
DISRUPT
Delivering Innovative Steel ReUse ProjecT
ASBP
The Alliance
for Sustainable
Building Products
DISRUPT Steel Reuse Project –
Toolkit Launch Event
Wednesday 22nd March 2023, 18:00-20:00, London
@asbp_uk

Today’s programme

18:00 **Welcome to the event**

- **Welcome from our event host and project partner: ISG** – Peter Kelly, Group Director of Sustainable Operations, ISG
- **Welcome from lead partner: ASBP** – Katherine Adams, Technical Director, ASBP
- **Welcome from the National Interdisciplinary Circular Economy Research (NICER) Programme** – Amy Peace, Innovation Lead – Circular Economy, Innovate UK

18:15 **Intro to DISRUPT** – Asselia Katenbayeva, Research Associate, ASBP

Today’s programme

18:30 **Steel reuse case studies**

- **Short history of steel reuse and agricultural building case studies** – Roy Fishwick, Managing Director, Cleveland Steel and Jonny Hawkshaw – Director, Simple Works
- **Domestic refurbishment project** – Philippa Birch-Wood, Thrive Director, Chetwoods
- **Elephant & Castle redevelopment and Sloane Square House** – Sally Walsh, Senior Engineer, WSP

19:00 **Launch of toolkit** – Katherine Adams, Technical Director, ASBP

19:15 **Q&A** 19:30 **Drinks and networking** 20:00 **Close**

Thank you to our funders and supporters

- The project has received funding via Innovate UK's Circular Economy for SMEs competition, in collaboration with the NICER programme.
- The NICER programme is a four-year £30 million investment from UKRI consisting of one hub and five specialist research centres aiming to grow the circular economy community through a significant programme of outreach and collaboration.
- The project received support from the Interdisciplinary Centre for Circular Metal.

Who we are

ASBP The Alliance for Sustainable Building Products

Not-for-profit, mission led, membership organisation

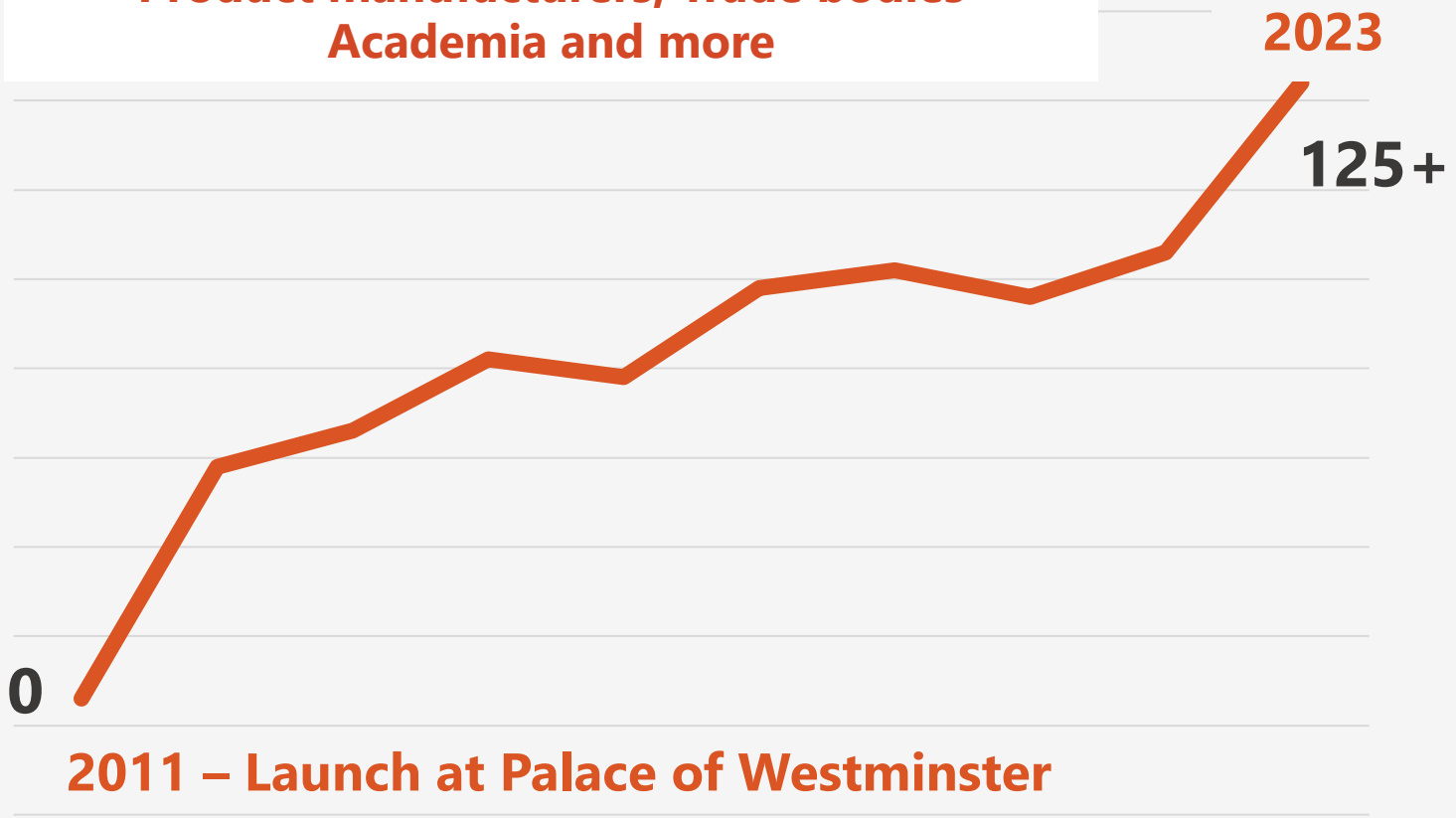
"To accelerate the transformation to a healthy, low carbon built environment by championing the use of demonstrably sustainable building products"

What we do

Share learning through events, participate in research projects, advocate product standards, respond to policy consultations.

Our Alliance – 130 members and counting…

Start-ups, SMEs and multi-national orgs
Architects, Specifiers, Contractors
Product manufacturers, Trade bodies
Academia and more



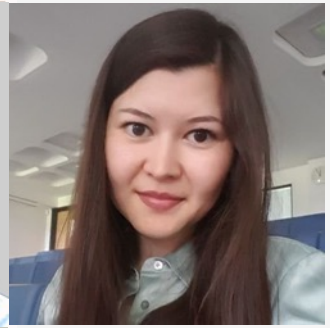
In 2021 we donated 100 trees to Caerphilly Woodlands Trust to mark our 100th member milestone.

Simon Corbey

Katherine Adams

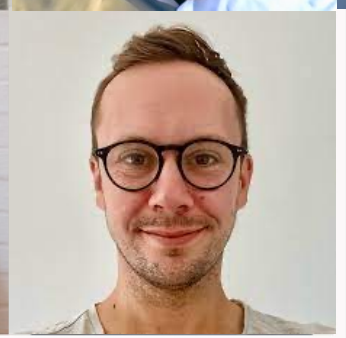
Richard Broad

Asselia Katenbayeva



Flavie Lowres

Debbie Mauger



Larry Tate

ASBP TEAM

ASBP The Alliance for Sustainable Building Products

BOARD

Gary Newman

Mark Lynn

Jane Anderson

Marcella Ucci

Alex Sparrow

Ben Humphries

Jon Bootland

Activities

ASBP Awards

Paints & Finishes

Healthy Buildings

Mass Timber

Reducing Plastics

Natural Fibre Insulation

Embodied Carbon/EPD

Circular Economy/Reuse

‘Reuse Now’ campaign

reuse now

ASBP has launched a new campaign to encourage greater reuse of building materials within the construction industry and accelerate the transition to a more resource efficient, circular economy.

- **Around 60 million tonnes of construction and demolition waste is created annually in the UK. Whilst much of this is recovered and recycled, only a small percentage is reused.**
- **Planned activities for the campaign include knowledge-sharing webinars, reuse case studies, freely available and topical briefing papers and factsheets, regular blogs and thought pieces.**
- **To reflect our diverse membership network and maximise impact, the campaign will focus on a wide range of materials and applications, and also technical solutions which can aid reuse.**

‘Reuse Now’ campaign

- **‘Reuse Now’ is supported by lead sponsor and long-standing ASBP patron member Cleveland Steel and Tubes, with additional support from circular economy experts Reusefully.**
- **ASBP has been working on the topic of material reuse for nearly 10 years, with past activities including the Re-Fab House feasibility study, research with University of Cambridge identifying the barriers to structural steel reuse, a Reuse Summit, and the DISRUPT project.**
- **Sponsorship opportunities are available for organisations seeking to support the campaign in its aim of enabling a more resource efficient built environment. For more information, please contact Richard Broad, Projects & Communications Manager, ASBP – richard@asbp.org.uk.**

Why join our Alliance?

- **Demonstrate** your company is taking a leadership role in the transition to a sustainable built environment
- **Network** with leading experts, practitioners, specifiers and academics across our core themes
- **Promote** your products, technical innovations and projects to a wider audience, through our active social media channels and events
- **Access** the latest technical information, research and funding opportunities. We collaborate with Universities of Bath, Bangor, Brighton, Cambridge, UCL, Nottingham, Sheffield, Leeds and more
- **Be part of** a coherent voice; we actively influence policy, by meeting regularly with policy makers and responding to consultations in UK and Europe
- **Reach out** to our growing contact list via our popular monthly newsletter and social media channels
- **Attend** our regular events and webinars for FREE or discounted rates

https://asbp.org.uk/join

Get involved with the ASBP

Join as a member – Standard (from £165) or Patron (from £1,100 per year)

Sign up to our mailing list – http://bit.ly/ASBPnewsletter

Support our work – Sponsor our Awards, campaign or annual conference

Input into one of our specialist groups or projects – Reducing Plastics in Construction, Natural Fibre Insulation, Paints & Finishes.

Register for one of our upcoming webinars - asbp.org.uk/upcomingevents

www.asbp.org.uk

Contact details

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Debbie Mauger (Social media)

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Flavie Lowres (Life cycle analysis)

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Welcome from the (NICER) Programme

Amy Peace

Innovation Lead – Circular Economy, Innovate UK

Intro to DISRUPT

Asselia Katenbayeva

Research Associate, ASBP

ASBP The Alliance for Sustainable Building Products

DISRUPT project on Steel Reuse

22 March 2023

Dr Asselia Katenbayeva, Research Associate

@asbp_uk

Steel is the world's most widely used product but …

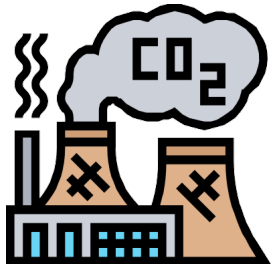
Steel production contributes 7% (2.6 billion tonnes) of CO_2 emissions worldwide

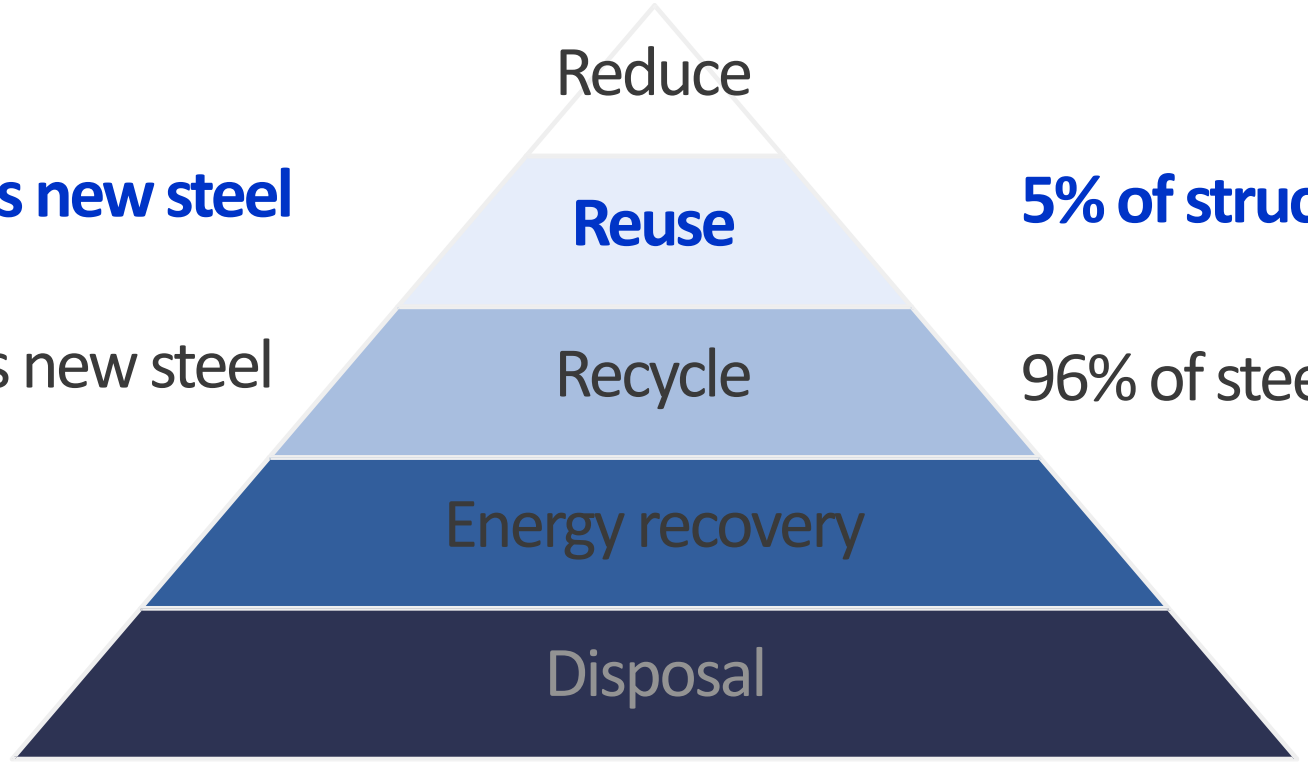
The construction industry produces a huge amount of waste, much downcycled (120 million tonnes)

