Directive agreed in December 08.



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Why: UK Annual construction sector stats

Total waste arisings from construction and demolition is 120m tonnes ¹

Of which reusable amount is 13m tonnes ²

1998: Amount reused was 2.9m tonnes ³

2007: Amount reused fell to 2.2m tonnes ⁴

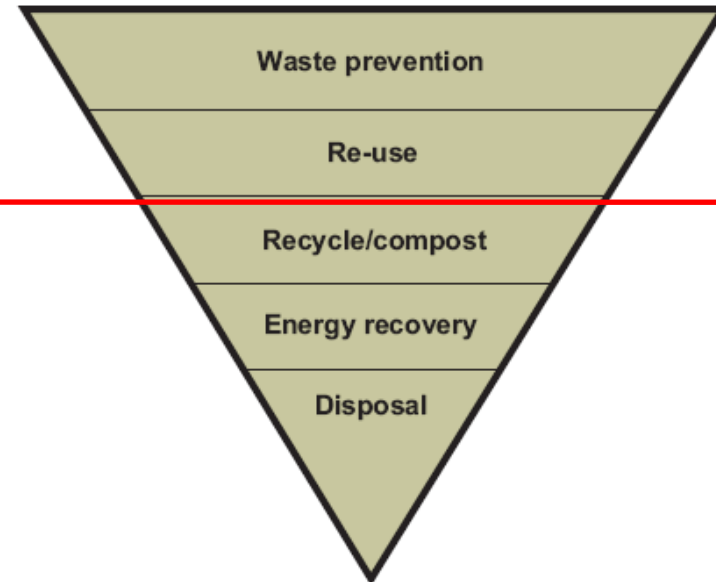
1. BRE Smartwaste stats

2. Salvo estimate

3. BigREc Survey 1998

4. BigREc Survey 2007

Current mainstream practice



“down-cycling”



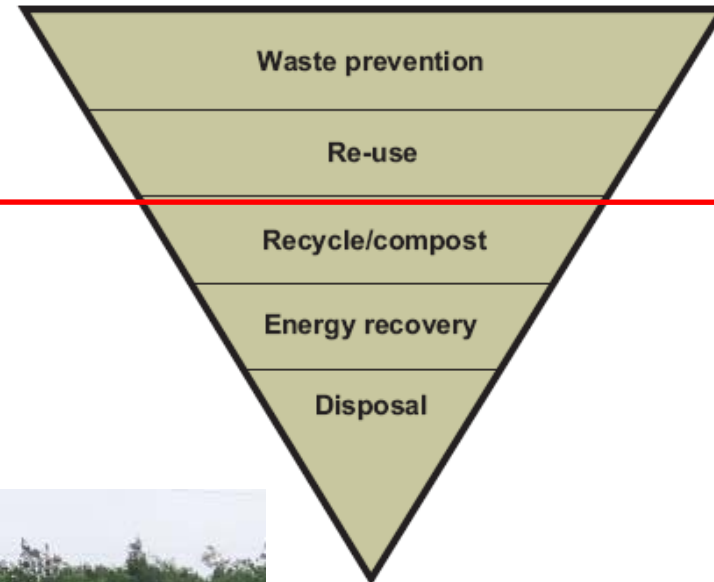
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Starting at the Top

Reclamation hierarchy for demolition materials

1. Minimise demolition waste
2. Re-use on site
3. Re-use off site
4. Recycle
5. Energy from waste
6. Landfill



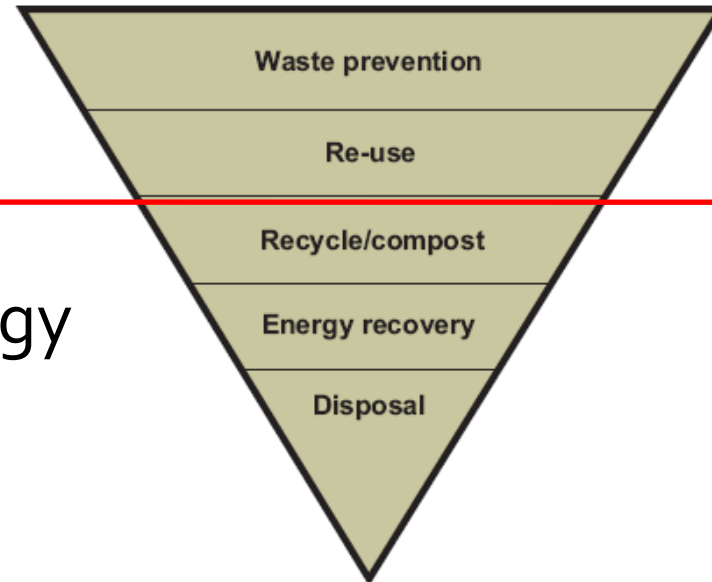
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Why Prioritise Reuse?

Saves energy + waste

Lower quality and less energy recovered. More waste.



"Reclamation and reuse helps reduce climate impact not just reduce waste to landfill."

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Framework

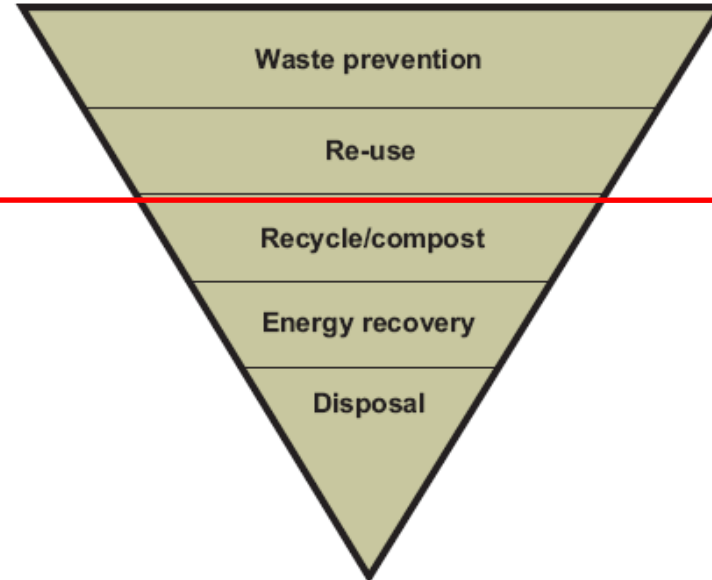
The waste hierarchy: Directive 2008

1. The following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy:
 - (a) prevention;
 - (b) preparing for re-use; **This is reclamation**
 - (c) recycling;
 - (d) other recovery, e.g. energy recovery; and
 - (e) disposal.

Why Reclaim? - the "negatonne"

Prevent problem before

throwing resources away.



"Only way to halve carbon and waste thrown away is to halve waste. Caretakers waste less!"

