

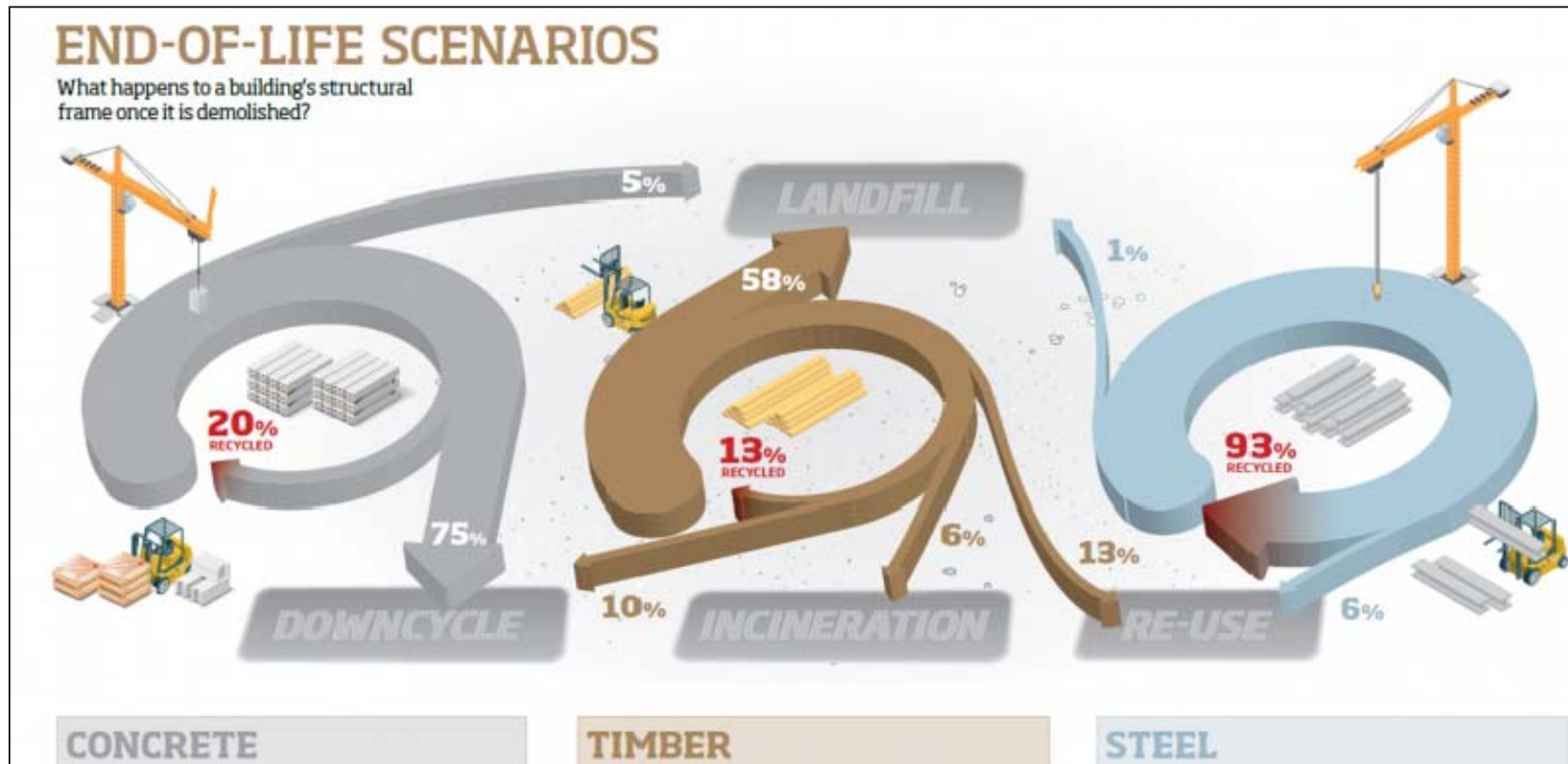
Reuse of steel structures and the circular economy