Steel reuse involves the subsequent use of steel, either for its original purpose or for a similar purpose with some minor alterations

96% carbon savings vs new steel

80% carbon savings vs new steel





5% of structural steel is reused

96% of steel is recycled

DISRUPT Steel reuse project

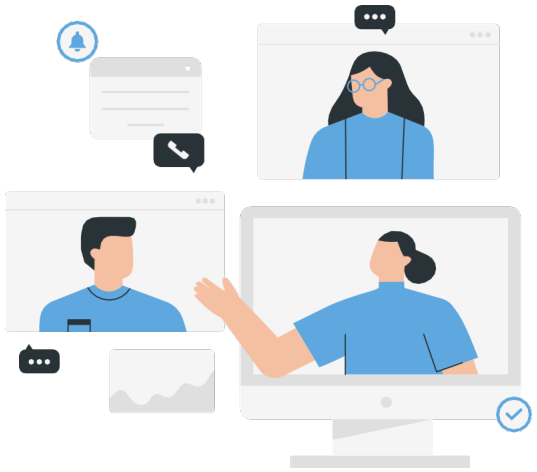
Project aim: Develop a toolkit for businesses to enter the market of steel reuse

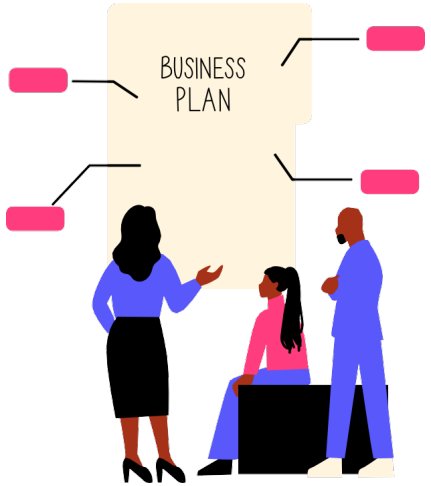
April 2022 - March 2023

Sponsor

Partners

Supporter





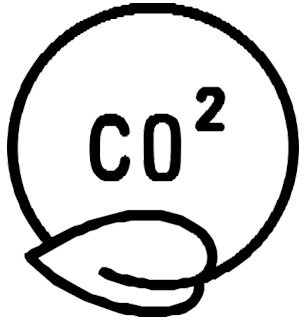
Literature review & mapping **supply chain models** for steel reuse

Interviews with stakeholders

Selected **11 case studies** of steel reuse

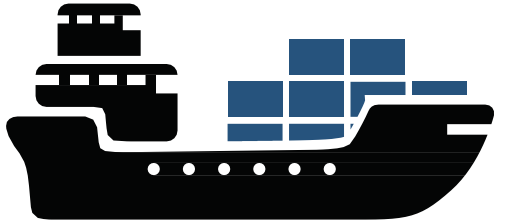
Developed the **toolkit** for market entrants of steel reuse

Why reuse steel?



Up to 96% carbon saving

Cost savings -
IF WELL MANAGED

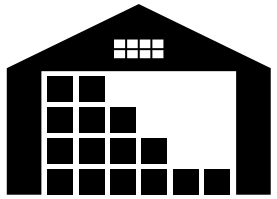


Local resource – scrap
Socioeconomic benefits – all in UK

77% of scrap steel in the UK is exported

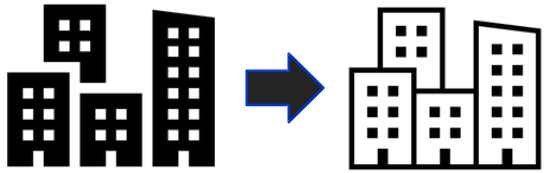
Steel reuse models

REUSE: STOCKHOLDERS DRIVEN



Stockholders purchase reclaimed steel from demolition contractors and then sell it in the open market

REUSE: CLIENT DRIVEN



Donor Recipient

Clients recover steel from their demolished buildings for reuse within their new buildings

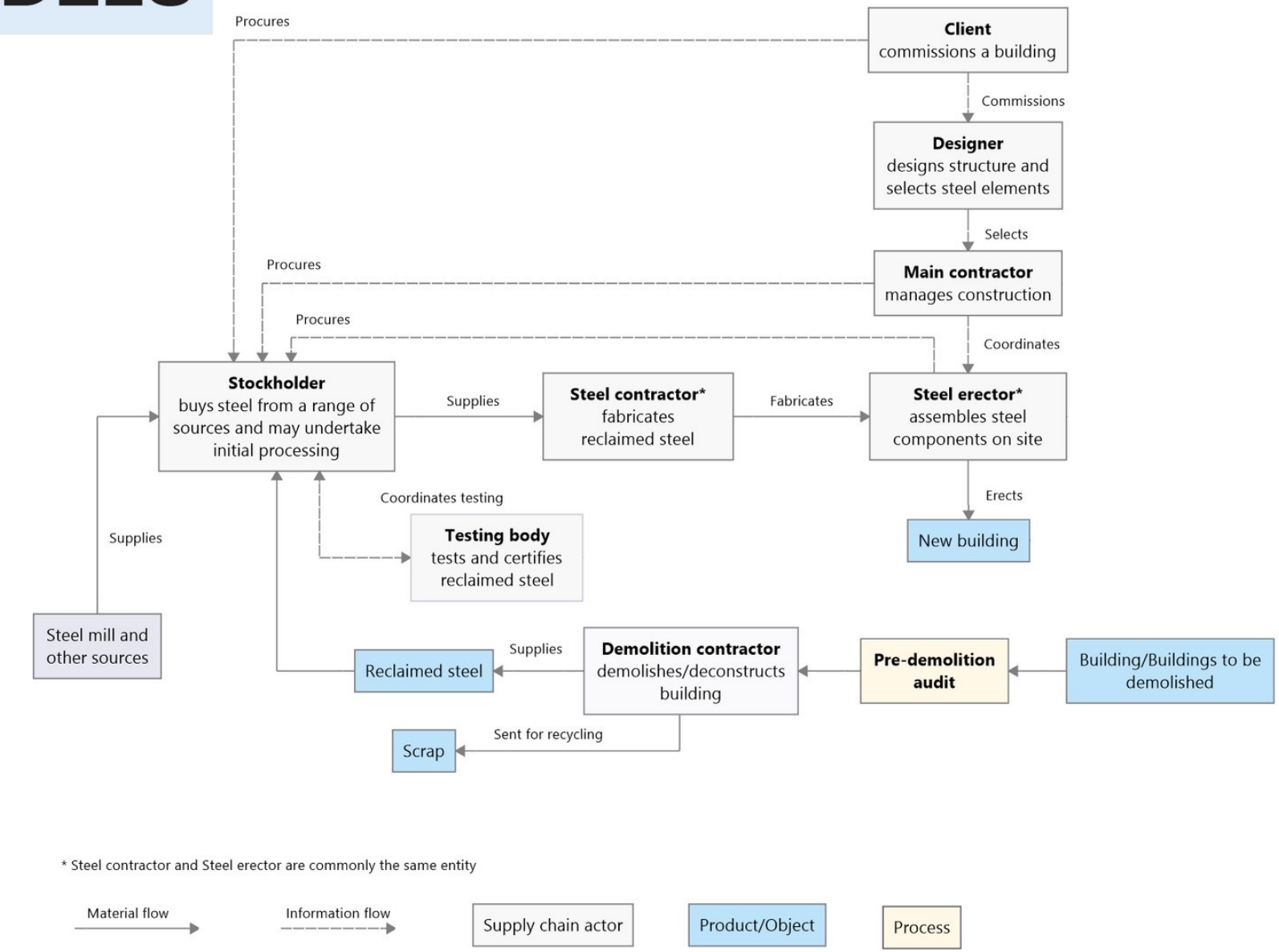
SUPPLY CHAIN MODELS

RECYCLING (BAU)

REUSE: STOCKHOLDERS DRIVEN

REUSE: CLIENT DRIVEN

REUSE: HYBRID MODEL



Steel reuse case studies

Entopia building

Holbein Gardens

55 Great Suffolk Street

Meridian Water project

Brent Cross Town Primary Substation

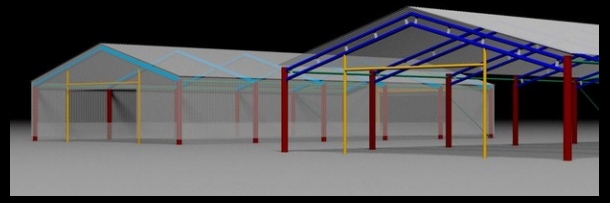
Elephant & Castle Town centre redevelopment

Sloane Square House

Agricultural buildings

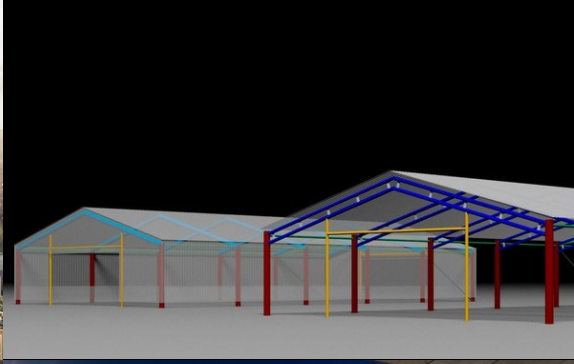
Domestic extension projects

Subsea drilling out of the wind farms



Case studies




Result	Size	Amount of steel reused	Carbon savings	Implications on project budget	Implications on timelines
9 successful 2 unsuccessful	154 - 70,000 sq m	353 tonnes	660 tonnes	5 cost savings 2 cost neutral 2 slightly more expensive	No