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Comparing Reuse and Crushing: Bricks

- Embodied Energy = 878 kg CO₂ / tonne (BRE, value for old reclaimed bricks) or 210 kgCO₂/ tonne (figure for new bricks in the UK).
- Crushed for reuse – replaces virgin material and saves 16 kg CO₂ / tonne as hardcore
- Reclaiming saves product and its embodied energy
- Helps reduce embodied carbon of new construction

Reclaimed Bricks – bucking the trend

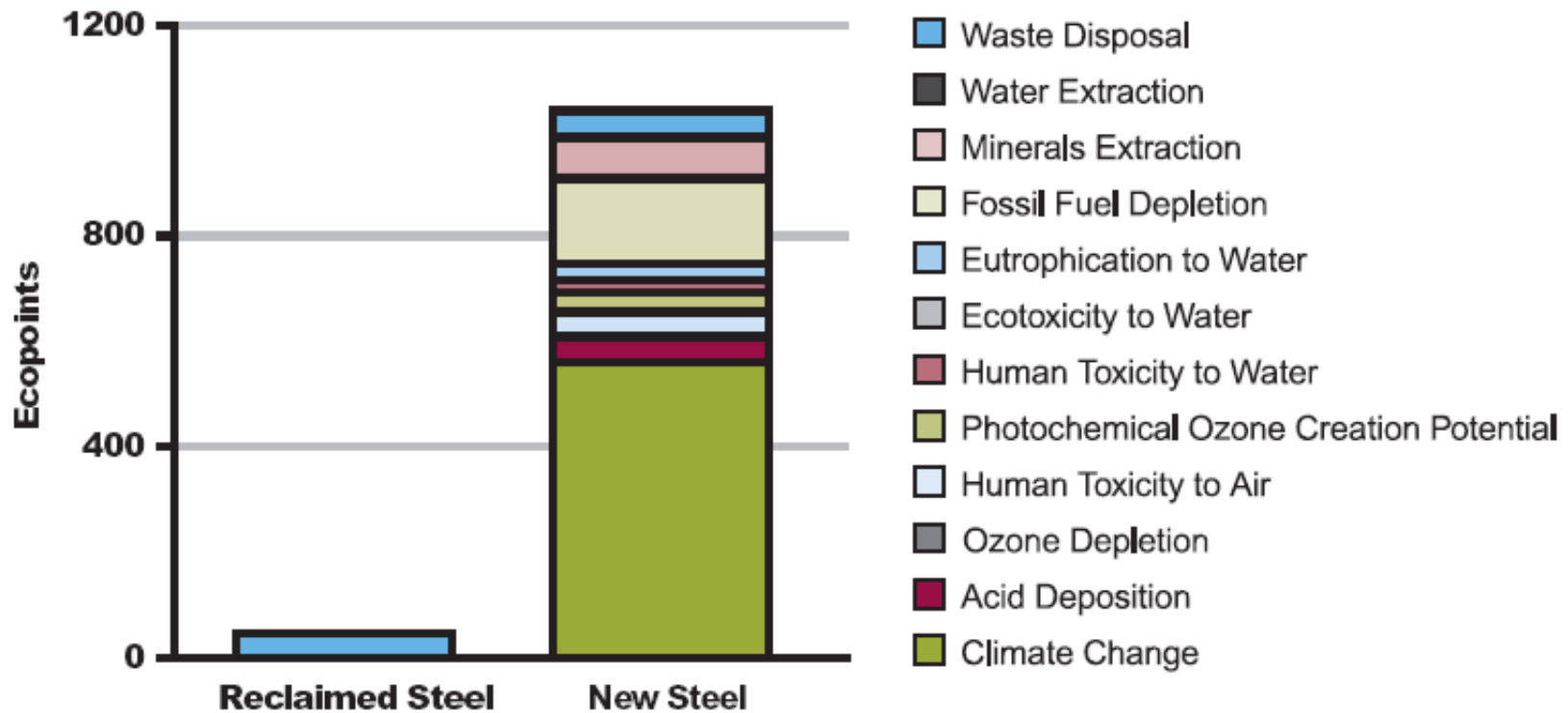
The total volume of all materials reclaimed fell by 30 per cent between 1998 and 2007, with a loss of 20,000 jobs.

But the amount of bricks reclaimed increased by 100 per cent. This is quite a success story.

3 billion bricks a year. 300 million (10%) reclaimed in 2007

Saved 189,000 tonnes CO₂ (17 bricks = 1 gallon of petrol)

Environmental benefits: Steel Reuse



Bar chart showing the 96% environmental impact saving by reclaiming and reusing steel sections

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Case Study: Steel Frame Building Reuse



Careful dismantling and disassembly



Building prior to demolition



Cladding panels



Source: WRAP Reclaimed Building Product Guide

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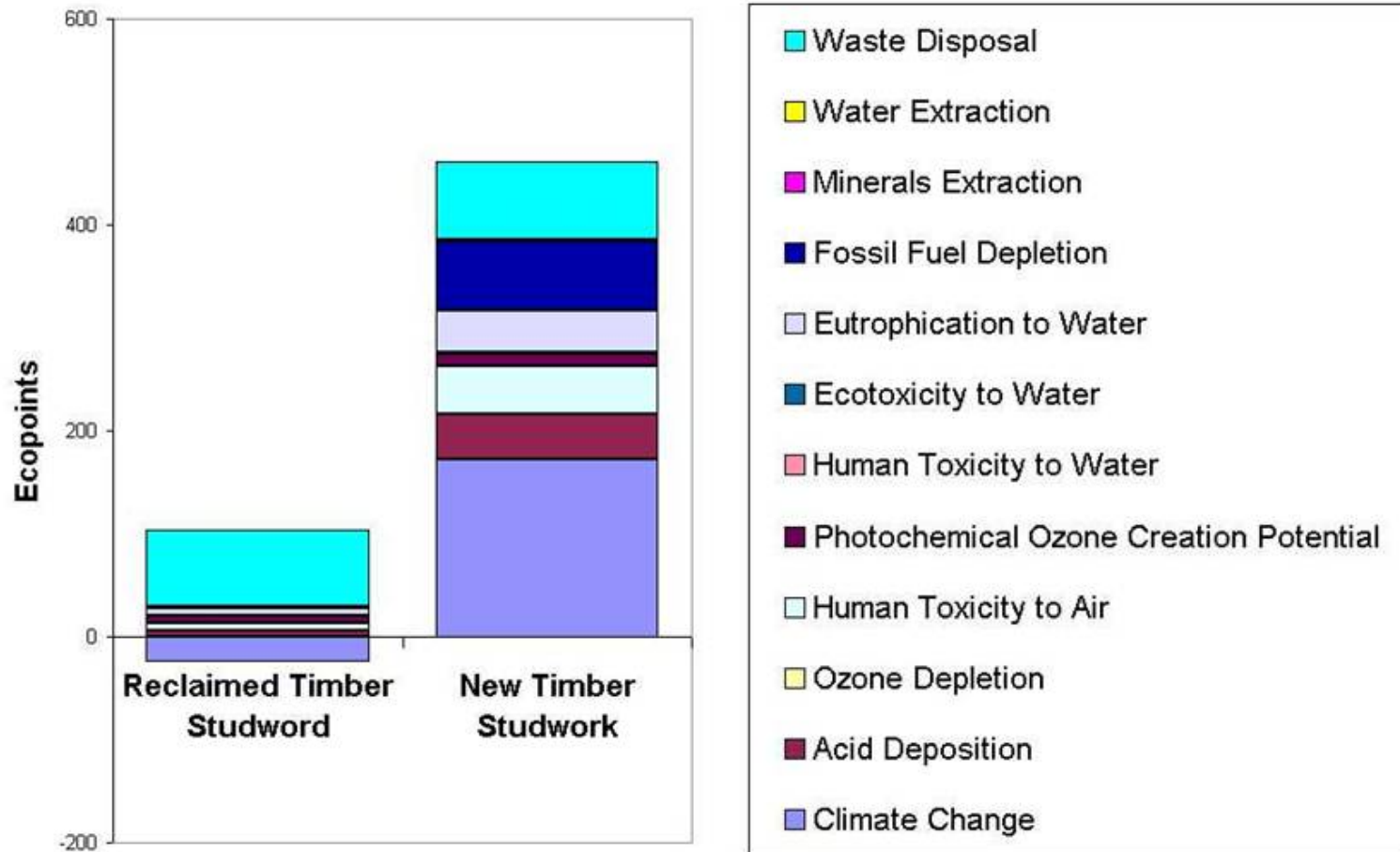
Saving steel beams saves more carbon