THE
BUILDING
CENTRE

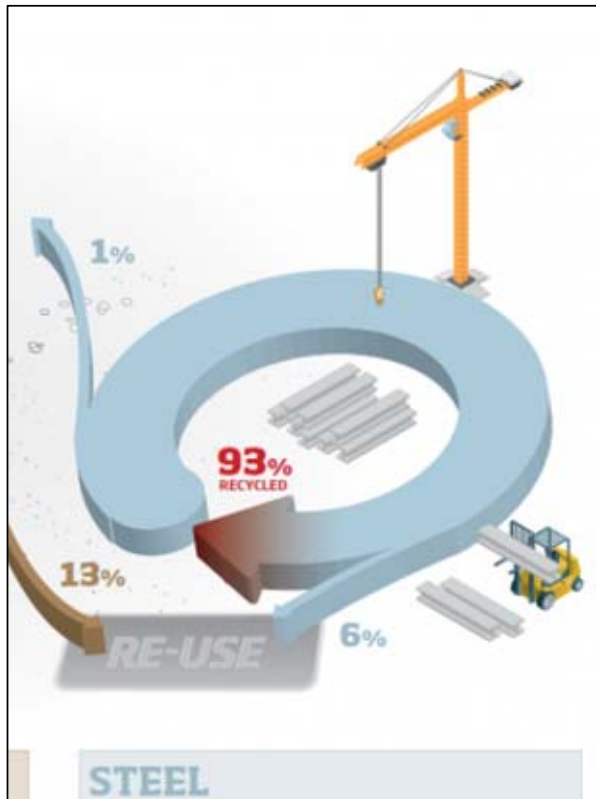
Tuesday 8th October 2019



Steel already has good recycling credentials

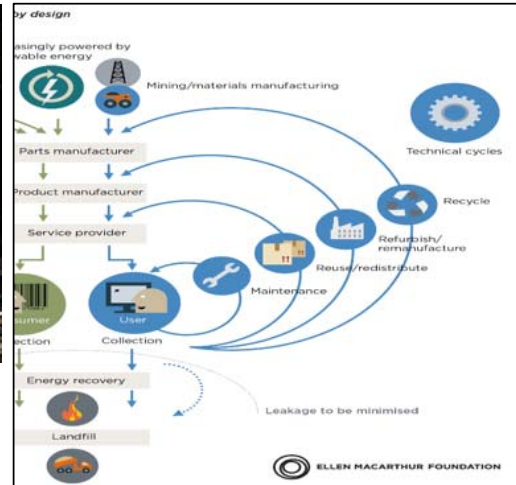


Steel recycling



- Versatile 3,500 different grades
- Durable and strong
- Infinitely recycled
- No loss of properties
- Magnetic properties assist recovery & sorting
- Economic value ensures recovery
- Global infrastructure for trading scrap steel

