

DISRUPT 2 - Delivering Innovative Steel ReUse Project

GUIDANCE FOR RECOVERING STEEL FOR REUSE



Steel is one of the most widely used and resource-intensive materials in construction. Although it is commonly recycled at the end of its life, even greater benefits can be achieved through reusing steel. Steel reuse offers up to 97% embodied carbon savings compared to using new steel and is ten times less carbon intensive than recycling.

In our previous DISRUPT I project, we explored steel reuse from the entire value chain perspective, developing business models for key supply chain actors and gathering case studies on steel reuse, among other outputs. The DISRUPT I Toolkit can be accessed here: [DISRUPT Steel Reuse Toolkit](#).

Within DISRUPT II, we focused on the major challenge of steel reuse – the limited availability of reclaimed steel from demolition. We worked closely with demolition contractors and established a Working Group on Steel Reuse in collaboration with our project partners, the Institute of Demolition Engineers and Cleveland Steel and Tubes.

The purpose of this toolkit is to provide guidance on recovering steel for reuse. It will be useful not only for demolition contractors but also for other stakeholders in the supply chain, helping them better understand the demolition industry and the challenges of recovering steel for reuse. Successful steel reuse requires a collaborative approach across the supply chain.

Acknowledgements

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Case studies

List and interactive map of projects with steel reuse

Case studies

Click a box to go to that section





This section provides a range of resources intended to support projects involving the recovery of steel for reuse.

High level Steps for Managing Recovering Steel for reuse can be used by demolition contractors and other supply chain actors, particularly clients and design teams, to coordinate reuse efforts.

Deconstruction/Demolition approaches based on building types describe the variety of methods for recovering steel sections from buildings, depending on specific site conditions and practical considerations—programme timeline, effort required, and subsequent material recovery rate. We encourage aiming for approaches that maximise material recovery rates, which can be facilitated by effective coordination and management.

Extra equipment that might be required for reuse is linked to deconstruction/demolition approaches; please note the red, amber, and green dots.

Guidance for a pre-demolition audit describes its purpose, what it involves, who should participate, and signposts existing UK and EU guidance for conducting pre-demolition audits.



Technical aspects of the recovery of steel for reuse

High level steps for managing the recovery of steel for reuse

Deconstruction/ Demolition approaches based on building types

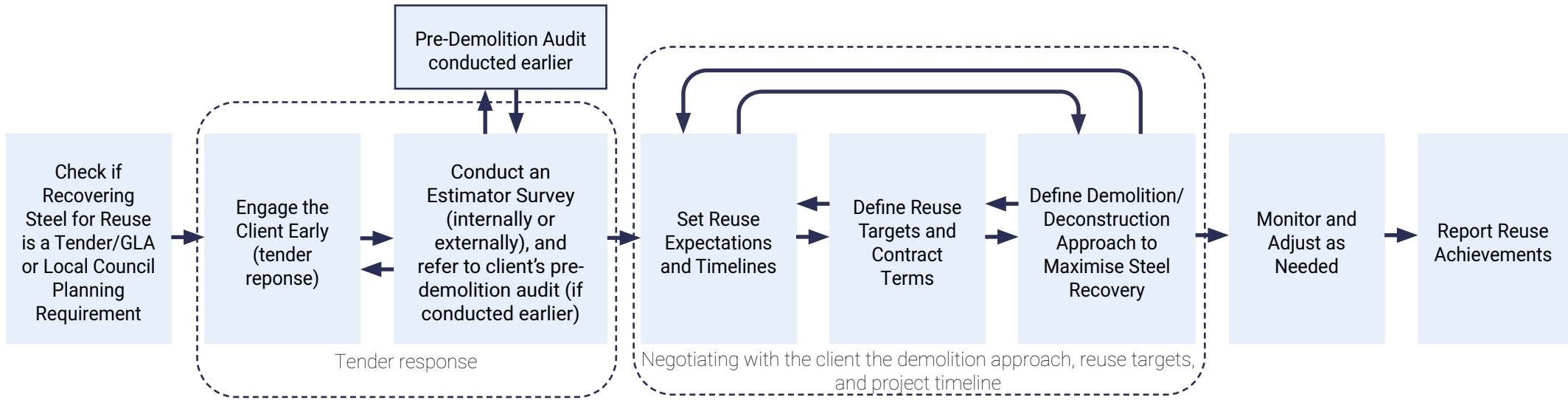
Extra equipment that might be required for reuse