- The amount of steel sections reused in the past 10 years in the UK has reduced. The overall amount of construction product reuse has fallen by 25% in the 10 years up to 2007.
- If half the reclaimable steel was reclaimed (as per case study) than we would save 100,000 CO₂ emissions each year – equivalent of taking 29,000 cars off the road.

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Environmental Benefits: Timber reuse



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An unusual example of failure to reuse was the 7,000 tonnes of new softwood timber washed on to beaches of southern England in 2008 which was perfectly reusable but was prevented from being reused by Receiver of Wrecks and ended being burned. A similar event with a large amount of new timber occurred in 2009 on the Kent coast.



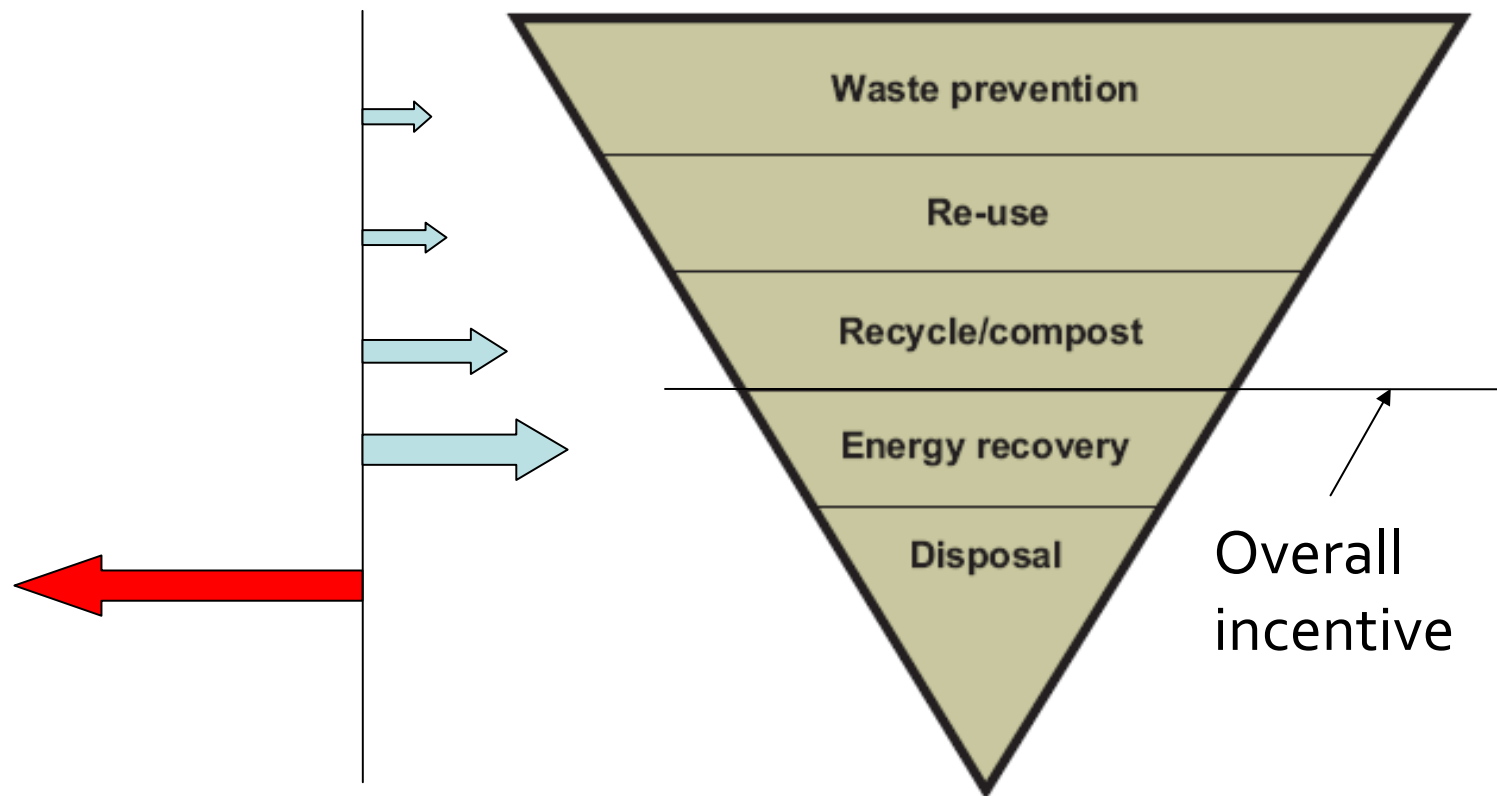
Less timber reused: a lost opportunity

- **Much Less Reuse.** The timber reused in UK fell by 250,000 tonnes in 10 years until 2007.
- **Special. We** burn elm floorboards we used to reuse, for which there is no option to buy new.
- **New enterprises not plugging the gap.** 20+ wood recycling not-for-profit enterprises reuse 0.4% of this.
- **Wasted carbon.** The carbon saved by reuse (reducing need for virgin timber) is over 2x carb on saving from a energy-from-waste plant.