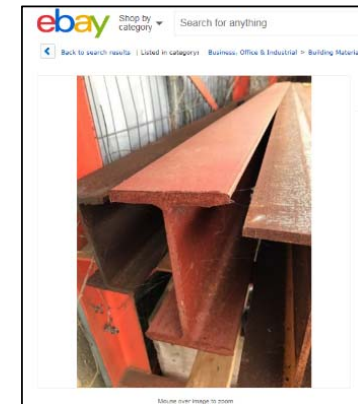
Going beyond recycling to reuse



Recycling



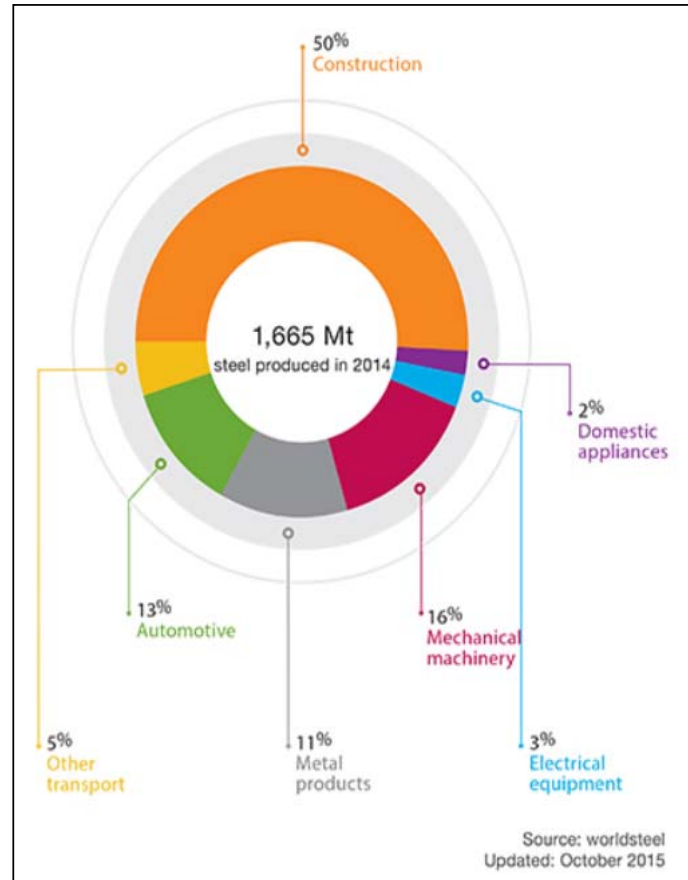
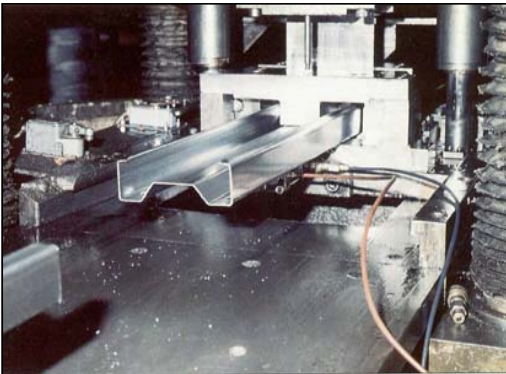
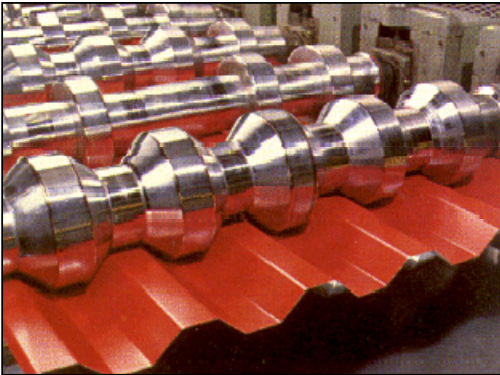
Reuse