Thank you

Dr Asselia Katenbayeva, Research Associate
Asselia@asbp.org.uk

@asbp_uk

Steel reuse case studies

Short history of steel reuse

Roy Fishwick

Managing Director, Cleveland Steel and Tubes Ltd

Steel reuse agricultural building case studies

Jonny Hawkshaw

Director & Co-founder, Simple Works

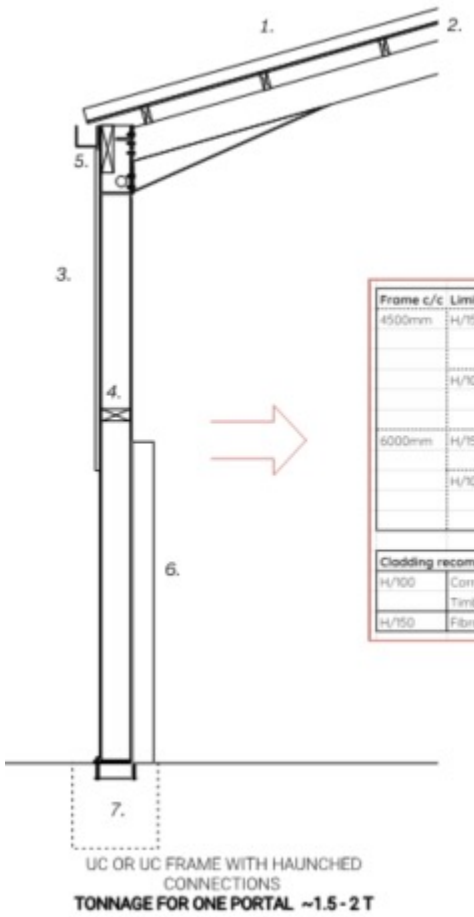
DISRUPT - Steel Reuse

Steel Tube Portal Frames

simple works

Traditional vs non-traditional

Traditional vs non-traditional

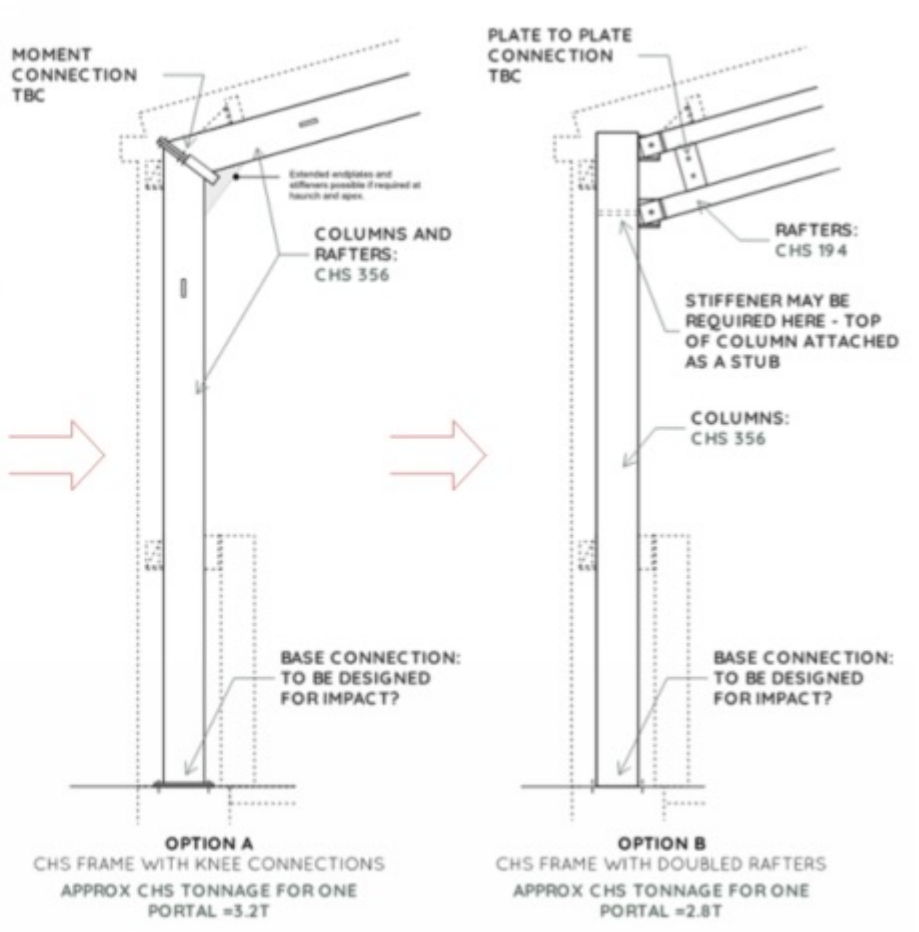


UC OR UC FRAME WITH HAUNCHED CONNECTIONS

TONNAGE FOR ONE PORTAL ~1.5 - 2 T

Frame c/c	Limit	Col CHS	Rafter CHS	Gable CHS	Bracing CHS	Bays	Total kg
4500mm	H/150	355x8	219x5	139x8.0	88.9x5	8	12,578
		323x12	193x6.3	139x8.0	88.9x5	8	14,788
		273x25	168x8	139x8.0	88.9x5	8	19,246
	H/100	355x6.0	219x5	139x8.0	88.9x5	8	11,490
		323x8	193x6.3	139x8.0	88.9x5	8	12,823
		273x12.5	168x8	139x8.0	88.9x5	8	14,599
6000mm	H/150	355x12.5	219x8	139x8.0	88.9x6	6	14,927
		323x16	193x10	139x8.0	88.9x6	6	16,321
	H/100	355x8	219x8	139x8.0	88.9x6	6	13,151
		323x10	193x10	139x8.0	88.9x6	6	14,257
		273x20	168x12	139x8.0	88.9x6	6	16,832

Cladding recommendations	
H/100	Corrugated metal sheeting
	Timber boarding
H/150	Fibre cement sheeting



OPTION A

CHS FRAME WITH KNEE CONNECTIONS

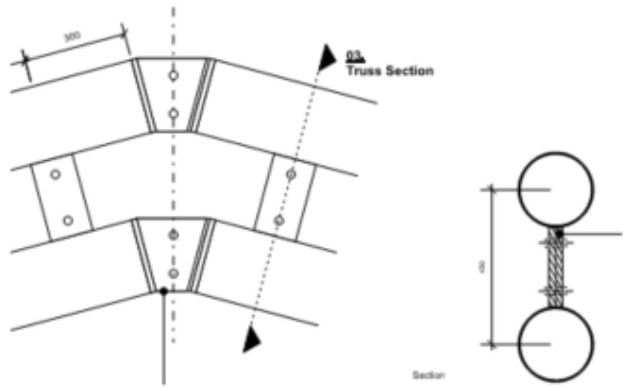
APPROX CHS TONNAGE FOR ONE PORTAL =3.2T

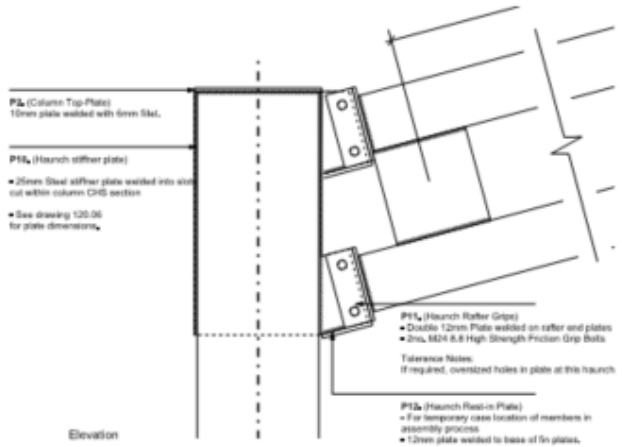
OPTION B

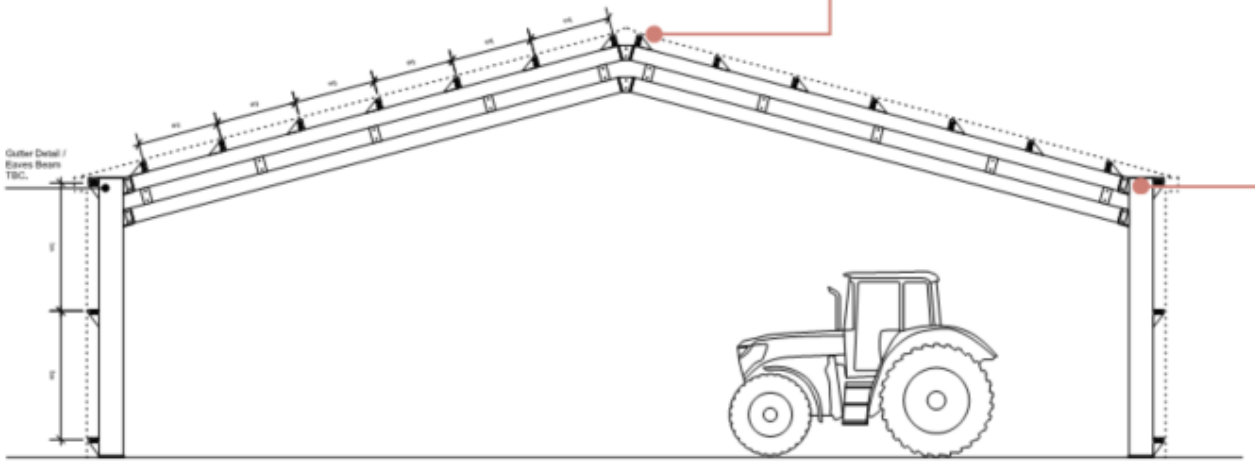
CHS FRAME WITH DOUBLED RAFTERS

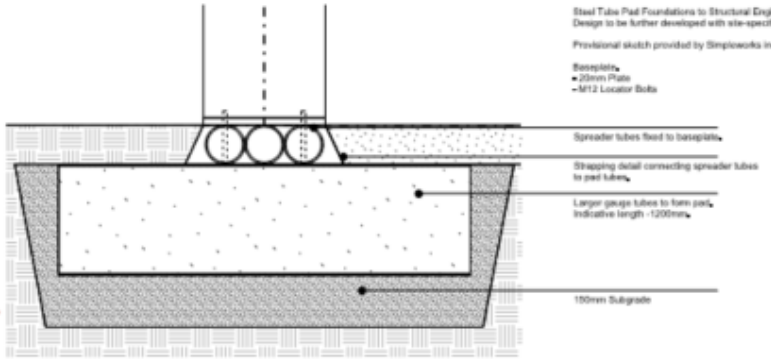
APPROX CHS TONNAGE FOR ONE PORTAL =2.8T

All in the detail









Fabrication photos

Steel reuse domestic refurbishment project

Philippa Birch-Wood

Thrive Director, Chetwoods

Who am I?

> Thrive Director, running a Sustainable Design Consultancy at Chetwoods Architects