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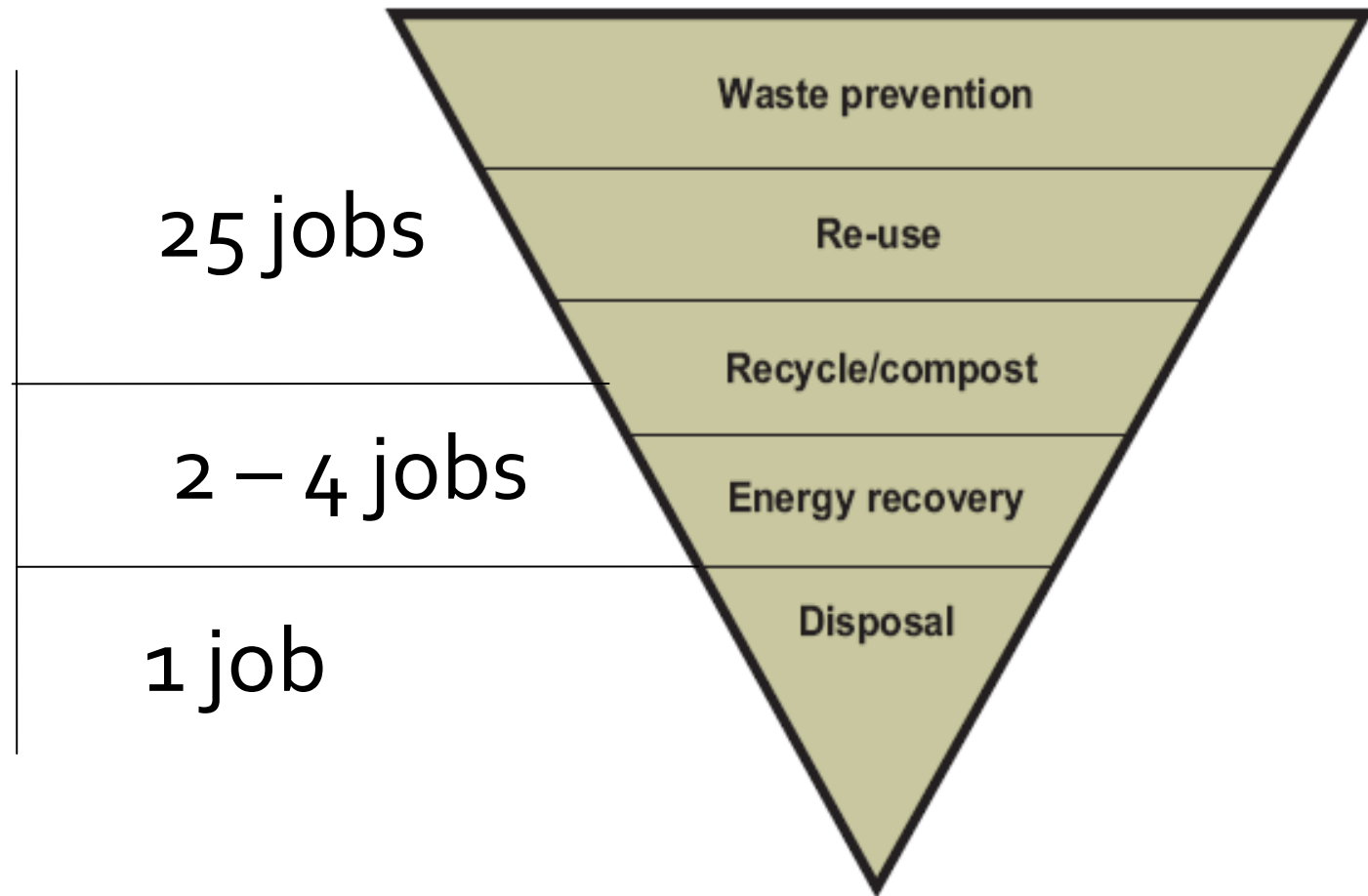
Current drivers incentivise biomass



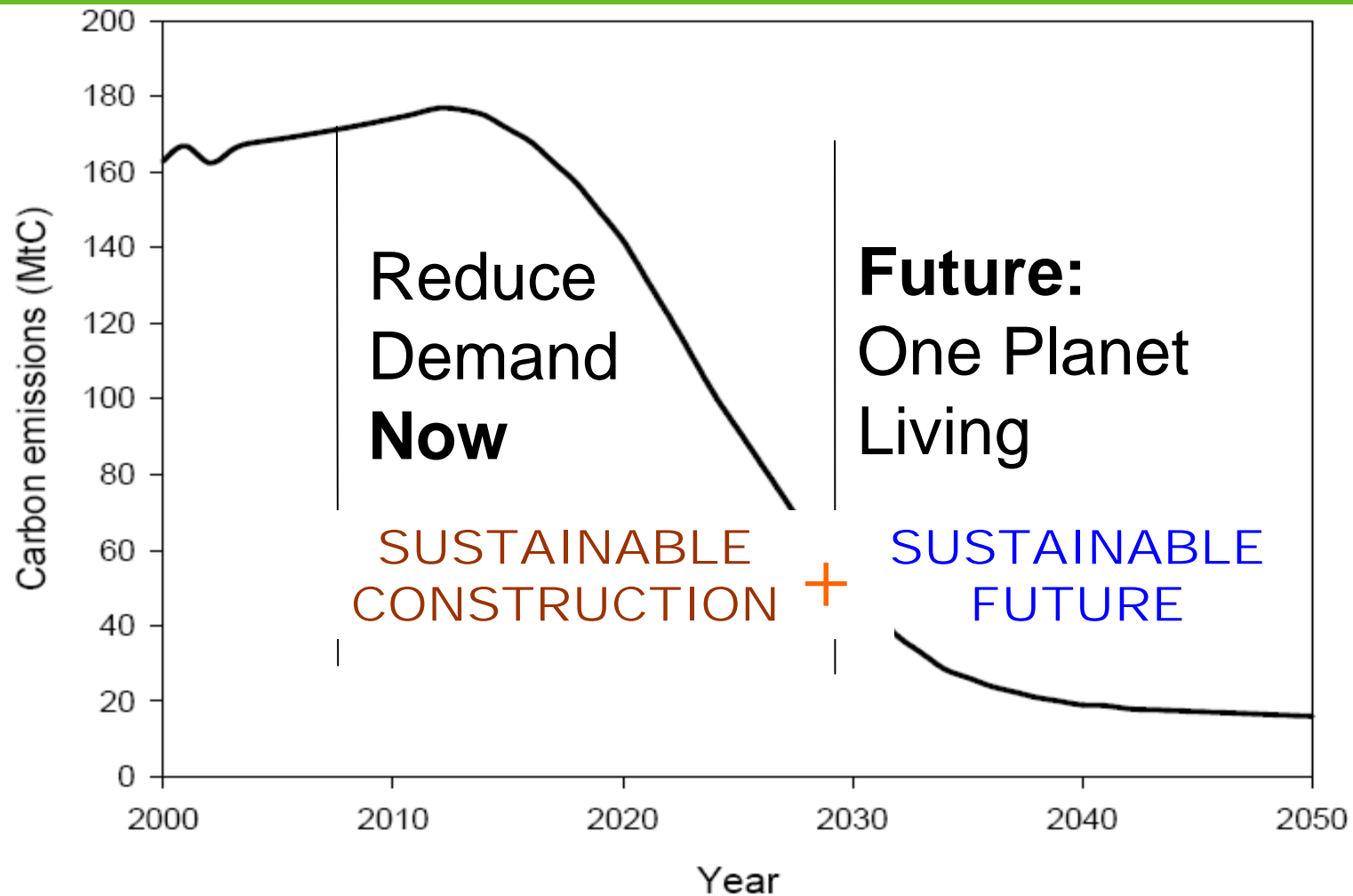
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Reuse would create new jobs



SUSTAINABLE DEVELOPMENT =



Source: Adapted from Tyndall Centre, 2006.