500m tonnes pa \approx 30% global production

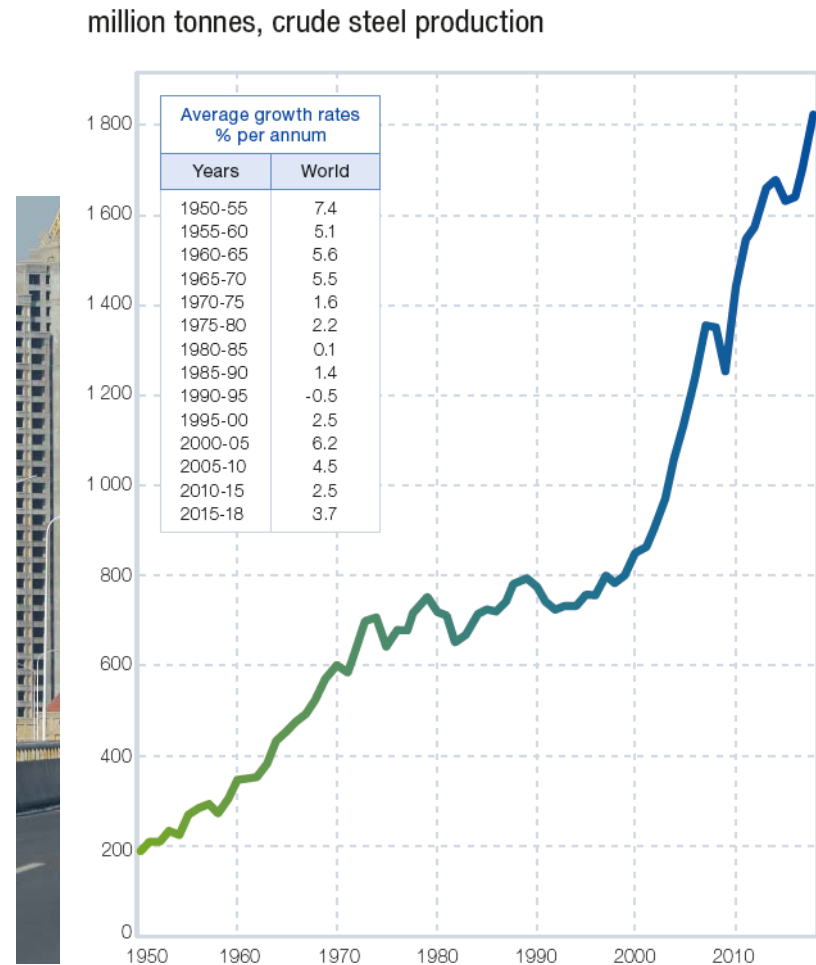
£974 per tonne

Steel construction products



Context

- 50% of all resources attributable to construction
- Global floor area predicted to double by 2060
- 2°C scenario requires steel sector to reduce GHG emissions by 65% by 2050
- Current consumption patterns are unsustainable



Steel is strong and lightweight



One Kingdom Street, London:

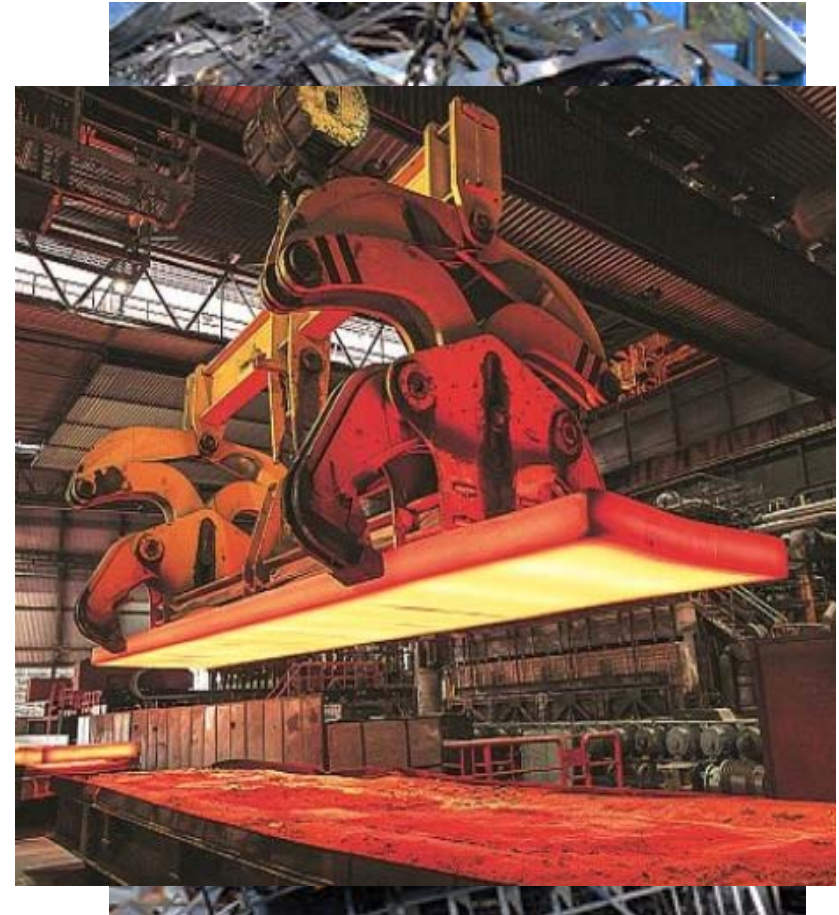
1. Steel frame 32.3kt
 2. PT concrete frame 55.4kt
- 72% (23kt) more materials!