Guidance for a pre-demolition audit

High level Steps for managing the recovery of steel for reuse (1/2)



Client Led



Clients should specify the requirement for recovering materials for reuse in the project tender documents or/ and GLA or local council planning requirements.

Review project tender documents for steel reuse requirements.

Engage with clients early to better understand their reuse goals and expectations. Ensure that these are aligned with practical realities.

Assess reuse practicalities, including offsite and onsite space, etc.

Refer to or ensure that [pre-demolition audit/ estimator survey](#) is conducted to identify steel sections suitable for reuse and those that are not worth recovering for reuse.

Consult with structural engineers and reuse specialists/ stockholders such as Cleveland Steel and Tubes, and EMR to determine the acceptability of steel for reuse. This will help to reach reuse targets and maximise steel recovery.

Organise a meeting with the client, design team, and other stakeholders to discuss reuse expectations.

Discuss realistic timelines that account for the demolition/ deconstruction approach to maximise steel recovery.

Ensure that reuse goals are achievable within the project's scope, budget, and timelines.

Review acceptable conditions for recovered steel, if set by clients.

Communicate the targets internally.

Define how recovered steel will be measured/ recorded on site before transporting off-site.

Choose a [demolition approach](#) that maximises the recovery of reusable steel within the given conditions.

Plan for the logistics of storing and transporting reclaimed steel, considering factors like space constraints.

Ensure that demolition operatives receive [appropriate training in steel recovery](#), with a focus on health and safety.

Regularly review progress against the reuse targets with relevant stakeholders.

Adjust strategies as necessary based on real-time conditions and continuous engagement with key project stakeholders.

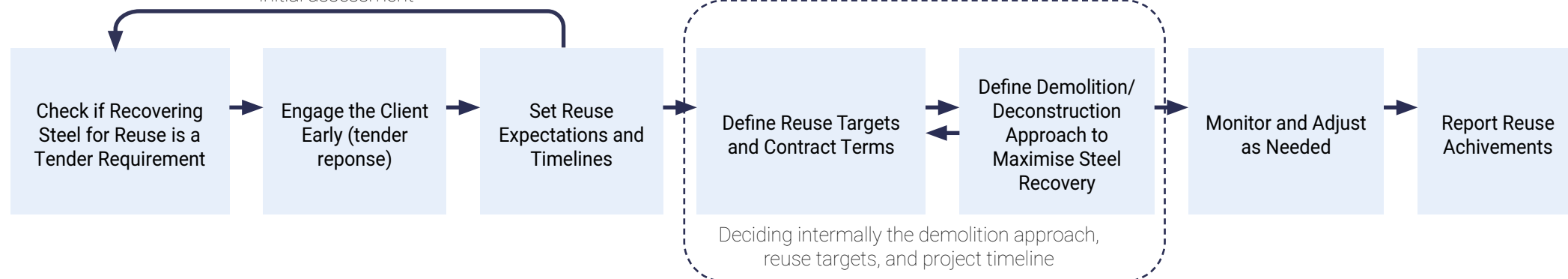
Report to share learning and best practices, and for CSR/ marketing purposes.





Demolition Contractor Led

If a pre-demolition audit has already been conducted by a client, results will support the initial assessment



Assess whether steel sections in the structure can be reused.

Assess the uplift of sending steel for reuse vs scrap.

Assess economic, environmental, CSR and ESG reporting, and marketing benefits of recovering steel for reuse. Also, knowledge and experience of steel reuse could provide a competitive advantage.