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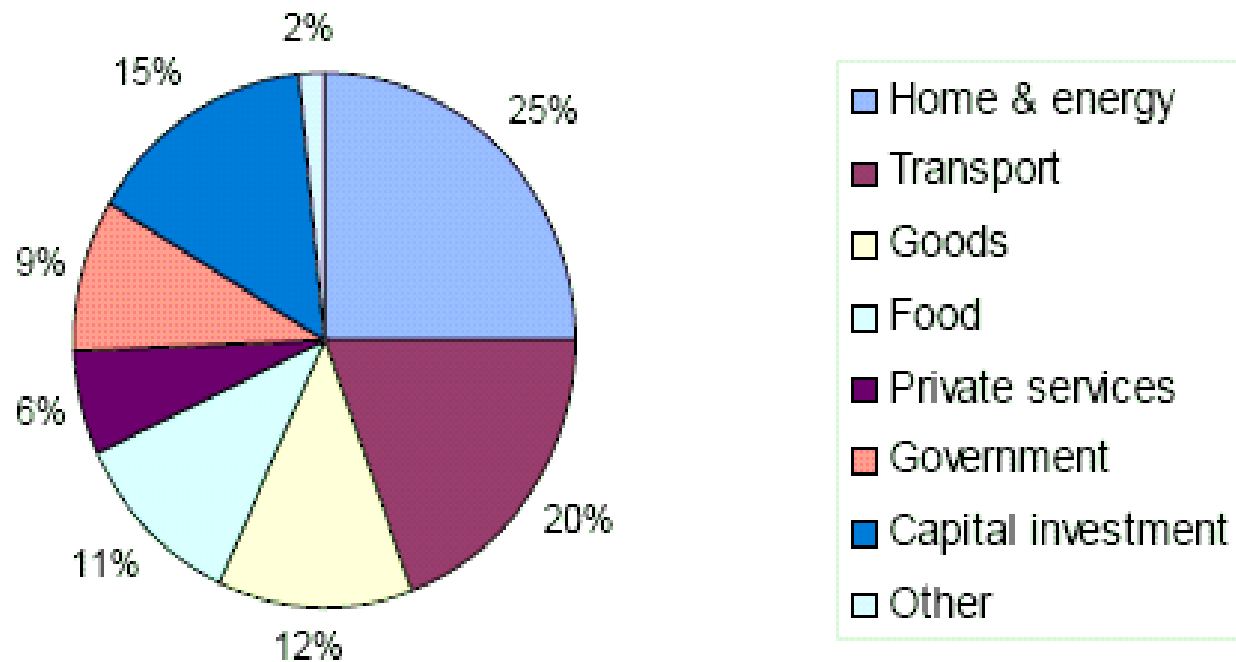
Lower Carbon in Use - Low Carbon Living?
What Carbon to Build - Sustainable Construction?

Construction Sector responsible for both of these



UK Carbon Footprint of Construction

Greenhouse gases (t CO₂e/cap)

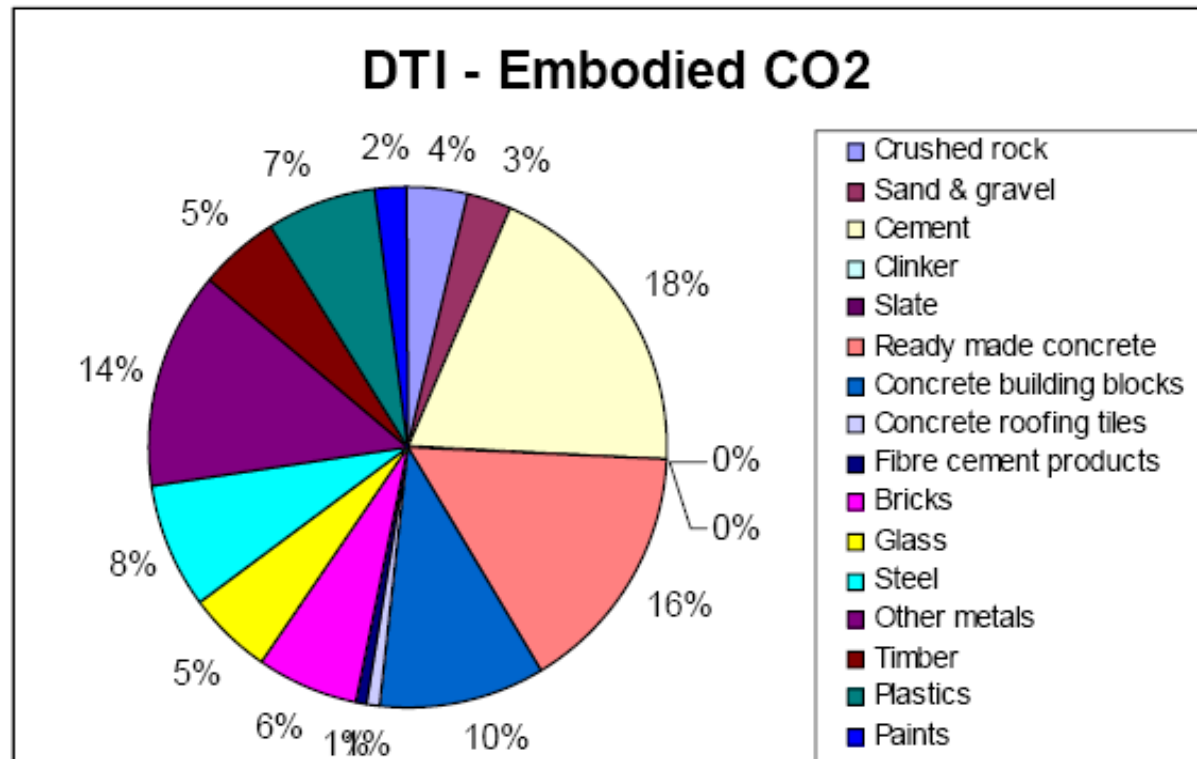


- Capital Expenditure is 12% UK CO₂ emissions.
- 46% construction industry spend is repair/maintenance

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UK Carbon Footprint of Construction