Frame and upper floors only:

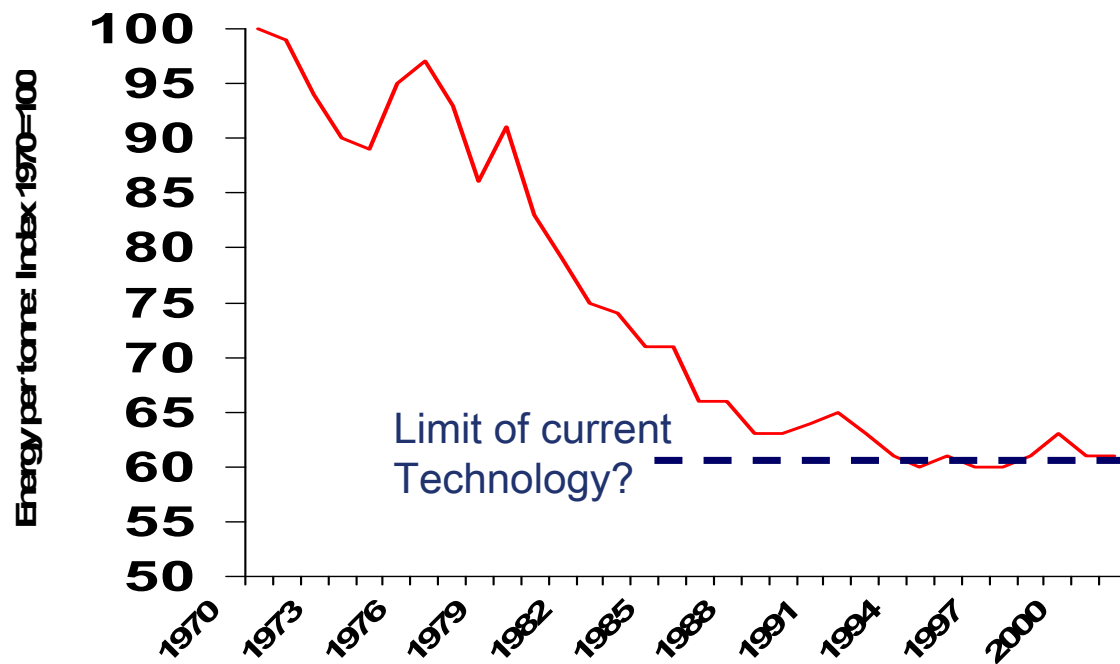
- PT has 142% (23kt) more materials

Carbon intensive steel

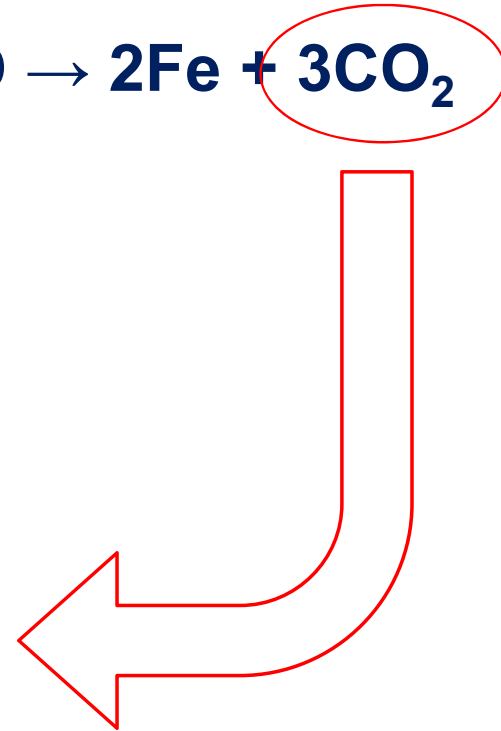
- Steel is currently carbon intensive in (primary) production
- Steel-making accounts for 7% of global CO₂ emissions
- But steel is highly recycled and 100% recyclable
 - And some constructional steel is reusable