Evaluate market demand and viability of steel sections for reuse on the market.

Discuss the potential for steel reuse in the initial project meetings.

Emphasise environmental, CSR and ESG reporting, and marketing benefits of recovering steel for reuse to ensure client support.

Refer to GLA requirements (if in London), relevant policies, BREEAM, best practices, previous experience, case studies, and industry guidance.

Ensure that [pre-demolition audit/estimator survey](#) is conducted to identify steel sections suitable for reuse and those that are not worth recovering.

Possibly, consult with reuse specialists/stockholders like Cleveland Steel and Tubes, and EMR to determine the [acceptability of steel for reuse](#). This will help to maximise steel recovery and cost efficiency.

Define realistic timelines that account for the demolition/deconstruction approach to maximise steel recovery.

Establish clear reuse targets and communicate internally.

Manage the demand for reusable materials (e.g. sending to stockholders, other customers, or keeping internally).

Define how recovered steel will be measured/recorded on site before transporting off-site.

Choose a demolition approach that maximises the recovery of reusable steel within the given conditions.

Plan for the logistics of storing and transporting reclaimed steel, considering factors like space constraints and constraints on loading for example in urban areas

Ensure that demolition operatives receive appropriate [training in steel recovery for reuse](#), with a focus on health and safety.

Regularly review progress against the reuse targets.

Adjust strategies as necessary based on real-time conditions and continuous engagement with key project stakeholders.

Report to share learning and best practices, and for CSR/marketing purposes.



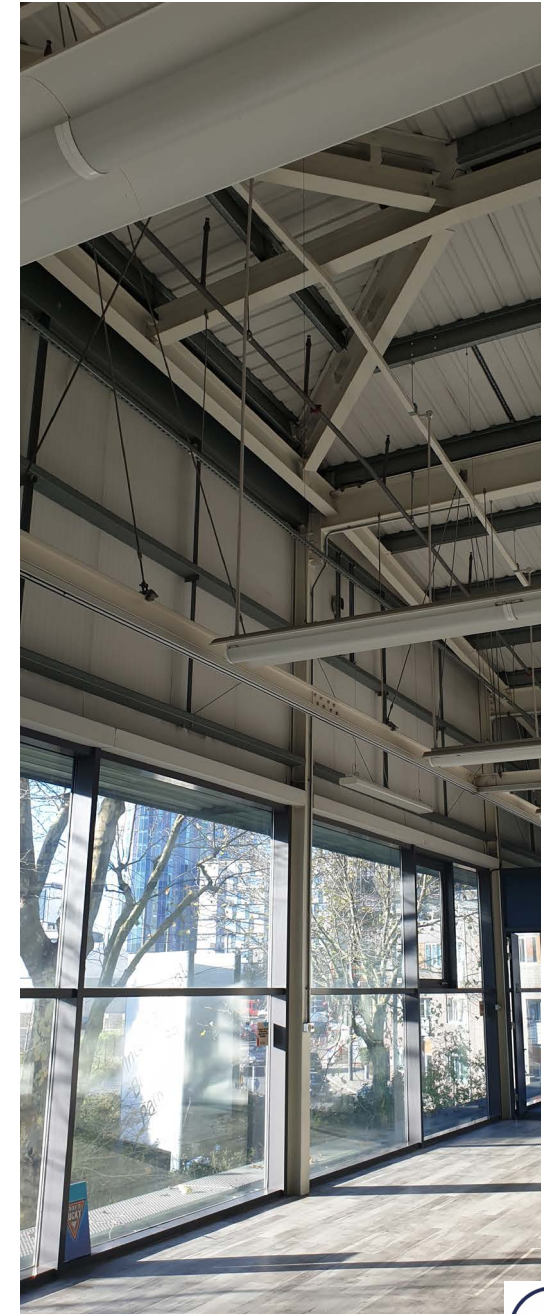
This diagram (next page) aids in decision-making by aligning demolition/deconstruction approaches with building types, space constraints, available time, effort involved, and the resulting percentage of reusable materials. It distinguishes 3 major approaches:

- Deconstruction involves the careful dismantling of buildings to preserve materials for reuse. This method requires meticulous planning, coordination, and a significant amount of manual labour to avoid damaging reusable materials. This approach usually requires maximum effort and time but provides maximum recovery of material for reuse.
- Partial deconstruction focuses on selectively dismantling parts of a building while demolishing others, balancing material recovery for reuse with practical demolition constraints.
- Conventional demolition to recover steel involves using heavy machinery, such as excavators fitted with shears and rotation grabs, to quickly dismantle structures while salvaging steel for reuse. This process includes controlled felling to maximise steel recovery, with ground preparation to minimise damage. The approach prioritises speed and cost-effectiveness over material preservation, while still ensuring an acceptable level of material is recovered for reuse.

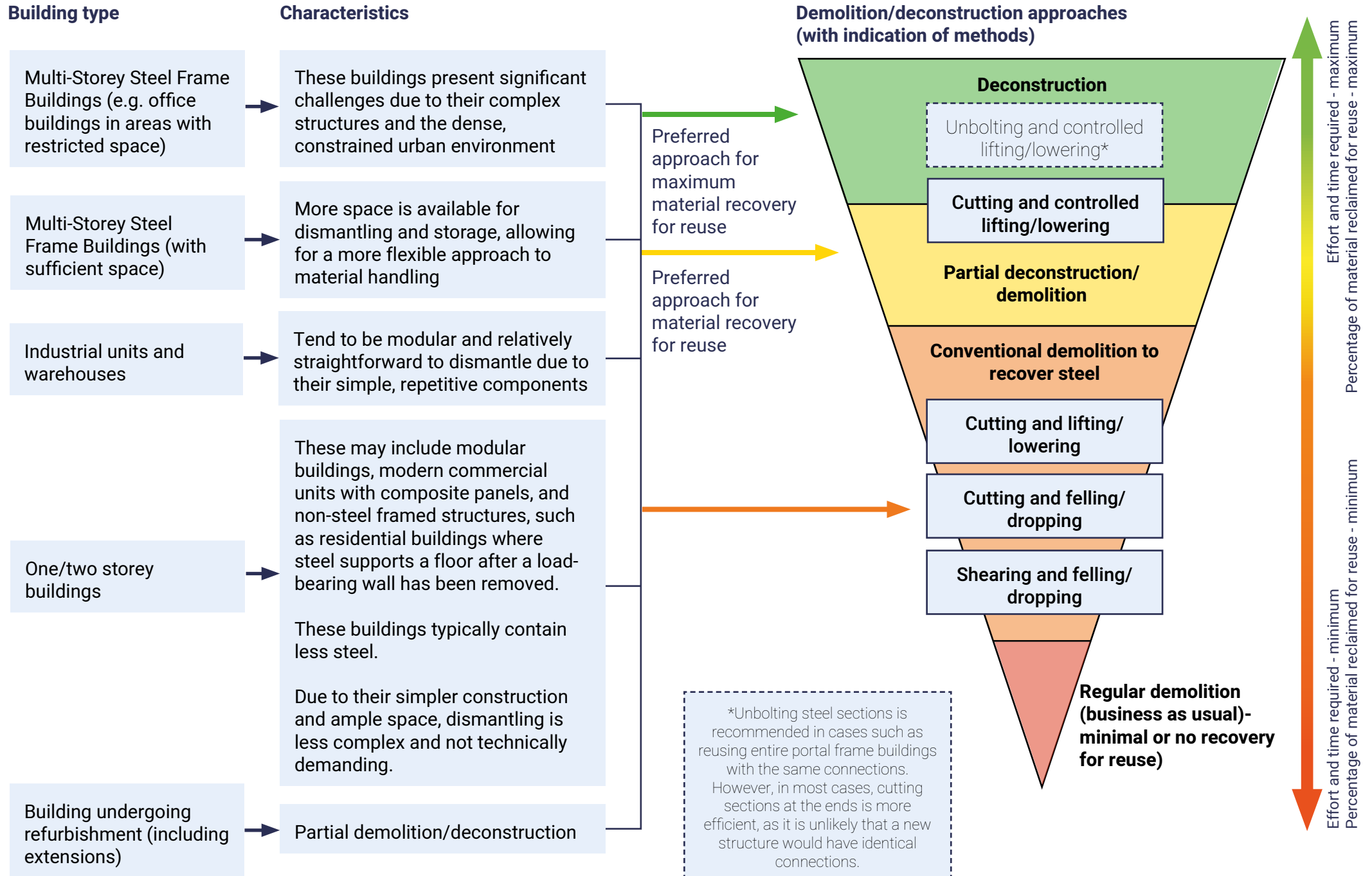
The approaches are presented as an inverted triangle, similar to the waste hierarchy, showing the trade-offs between these approaches. For instance, deconstruction may yield better steel recovery but generally requires more time and effort, whereas conventional demolition is faster and simpler but less effective for steel recovery for reuse. This diagram could serve as a valuable tool for negotiating demolition approaches, reuse targets, and project timelines with clients and other stakeholders.