> UKGBC Regional Rep for Birmingham and the West Midlands

> A homeowner, concerned about the Climate and Biodiversity Emergency

1960s build

2 storey

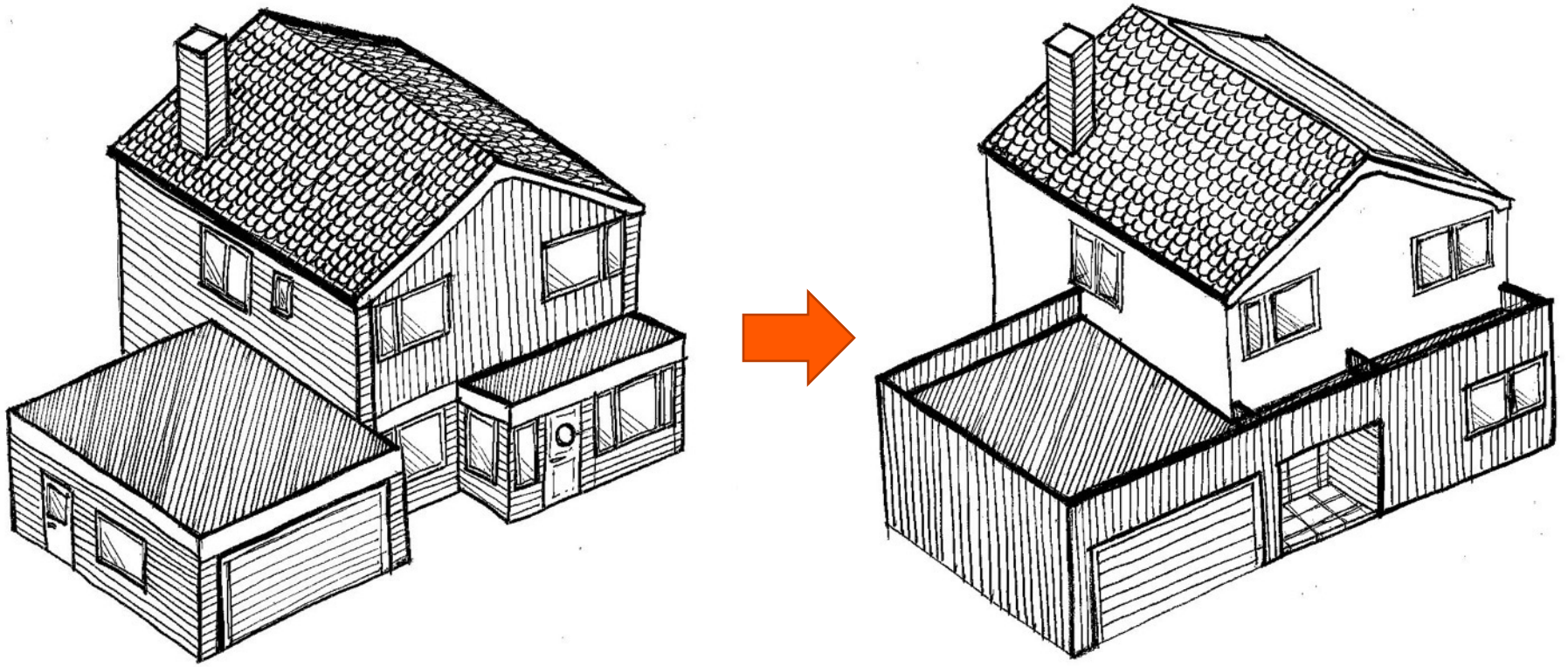
3 bed

154 m2

Completion

2023

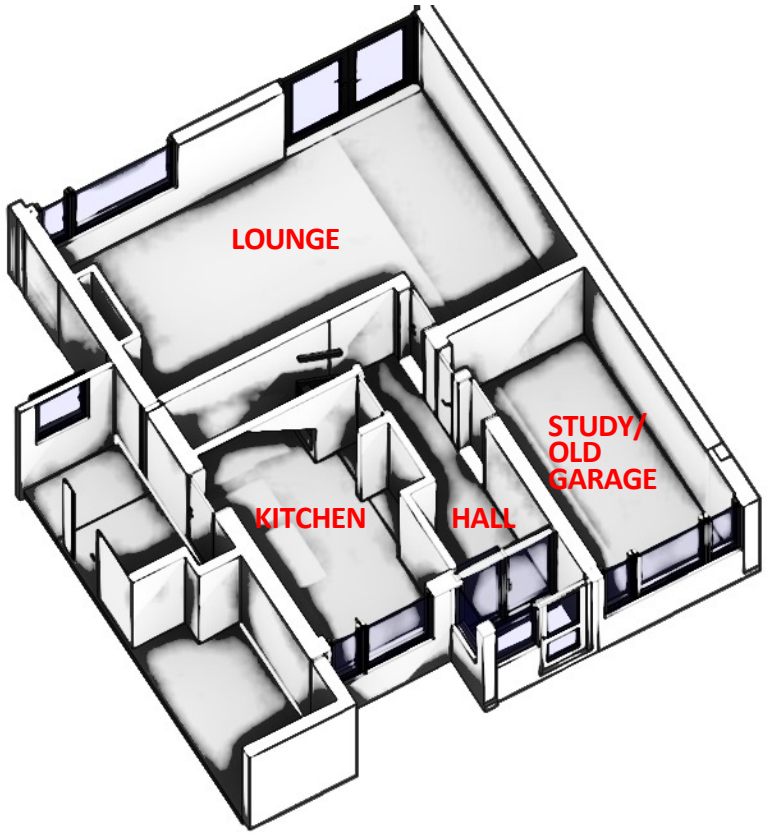
The context



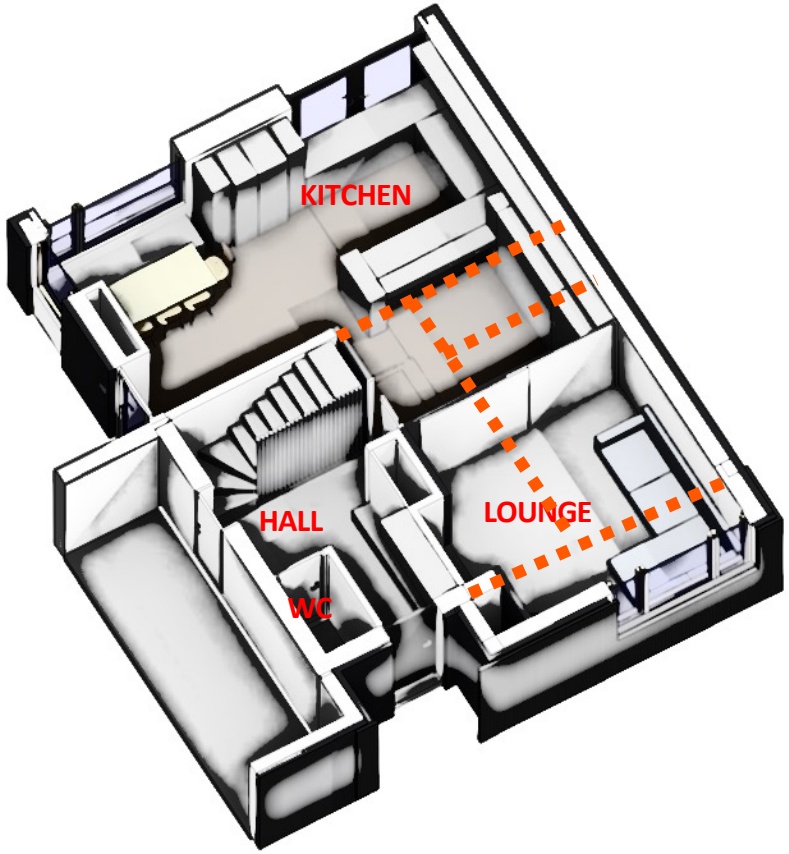
Before

After

Why we needed steel…

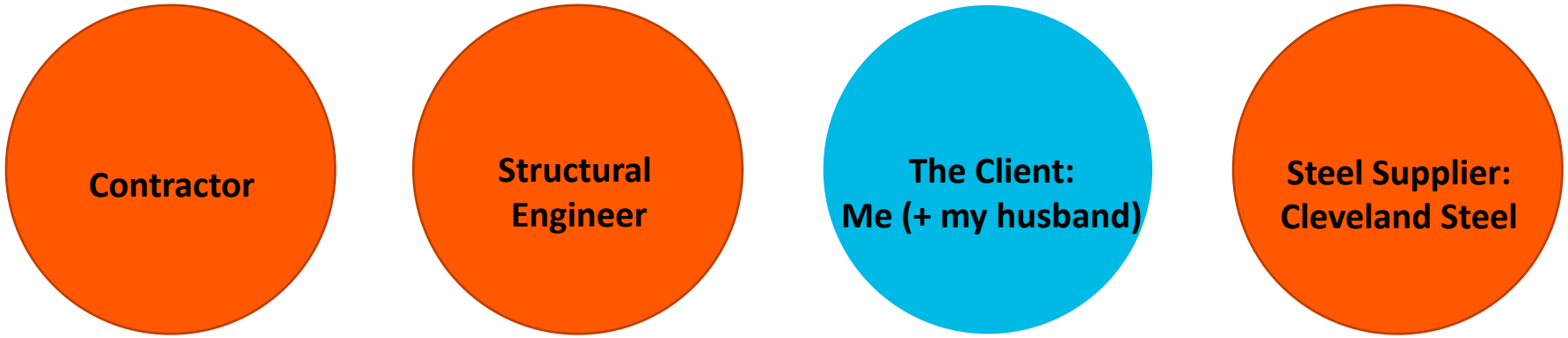


Before



After

Enabling Steel Reuse



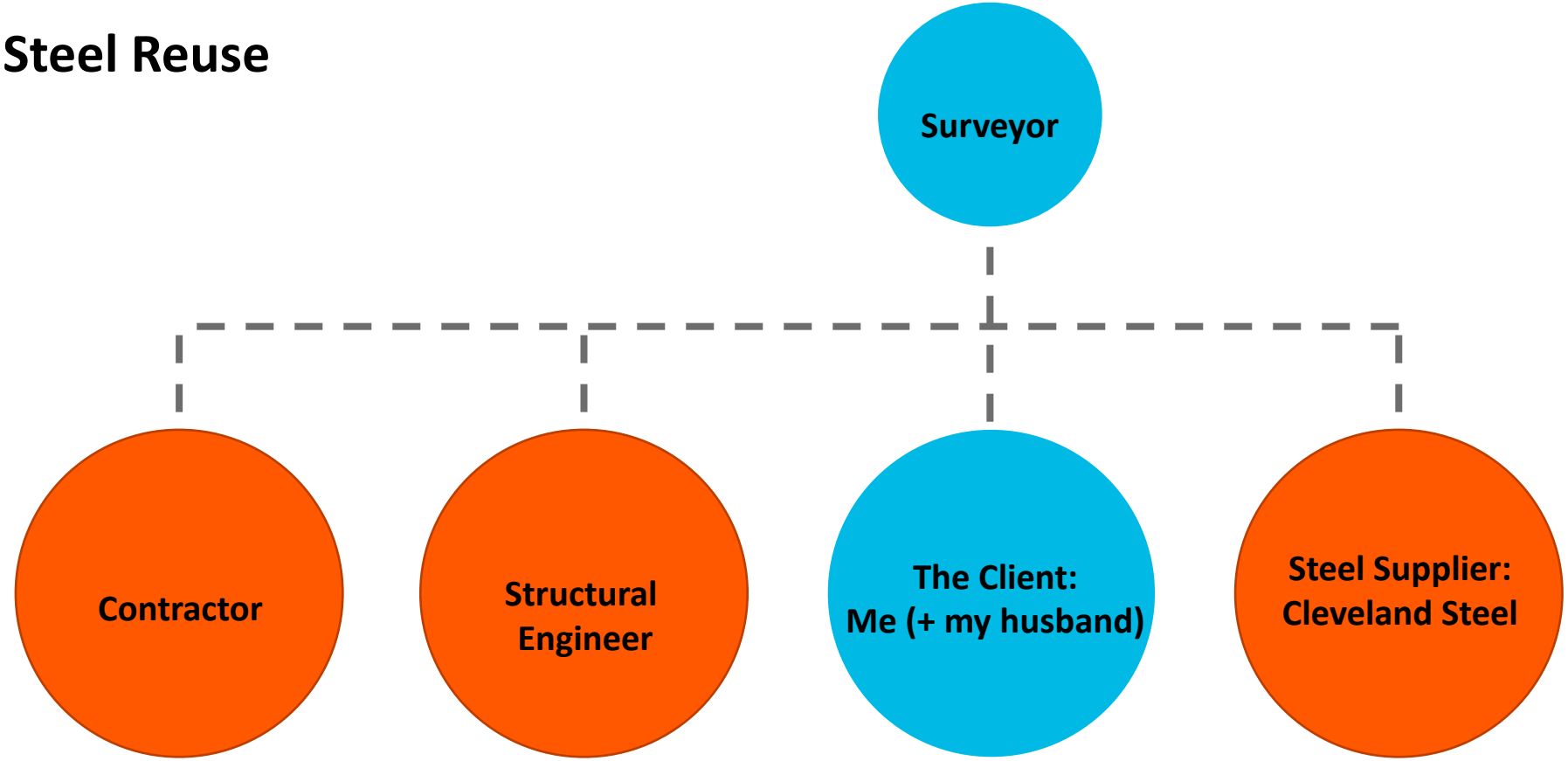
Fine, but won't take measurements. Their steel suppliers typically do this

Resistant/ Risk Adverse
Needed convincing, saying "Steel is recycled anyway." Concerned about provenance of steel.

Desperately wanting to make this happen

Would need Measurements to ensure availability
and for fabrication

Enabling Steel Reuse



On board
Happy that someone is measuring

On board
Convinced by provenance, testing, fabrication and CE Marking

Hired a Surveyor to measure for steels.

Link up Contractor and Structural Engineer with Roy on Teams chat

Could check availability and deliver steel within the Contractor's time frame

The result

1.45 Tonnes of Steel reused

2 x lengths of 203 x 203 x 71 –
temporary façade retention American embassy

203 x 203 x 86 -
temporary façade retention American embassy
plus a scrap offcut butt welded together

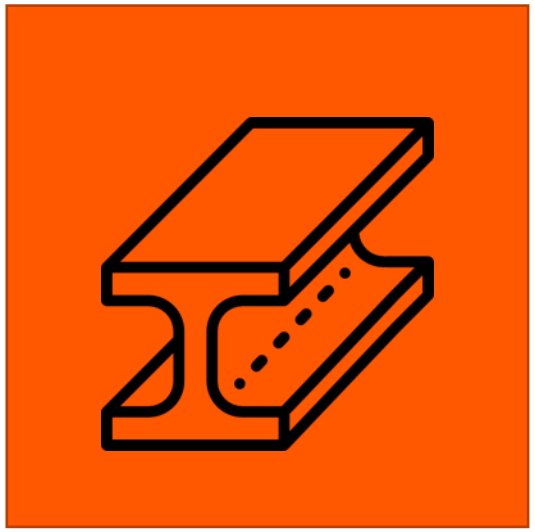
203 x 133 x 25 -
Pinewood Studios – rail and track system for a movie project

The stats

New Steel
1.45 T

Cost: £2200 +VAT + Delivery
(£1250/tonne + painting)