Steelmaking and carbon



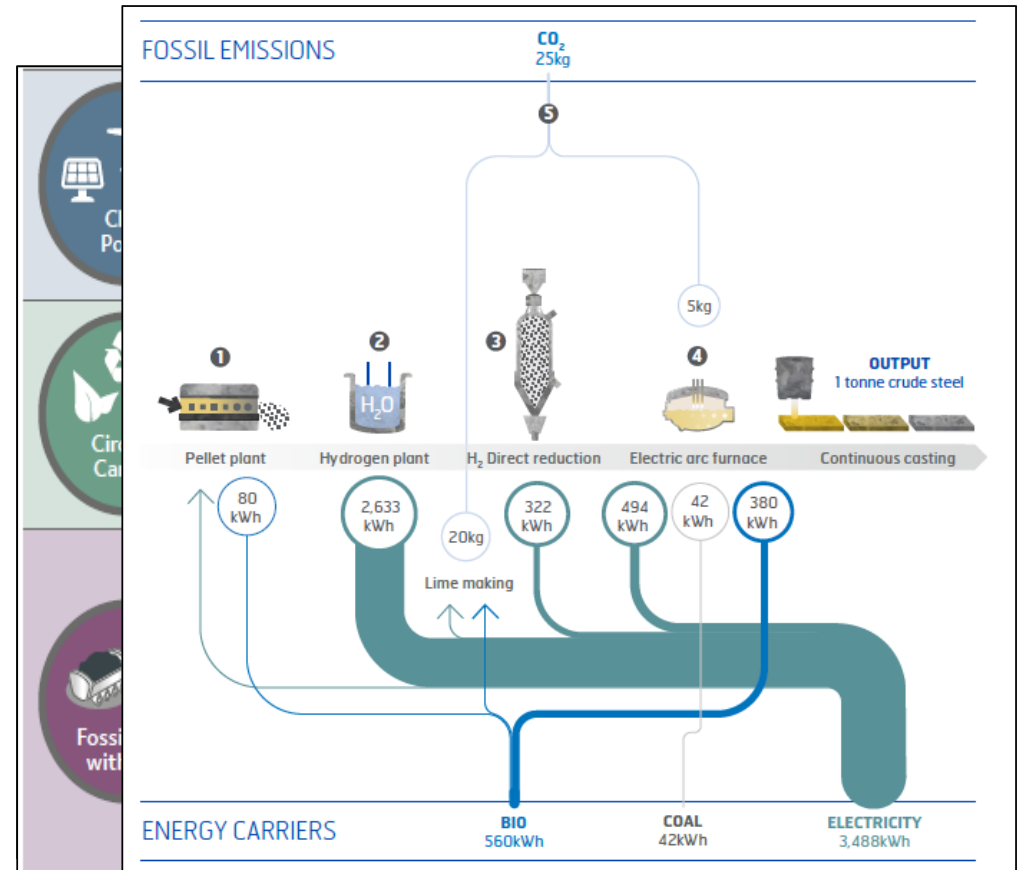
Tata Steel data



Supply side measures

Steel producers have ambitious plans for low and zero carbon steel:

- Tata Steel - Hisarna
- Arcelor Mittal
- SSAB – HYBRIT initiative
- But we also need to implement demand-side measures



End-of-life scenarios



Deconstruction and reuse



Demolition and crushing (downcycling)

Many reusable steel systems



Although steel reuse does happen



We know there are barriers

- Extra cost – perception or reality?
- Availability of suitable sections
- Lack of demand/incentive
- Traceability, certification and quality
- Programme constraints (automation)
- Lack of supply chain integration
- Uncommon practice – lack of skills and experience in how to do it



Two reuse scenarios

Reuse today



Future reuse



Reuse today

Problems:

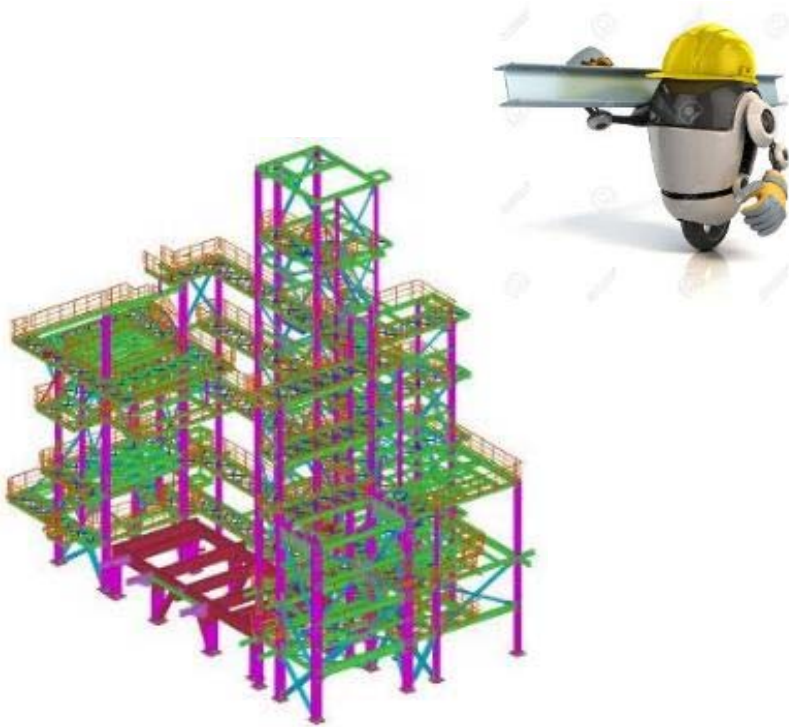
- Traceability, certification and quality
- Availability
- Lack of expertise