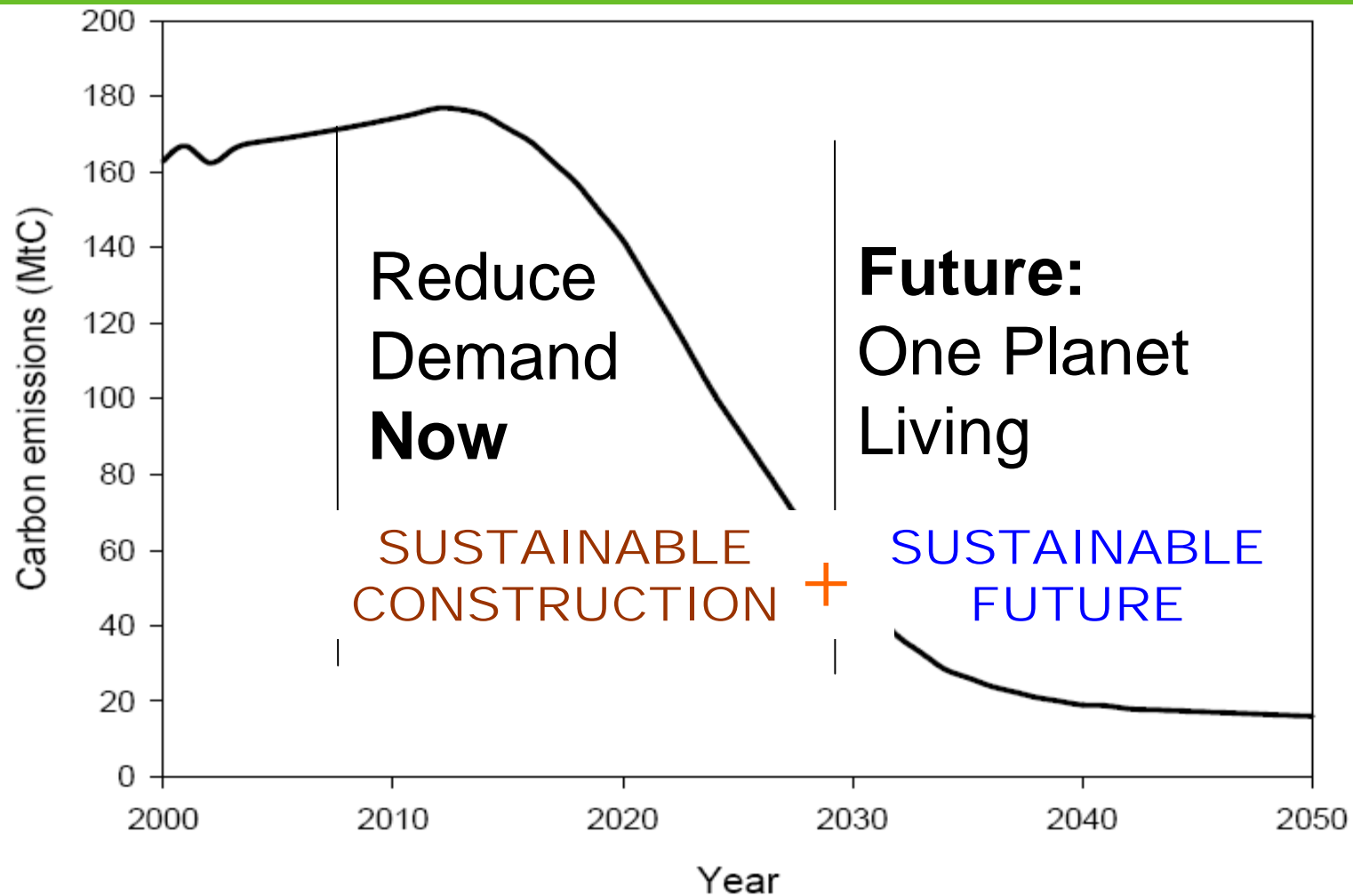


- 328 million tonnes of materials
- 70 million tonnes of CO2
- 13% UK reported CO2 emissions

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SUSTAINABLE DEVELOPMENT =



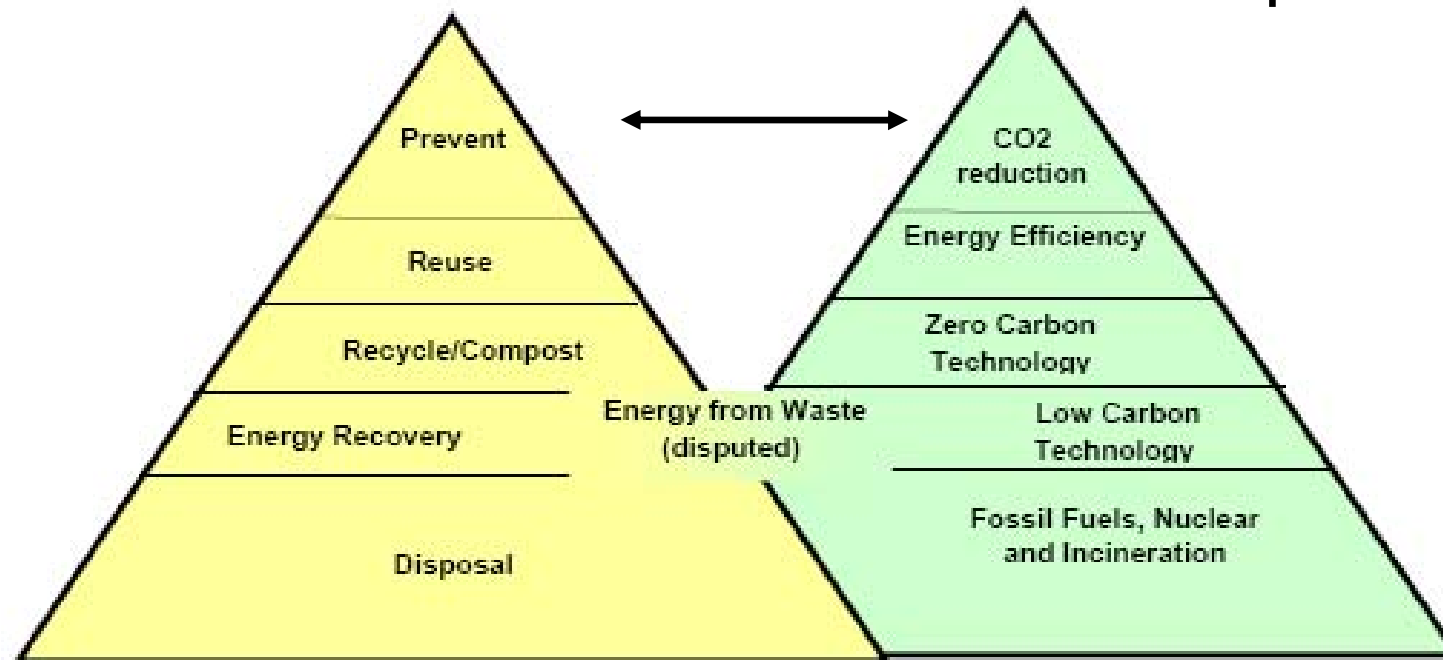
Source: Adapted from Tyndall Centre, 2006.