Lead Time: At the time 5 weeks+



Our Steel
1.45 T

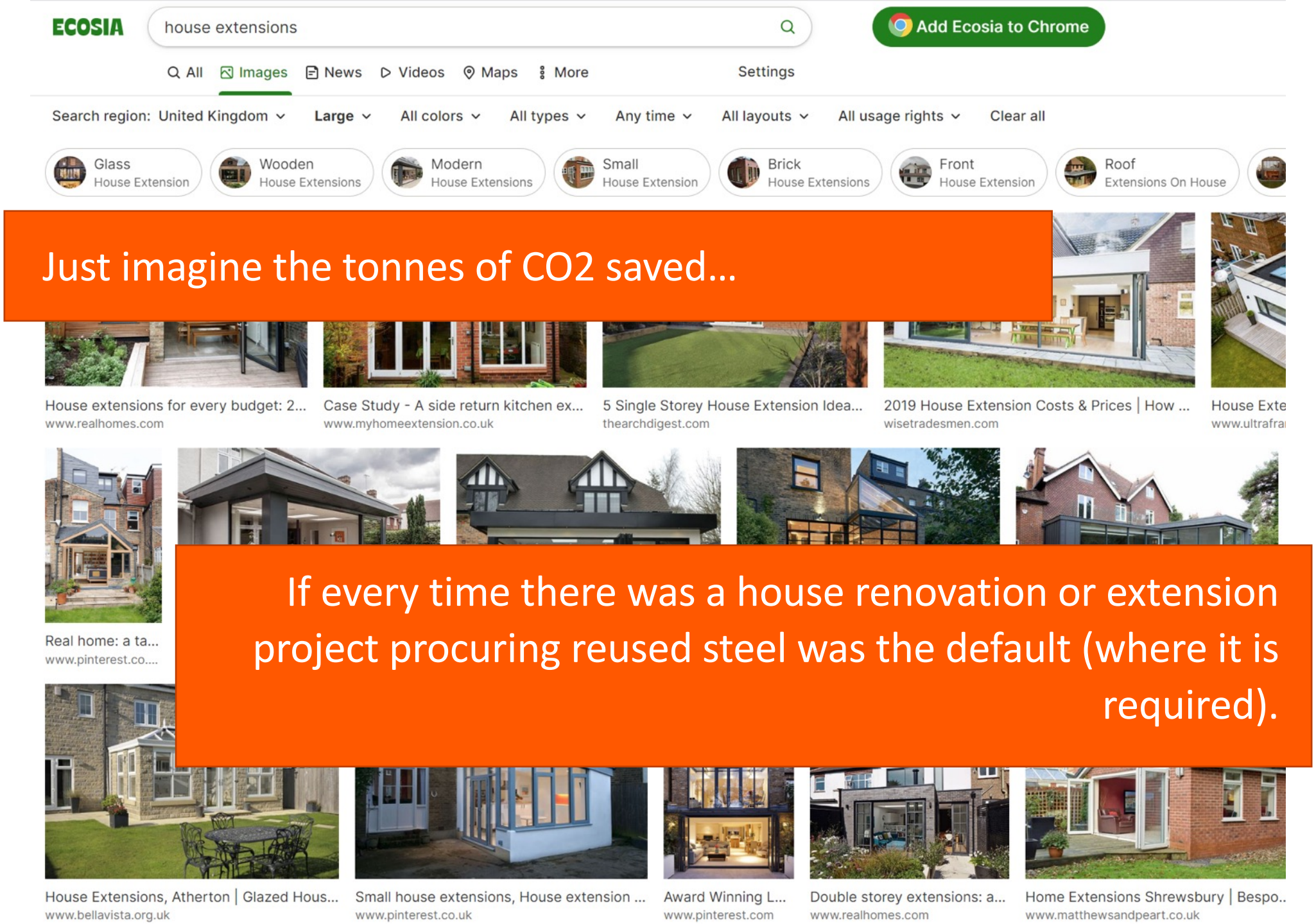
Cost: £1300 + VAT + Delivery
(£850/tonne + fabrication)

+£400 for a surveyor and
£90 for structural engineer time

CO2 emissions: 3 Tonnes saved

Lead Time: 4 days

[1]Carbon savings were calculated based on the LCA of reclaimed steel by Cleveland Steel and Tubes.
This includes inbound transport impact to the stockholder's yard and excludes outbound transport impact to the construction site.
[2] Based on the costs when the project was in the design stage



Just imagine the tonnes of CO2 saved…

If every time there was a house renovation or extension project procuring reused steel was the default (where it is required).

Elephant & Castle redevelopment and Sloane Square House

Sally Walsh

Senior Engineer, WSP

STEEL REUSE AT WSP

Sally Walsh Senior Structural Engineer

1. Circular Economy Goals
2. WSP Steel Reuse Tool
3. Elephant & Castle Town Centre
4. Sloane Square House

1 CIRCULAR ECONOMY GOALS

Apply the **embodied carbon hierarchy** of design and set a project embodied carbon target

Apply the **circular economy hierarchy** and set a target for % of material reuse

Challenge the typical design process to **maximise the potential for reuse**

Collaborate and engage with suppliers, fabricators, and contractors early

Encourage auditing of assets and **reused material databases** to establish availability

Delivering Net Zero

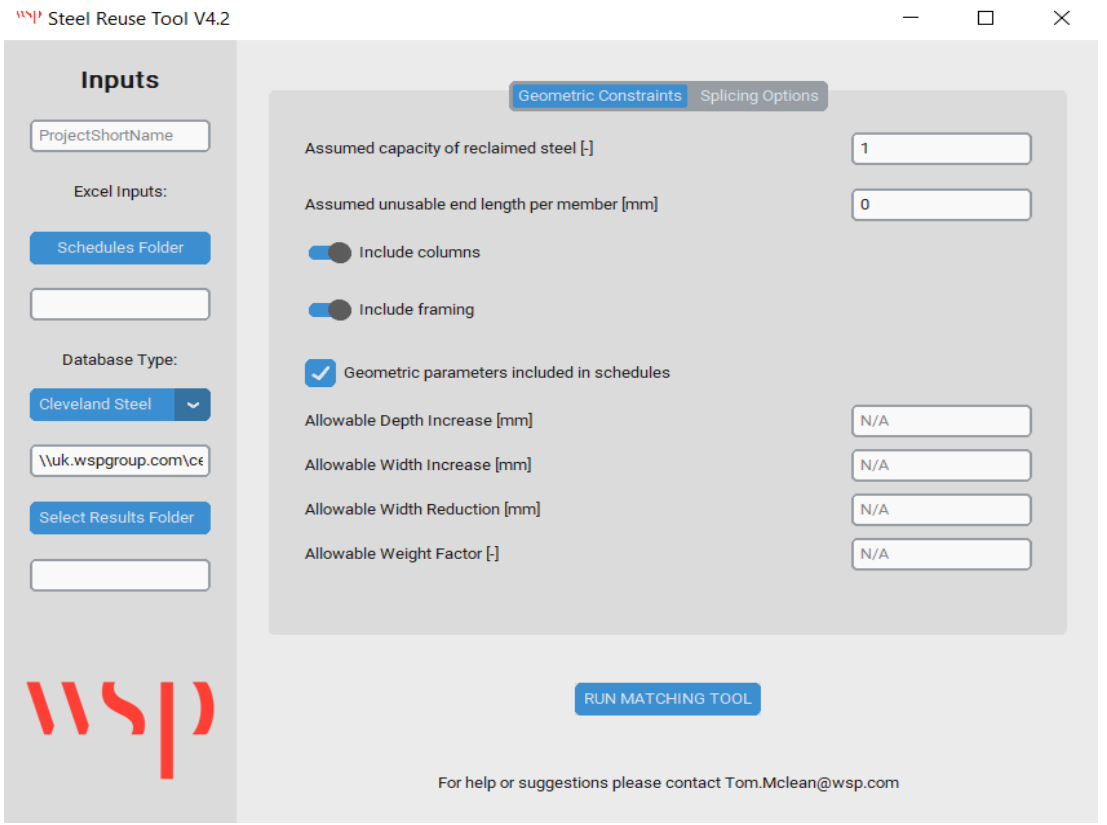
WSP commit to halving the carbon footprint of our designs and advice by 2030