Solutions:

- NDT
- Remote/drone surveys
- Better supply chain integration
- Bespoke material exchange
- Provision of guidance
- Fiscal incentives

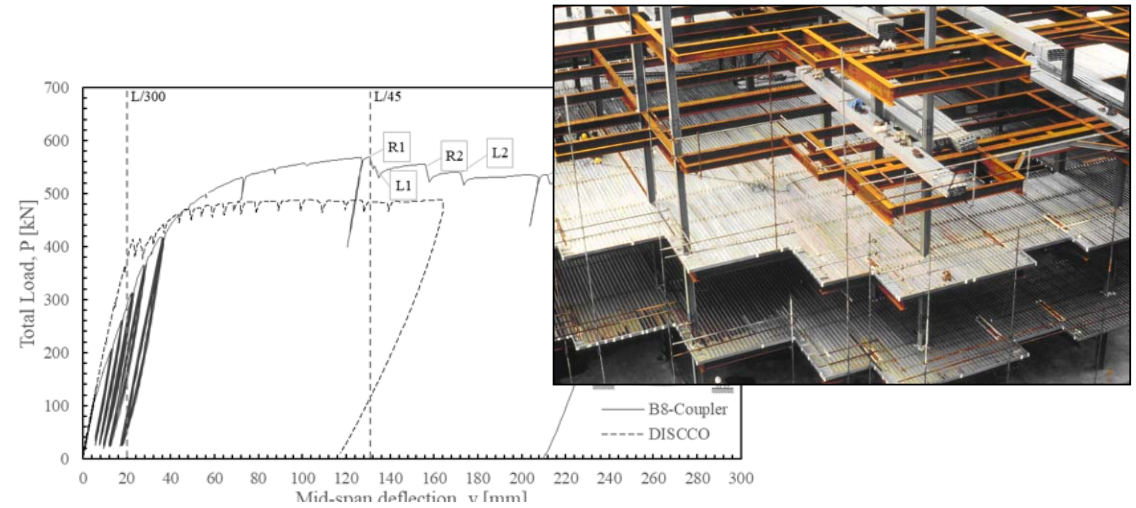
Future reuse



Solutions:

- Digital information
- Design for deconstruction and reuse
- Standardisation

CE theory vs reality

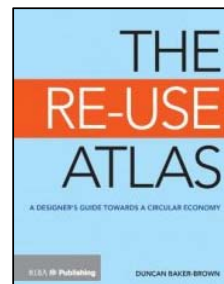


VS

The screenshot shows an eBay search for "steel beams". The search results list several items:

- Rsj steel beam USED**: £20.00, 0 bids, Collection only: free
- MARKETINA RSJ ST USED**: £40.00, 0 bids, Collection only: free
- rsj steel beam**: £60.00, Buy it Now, or Best Offer, Collection only: free

The listing also includes filters for Condition (New, Used, Not specified), Price, and Format (All listings, Auction, Buy it now).