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Current: Wasteful Society

MATERIALS to build and CO₂ in use - separated



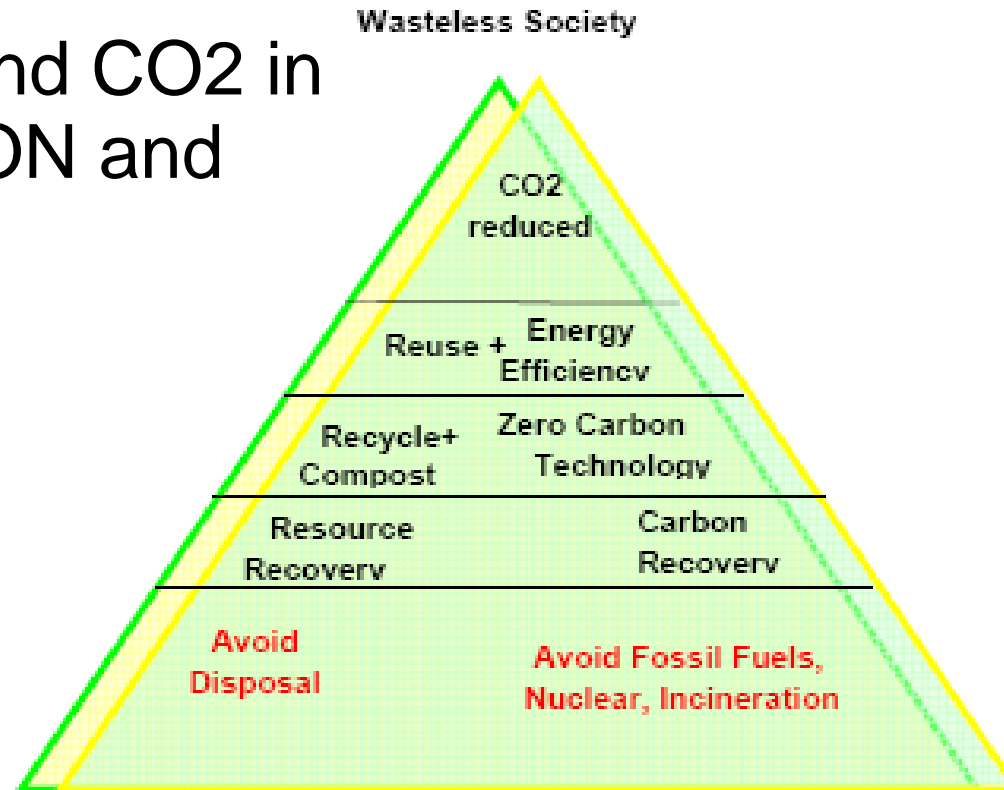
Less waste to landfill but ecological footprint continues to increase. Carbon sinks are lost and CO₂ emissions also continue to rise.

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Future: Wasteless Society

MATERIALS and CO2 in
CONSTRUCTION and
USE.

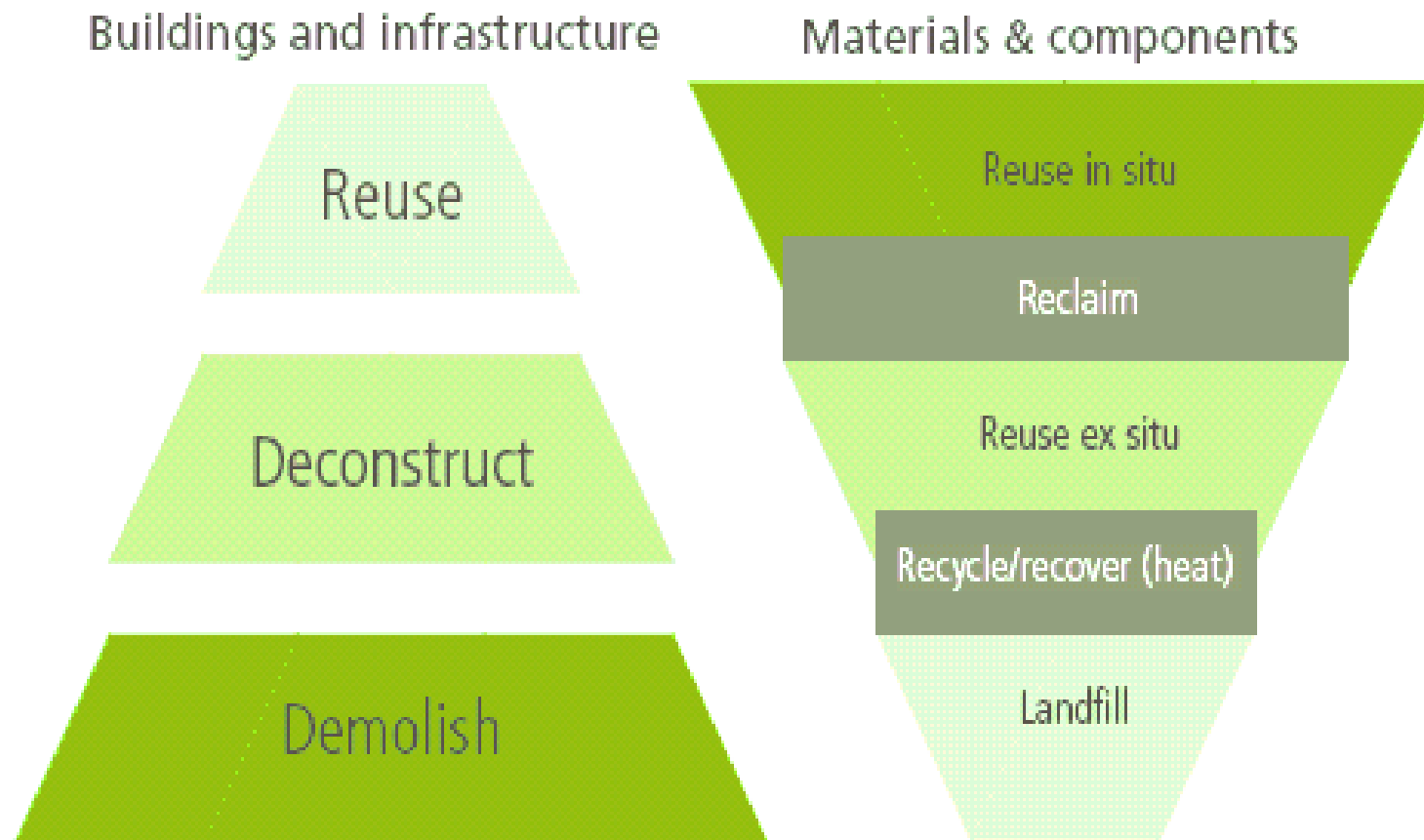


New incentives to reduce CO₂ (including in stuff) and improve quality of life for all. Energy, waste and resource use are all reduced too.

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| | |
|----|---------------------------------|
| 1 | Zero Carbon |
| 2 | Zero Waste |
| 3 | Sustainable Transport |
| 4 | Local and Sustainable Materials |
| 5 | Local and Sustainable Food |
| 6 | Sustainable Water |
| 7 | Natural Habitats and Wildlife |
| 8 | Culture and Heritage |
| 9 | Equity and Fairtrade |
| 10 | Health and Happiness |