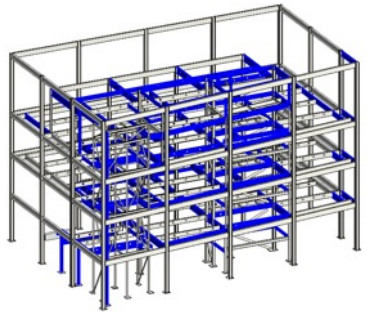
2 WSP STEEL REUSE TOOL

Steel Frame Design

Parameter Limits Agreed

Reclaimed Sections Database





X Tonnes of **Steel Reused**

X Tonnes of **Carbon Saved**

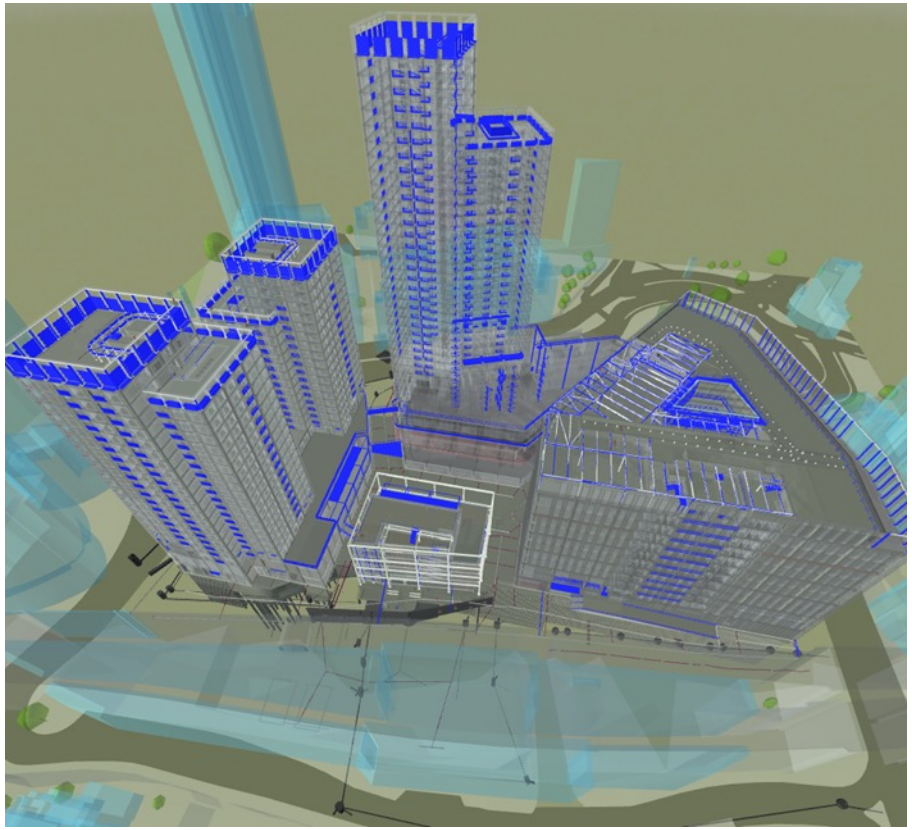
3 ELEPHANT & CASTLE TOWN CENTRE

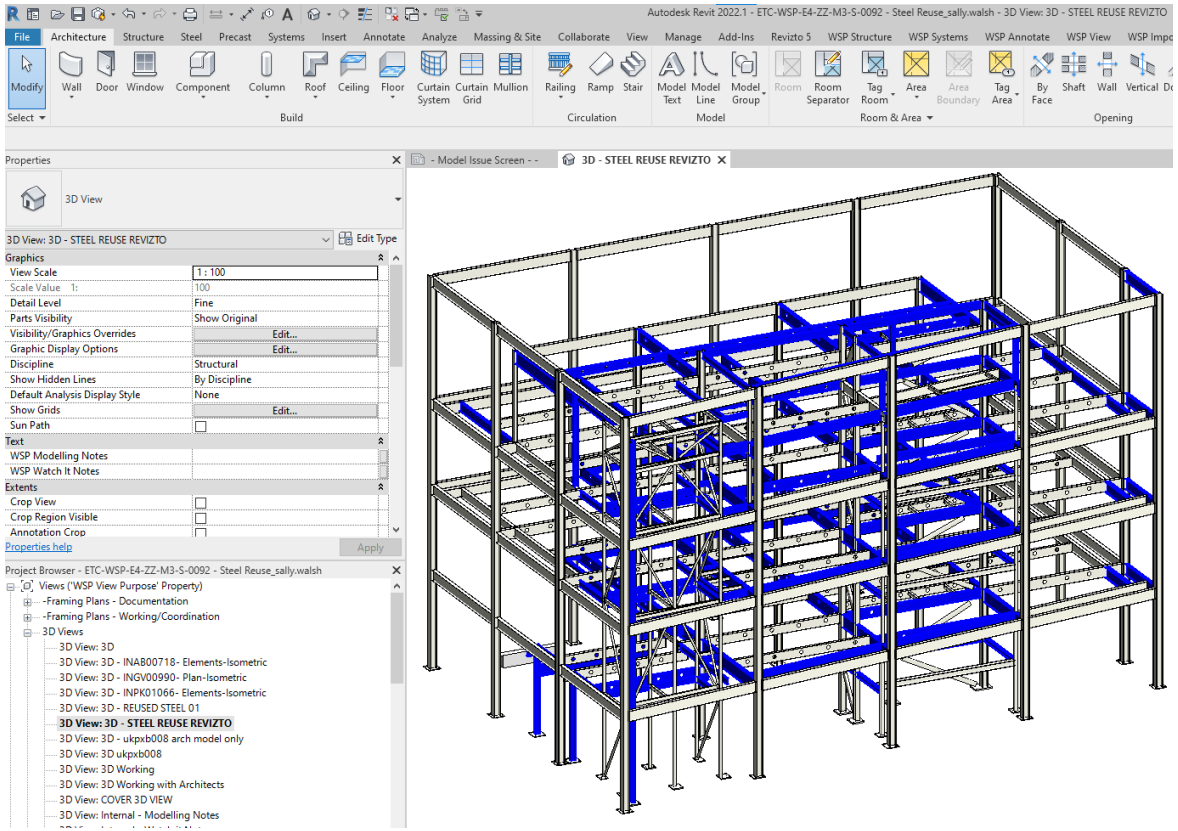
372 tonnes
Total Designed Steel

26% Reclaimed Steel

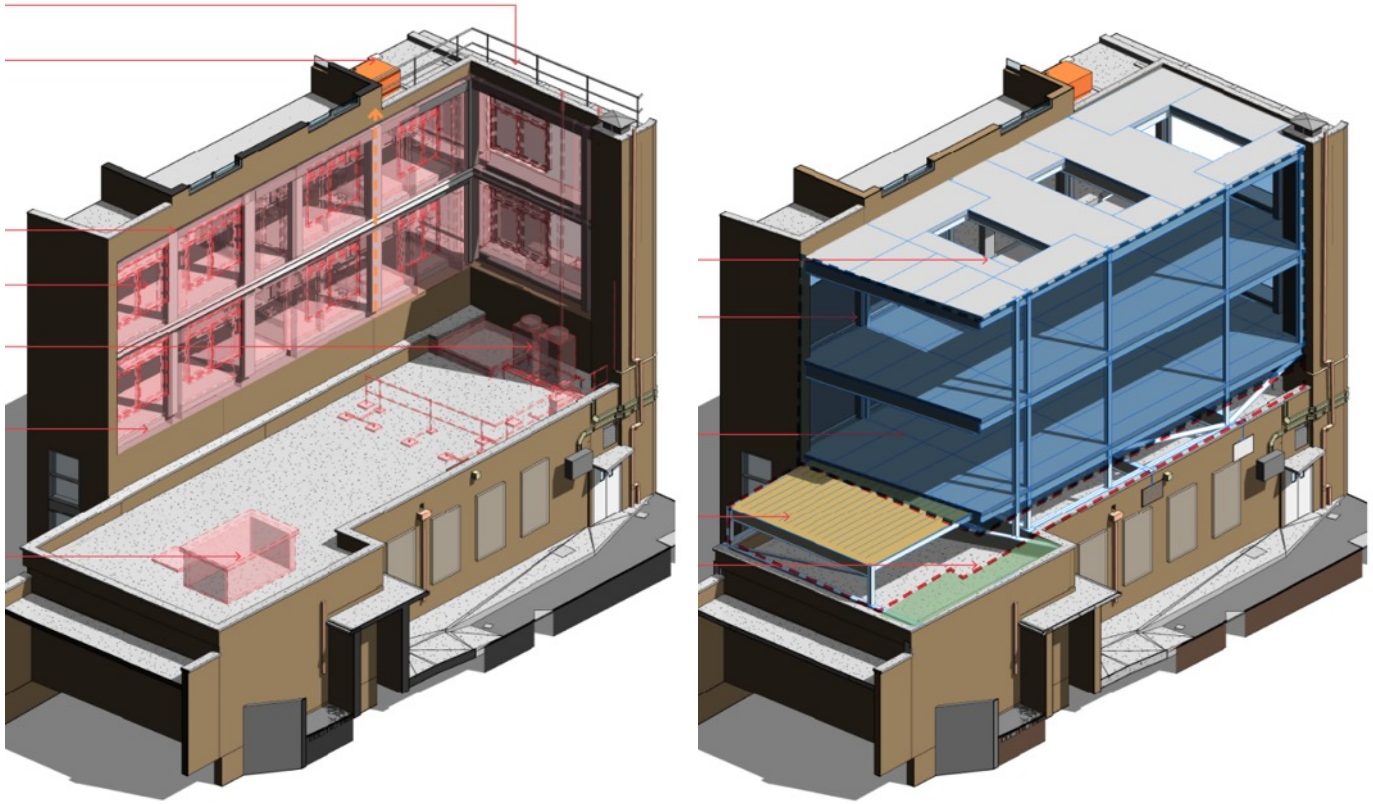
160 tonnes CO2e
Saved

3 ELEPHANT & CASTLE TOWN CENTRE





4 SLOANE SQUARE HOUSE

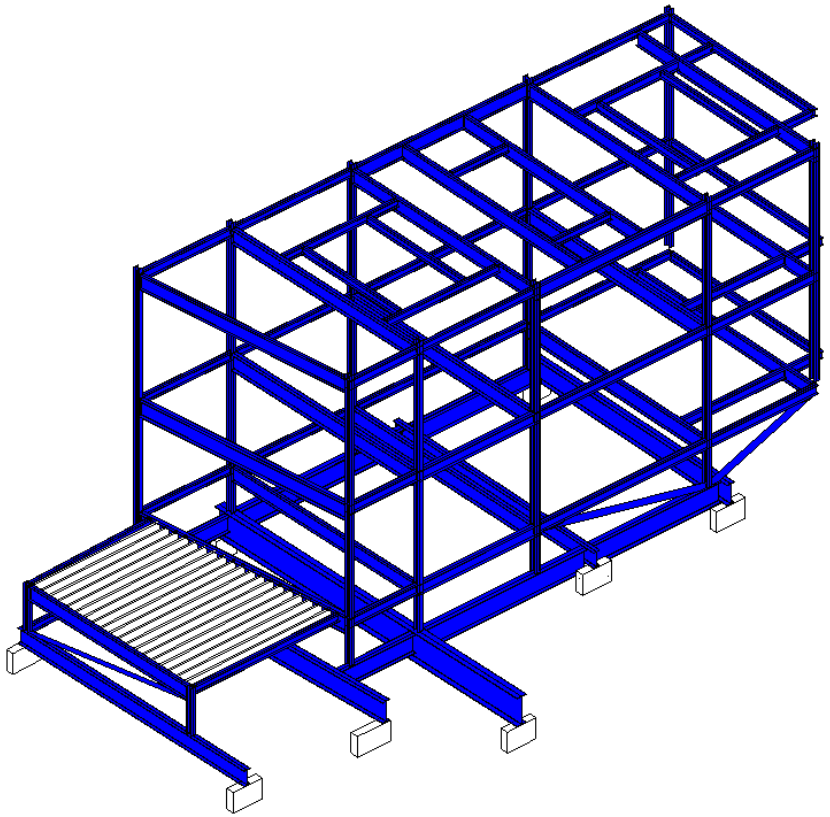


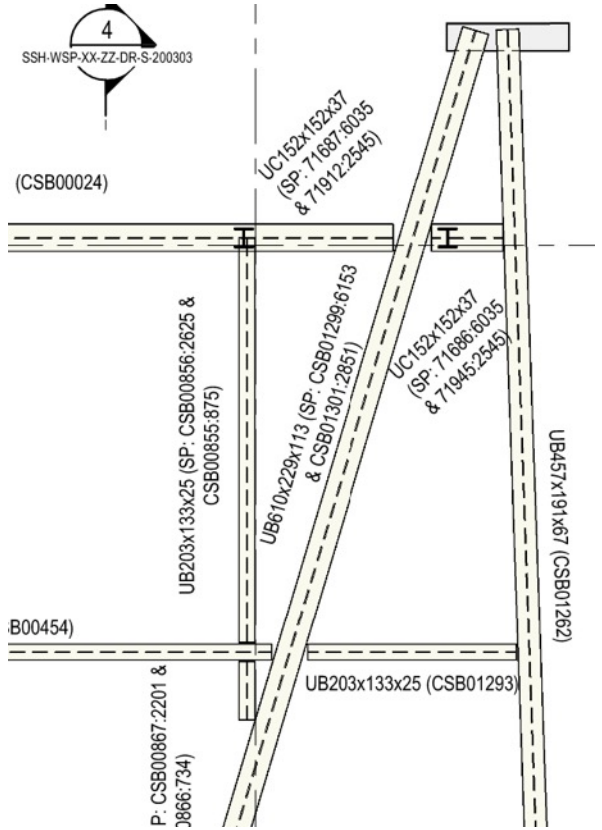
21 tonnes
Total Designed Steel

100% Reclaimed Steel

35 tonnes CO2e saved

4 SLOANE SQUARE HOUSE





Thank You

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tom.mclean@wsp.com

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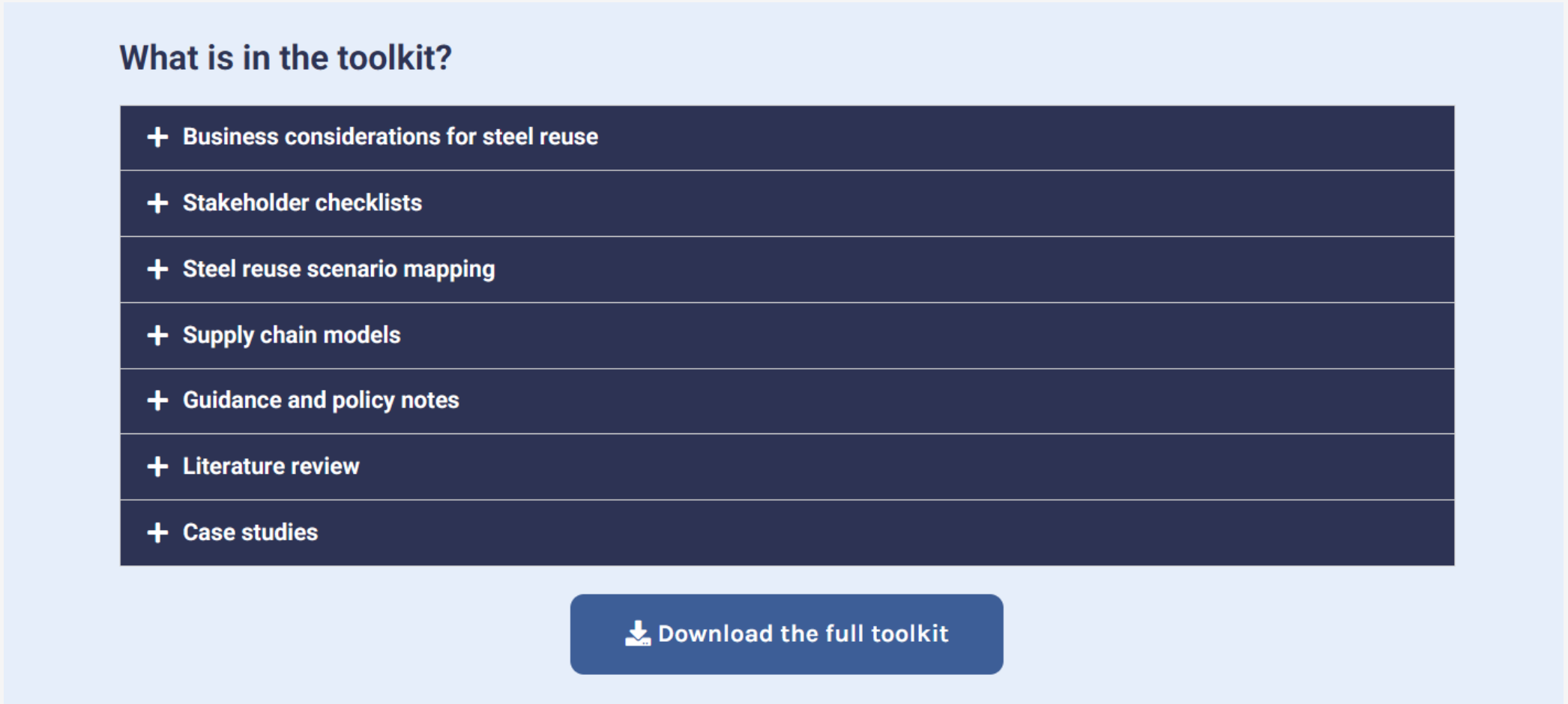
Launch of steel reuse toolkit