Delivering real solutions

REDUCE

- Reuse and Demountability using Steel Structures and the Circular Economy
- To provide practical tools and steel-based technologies to be able to design steel and **composite structures** for deconstruction and reuse

PROGRESS

- Provisions for Greater Reuse of Steel Structures
- Reuse of existing and new **single-storey buildings**
- Primary, secondary structure and envelope



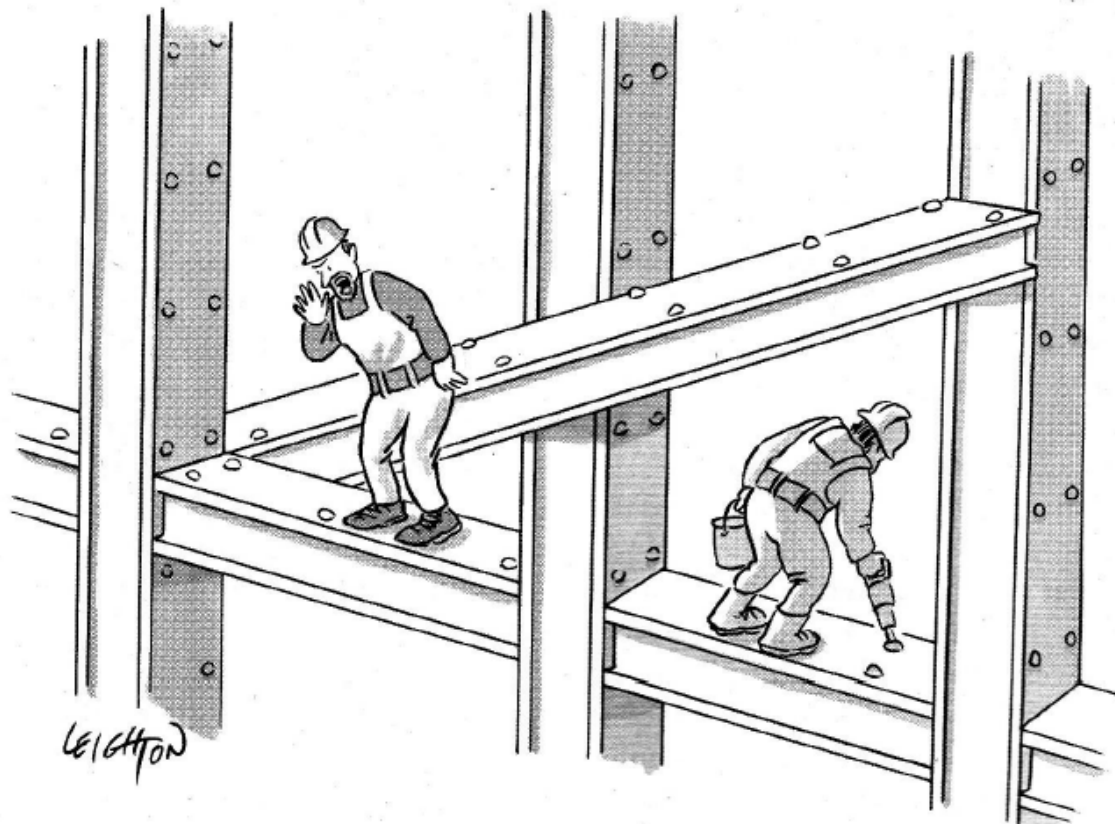
Reuse of steel structures and the circular economy

10.40-12.45	Reuse of single-storey steel framed buildings <i>Findings from the EU project PROGRESS</i>
12.45-13.45	Lunch
13.45-14.00	Launch of the SCI structural steel reuse protocol
14.00-15.05	Findings from the EU project REDUCE
15.05-15.15	Break
15.15-16.20	More findings from the EU project REDUCE
16.20-16.40	Overview of the EPSRC REUSE project
16.40	Close



EU project PROGRESS

1040-1100	<u>Overview of the EU project PROGRESS</u> <i>Dr Petr Hradil, VTT, Finland</i>
1100-1120	<u>Reusability of existing structural steel</u> <i>Dr Ana Girao Coelho, SCI, UK</i>
1120-1140	<u>Design of new single-storey steel buildings for reuse</u> <i>Ricardo Pimentel, SCI, UK</i>
1140-1200	<u>Reuse of steel cladding systems</u> <i>Prof Markus Kuhnhenne, RWTH Aachen University, Germany</i>
1200-1215	<u>Environmental assessment of steel recycling and reuse</u> <i>Dr Michael Sansom, SCI, UK</i>
1215-1235	<u>Evaluation of single-storey building design using reclaimed steel</u> <i>Prof Daniel Viorel Ungureanu, University of Timisoara, Romania</i>
1235-1245	Q&A and discussion



"Escher! Get your ass up here."