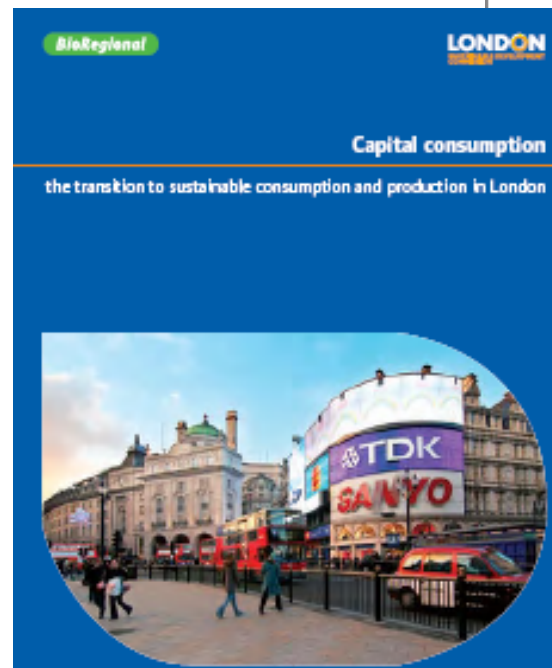
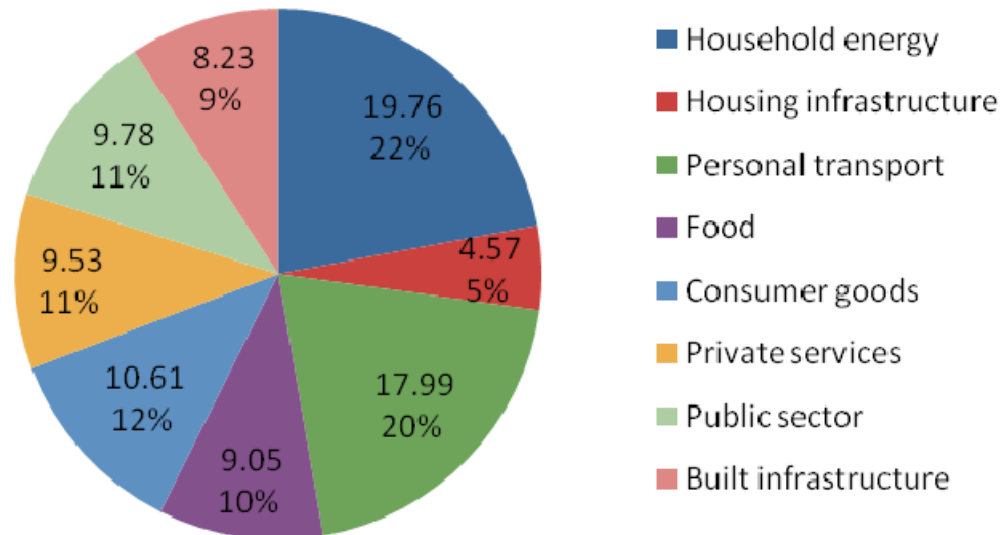
* "Element" refers to assemblies of components such as internal walls, frames, substructure etc.

Hierarchy for Sustainable Regeneration of Buildings & Infrastructure.

Source: ICE Demolition Protocol, 2008.

Capital consumption report (London)

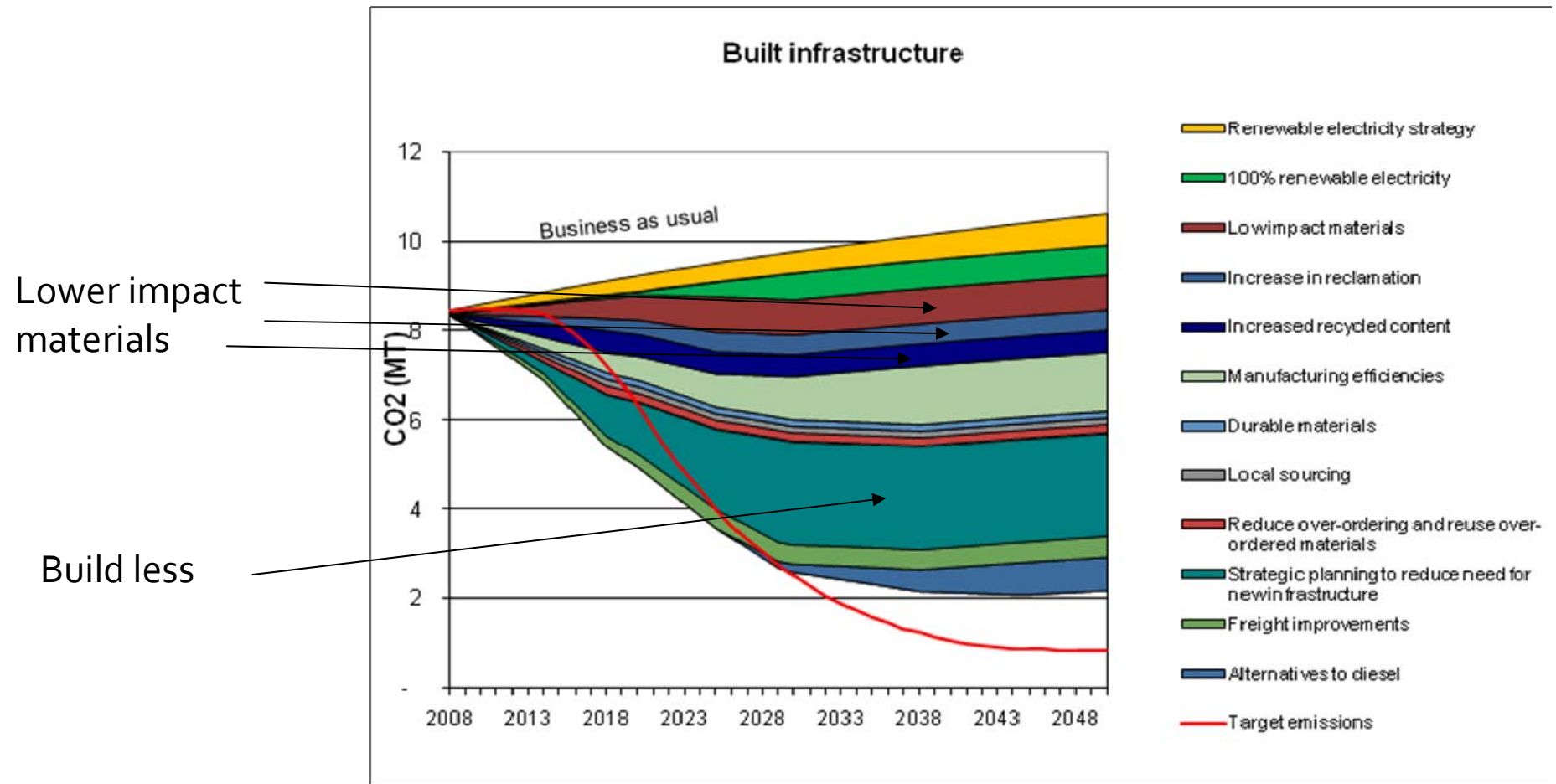
Breakdown of London's CO2 emissions due to consumption



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90% reduction in construction CO₂



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Objections to reuse by construction sector

Health & Safety, Time constraints

Space, storage and transport

Cost savings, Environmental impacts

Market considerations, Sourcing difficulties

Specification difficulties, Supply standards

Installation time, Product liability, Client led

Pushing Reuse - Recommendations

Create a reuse champion and invest in reuse enterprises to create low carbon jobs

Put reuse and **embodied CO₂ at heart of planning decisions** to encourage reuse in all construction

Economic incentives for reuse so more happens.

Reuse is the new recycling. The government can and should create a new reuse agenda.

Opportunities: Create jobs and cut CO₂

- **Reuse-led decision making:** reuse existing structures first, deconstruct and, reclaim, reuse and low carbon – before 'traditional' high carbon new build.
- **Choose to Reuse. Construction reuse centres** are opening up (30+ across UK). Support or set one up? See www.reiy.net+
- **Count and cut carbon.** Measure and reduce embodied CO₂. Open source bills of quantities. Reuse helps.

Reclaim our Future – A Better Approach

Carbon Consciousness

Construction = 15% Carbon Emissions

Need to Measure and Reduce.

Our Responsibility as we have ability to respond.

Believe it is necessary and achievable!

Sustainability is about Limits = Good Enough Design

A Reuse-led approach links waste, carbon and resources, creates jobs and retains value.

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Thank you