Katherine Adams

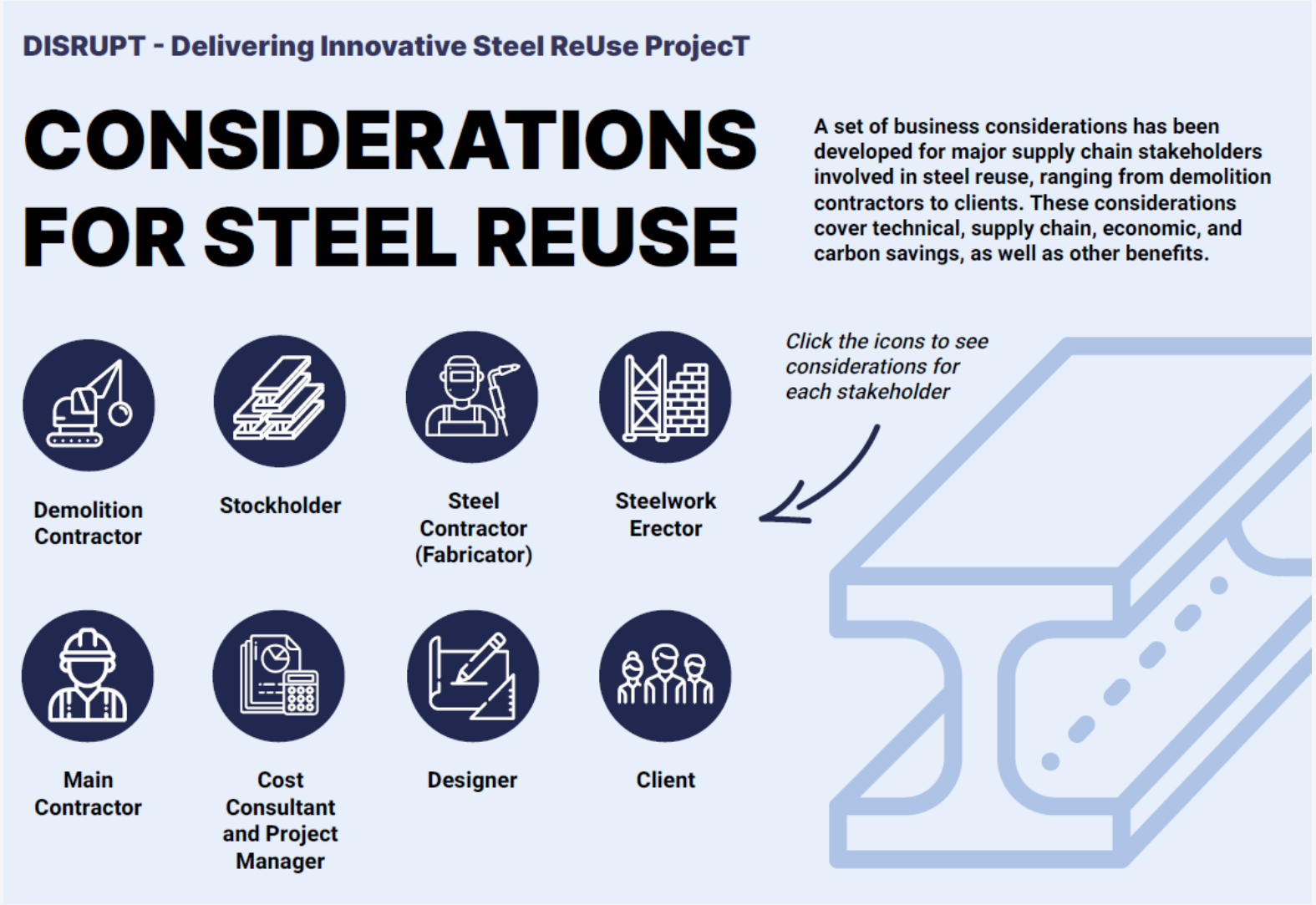
Technical Director, ASBP

The toolkit



https://asbp.org.uk/toolkit/disrupt-steel-reuse

Business considerations for reuse



Business considerations for reuse

Demolition Contractor

TECHNICAL

Pre-demolition audits (to ascertain which structural steel maybe suitable for reuse, the quantities, its condition and potential age)

Specifications/requirements from clients (to recover a certain amount of steel, in certain conditions and/or specific steel elements)

Demolition approach to recover steel sections

Ability to use existing demolition equipment to reclaim steel or utilise different equipment

Health and safety considerations (careful demolition/deconstruction may possess more injury risks)

SUPPLY CHAIN

Time constraints (it may take more time than usual although not necessarily as depends on the type of structure, the complexity of connections, composite materials and other factors)

Storage on site (might need to store large quantities of reclaimed steel on site)

Transportation of reclaimed steel elements

Demand for reclaimed steel (versus demand for scrap steel)

ECONOMIC

Potential cost increase in case of delays to the demolition programme (although not necessarily as this depends on the complexity of the project)

Payment for reclaimed steel (versus payment sent for recycling, and agreeing on the payment rate)

Potential increased labour costs (not necessarily as depends on the complexity of the project)

Potential increased machinery/ equipment cost (not necessarily as depends on the complexity of the project)

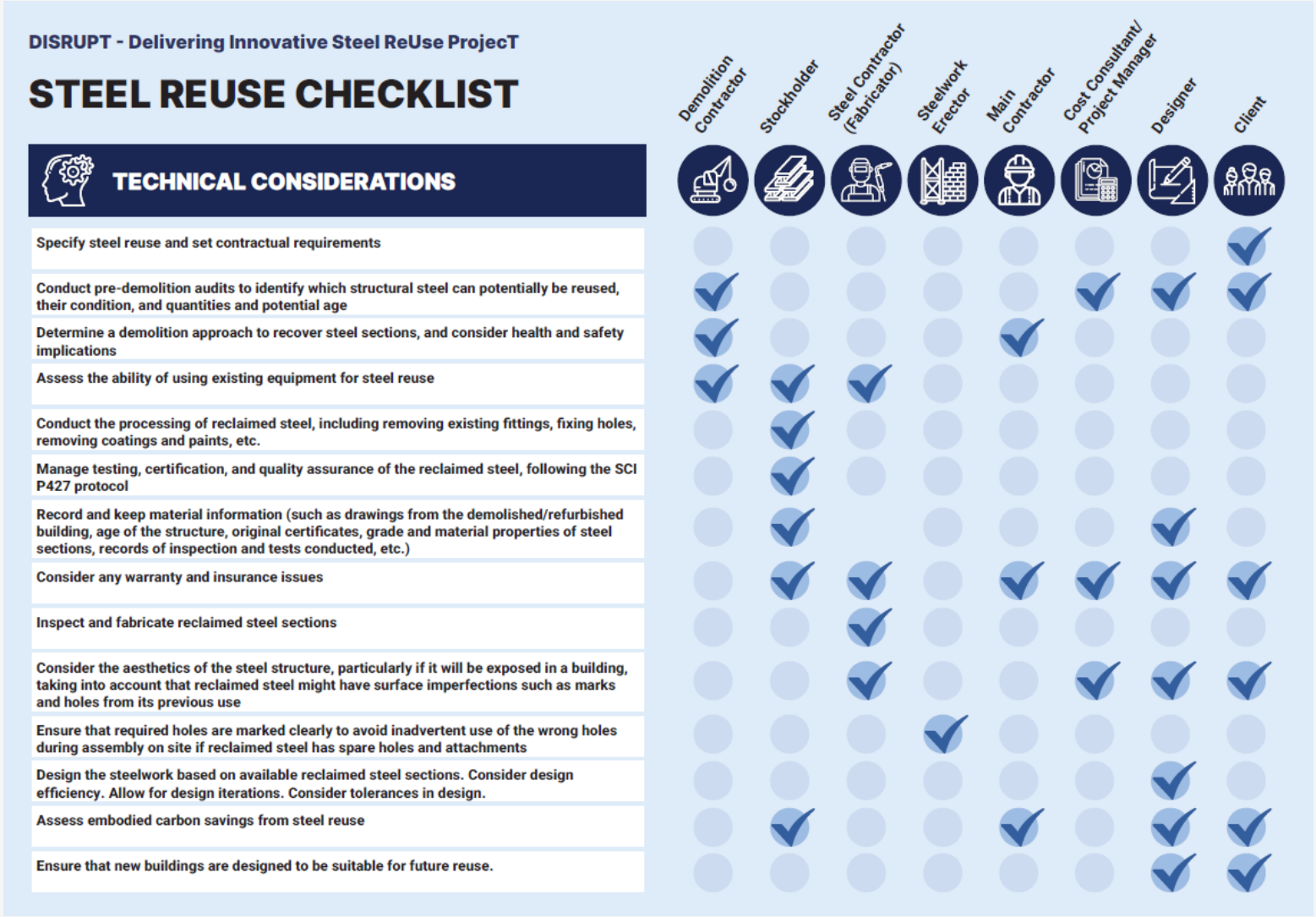
Cash flow (versus quick payment for steel scrap sent for recycling)

CARBON & OTHER

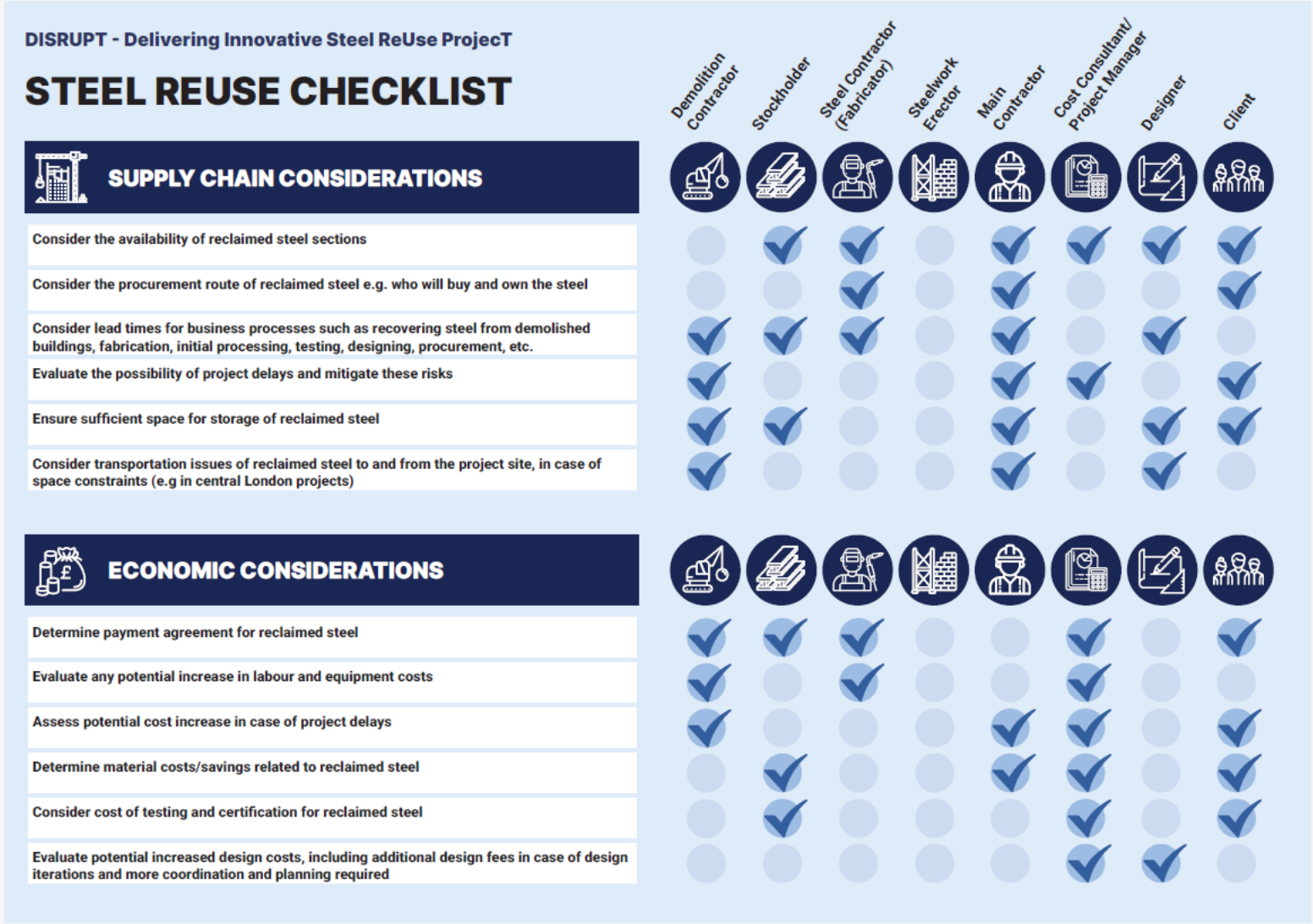
Competitive advantage (knowledge and experience of steel reuse could provide competitive advantage)

Carbon savings and environmental benefits

Stakeholder checklists

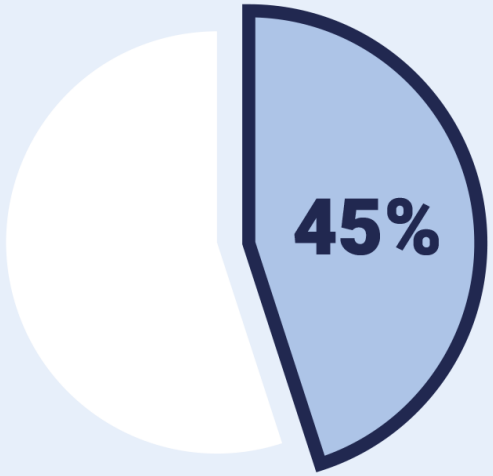


Stakeholder checklists

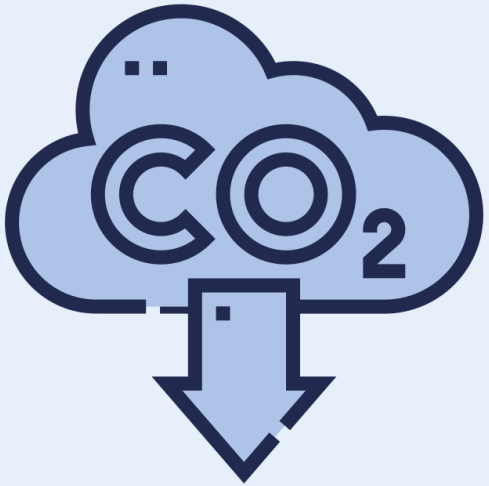


Scenario mapping

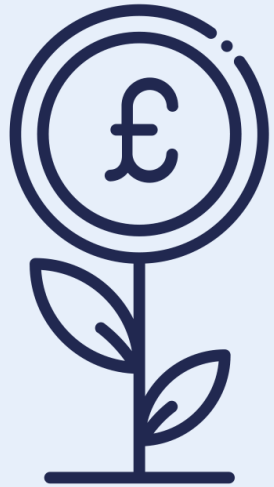
By 2050...



45% of all structural steel* in construction is being reused



Steel reuse could save 250,000+ tonnes of embodied carbon per year



Construction projects could save £40m annually by using reused steel

Scenario mapping

DISRUPT - Delivering Innovative Steel ReUse ProjecT

STEEL REUSE SCENARIO MAPPING

Four scenarios have been developed for structural steel reuse. These scenarios include one current scenario for 2023, and three future scenarios for 2030, 2040, and 2050. Each scenario includes the annual availability of structural steel for reuse, as well as the carbon and socioeconomic impact of steel reuse. Please note that scenarios focus specifically on ***columns and beams** as the main structural elements currently reused.

Scenario	2023 (current)	2030	2040	2050
Description	This current scenario includes beams and columns reused at a 5% rate.	In this scenario, 15% of beams and columns are reused	In this scenario, 30% of beams and columns are reused	In this scenario, structural steel reuse is a widespread practice and 45% of beams and columns are reused
Annual availability of structural steel for reuse, tonnes	313,038[1]	338,081[2]	338,081[3]	331,319[4]
Reused structural steel, tonnes	15,652	50,712	101,424	149,094
Embodied carbon savings due to steel reuse, tonnes per year[5]	26,499	85,856	171,711	252,416
Annual costs savings from steel reuse to construction projects[6]	£4,226,013	£13,692,282	£27,384,564	£40,255,309

Supply chain models

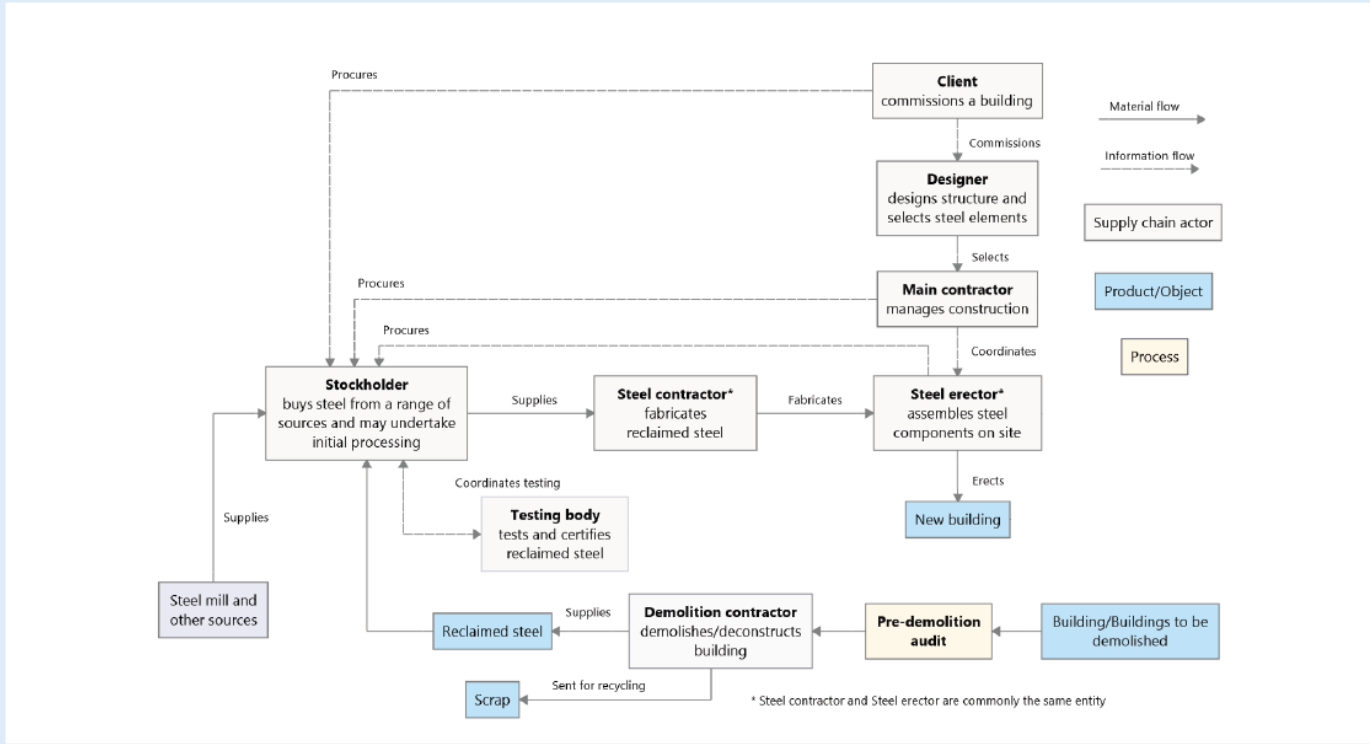
DISRUPT - Delivering Innovative Steel ReUse ProjecT

Download the full toolkit and view case studies at asbp.org.uk/toolkit/disrupt-steel-reuse

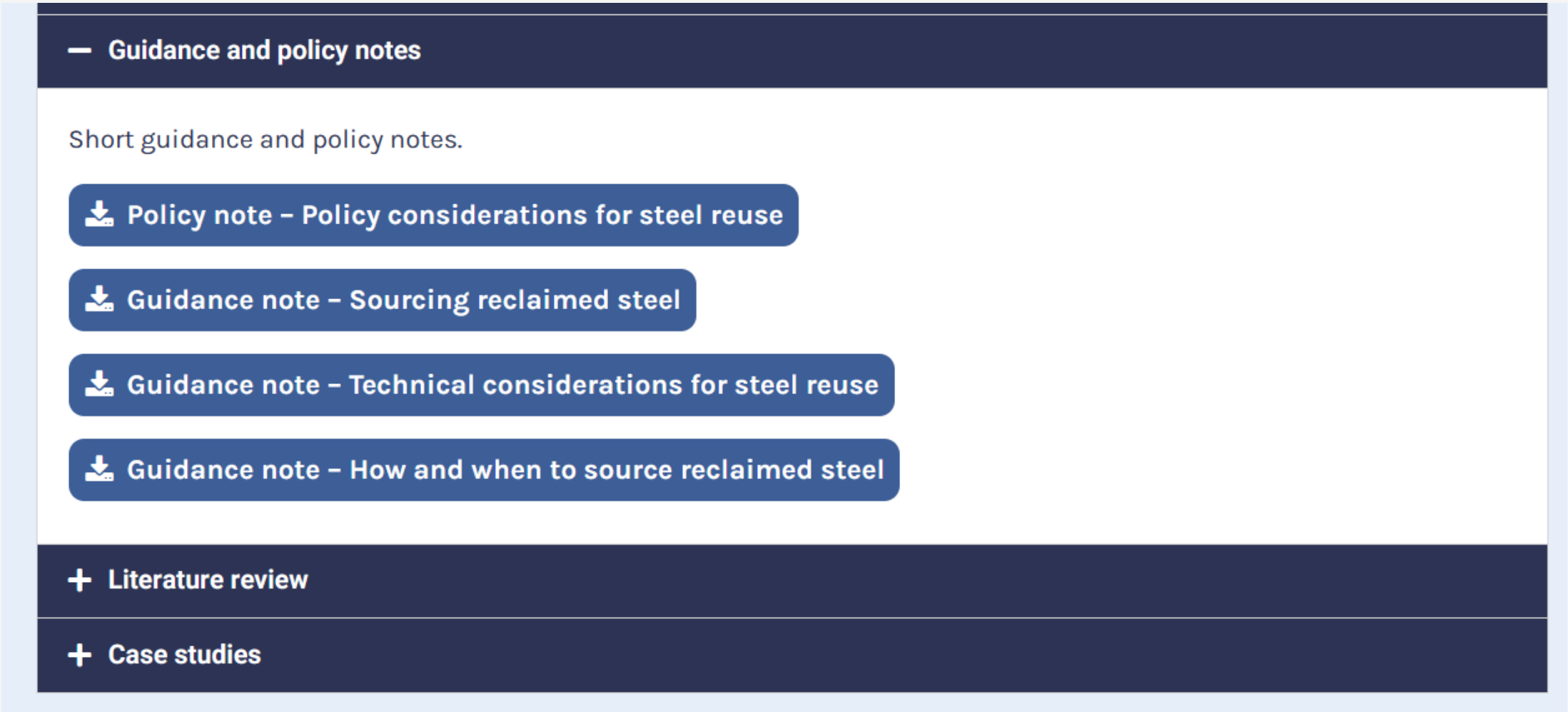
SUPPLY CHAIN MODELS

REUSE: STOCKHOLDERS DRIVEN

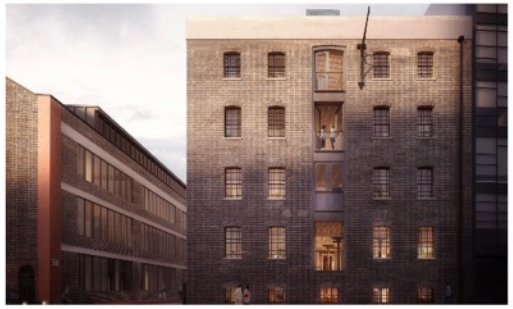
Stockholders purchase reclaimed steel from demolition contractors and then sell it in the open market. Stockholders perform the initial processing of reclaimed steel, such as sandblasting to remove paintings and coatings. Reclaimed steel is tested and certified, the complexity of which might depend on the amount of information available on the reclaimed elements (e.g. material properties, steel grade, previous testing). Certified steel is then supplied for fabrication and assembly on site as usual.



Guidance and policy notes



Case studies



55 Great Suffolk Street

Southwark, London

Brent Cross Town Primary Substation

Brent Cross, London

Elephant & Castle Town centre redevelopment

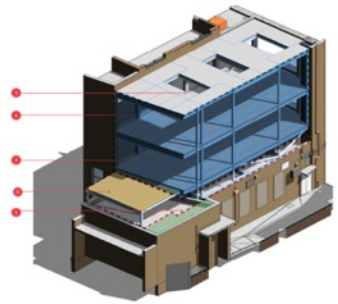
Southwark, London

Holbein Gardens (DISRUPT)

Sloane Square, London

Meridian Water

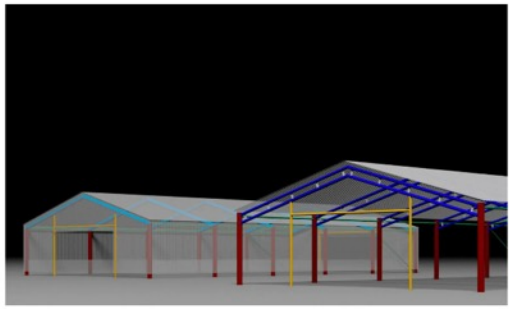
Enfield, London



Sloane Square House

Sloane Square, London

Case studies



Steel reuse agricultural buildings

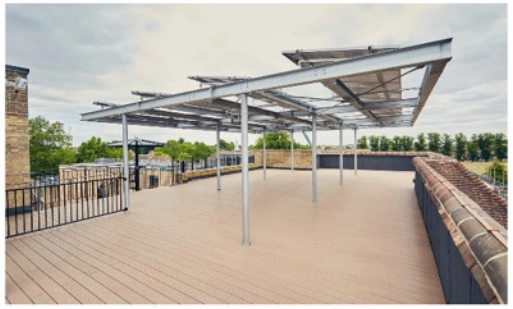
North Yorkshire

Steel reuse domestic refurbishment project

Lichfield, West Midlands

Steel reuse for offshore wind farm

Wick, Scotland



The Entopia Building (DISRUPT)

Cambridge

Unsuccessful steel reuse case study

London

What's next?

DISRUPT 2 – Start May 2023 for 18 months

Partners: National Federation of Demolition Contractors (NFDC) and Cleveland Steel and Tubes

Funding from **Innovate UK** to:

- **Deep dive with demolition contractors**
- **Reuse platform**
- **Procurement analysis**
- **Demolition guidance/toolkits**
- **Structural steel and non-structural steel products**
- **Wide stakeholder engagement**

Also..

Embedding Traceability in Manufacturing Construction Steel (E-TRACS) to Aid Reuse

- Innovate UK Funding – Feasibility Study
- Partners: Dynatics Solutions Ltd, University of Hertfordshire , Leeds Beckett University
- Start June for 6 months
- Researching construction steel products suitable for tracing/tracking &identify suitable trace/track system technologies for construction steel

ASBP The Alliance for Sustainable Building Products

Thank you

22nd March 2023

Dr Katherine Adams, Technical Director

katherine@asbp.org.uk www.asbp.org.uk

@asbp_uk

Q&A

Any questions?

Thank you

Drinks and networking until 8pm

Download the free toolkit at:

asbp.org.uk/toolkit/disrupt-steel-reuse

Please consider joining ASBP