Each approach includes specific methods for separating and lowering steel from the structure. Unbolting steel sections is recommended in cases such as reusing entire portal frame buildings with the same connections. However, in most cases, cutting sections at the ends is more efficient, as it is unlikely that a new structure would have identical connections, and connections aren't typically reused.

In addition, while the demolition/deconstruction method is critical, the handling and transportation of steel sections both on-site and off-site are also important, as damage can occur to steel sections post-demolition. Using (rotating) demolition/sorting grab attachments can help transport and sort reclaimed steel sections without causing damage. Further details on additional equipment that might be needed for reuse are provided in the [following diagram](#).



Demolition/deconstruction approaches linked to building types (2/2)



Extra equipment that might be required for reuse vs business as usual



Removing steel sections from buildings

Transporting on and off site

Processing on site: such as removing fixings from steel sections for efficient transport and compliance with stockholder (or any other) customer acceptance criteria

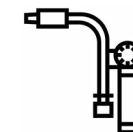
Tower/Mobile Cranes: For lifting and removing steel sections from taller buildings



(Rotating) demolition/ sorting grab: For transporting and sorting reclaimed steel sections without damaging them on site



Manual Tools: Hot cutting equipment for processing reclaimed steel on site



Spider (Mini) Cranes: For lifting and removing steel sections from buildings with tight and restricted spaces, e.g. rooftops



Forklifts: For moving dismantled materials on site



Manual Tools: Wrenches and other tools for unbolting connections



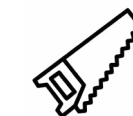
Excavators: For dismantling structures



Lorries, including with Extendable Trailers: For transporting longer steel sections from site



Manual Tools: Saws and other tools for cutting connections and detailed dismantling work

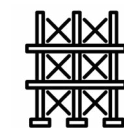


High Reach Demolition Excavators: With an extended boom and arm, allowing them to reach higher stories of a building



Additional Equipment

Scaffolding: More may be required to provide access and ensure safety during manual dismantling



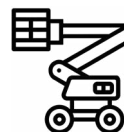
Sorting and Grading: visual checks to assess the condition of reclaimed materials



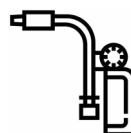
Shear Attachments: For cutting sections



Boom Lifts: To elevate workers for cutting/unbolting sections



Manual Tools: Hot cutting equipment for initial dismantling



Manual Tools: Wrenches and other tools for unbolting connections to dismantle



Key - Corresponding approach to deconstruction/demolition

- Deconstruction
- Partial deconstruction/demolition
- Conventional demolition to recover steel



What are pre-demolition audits?

Pre-demolition audits are a useful tool to understand the materials and products that are in a building. Importantly they make recommendations for reuse and recycling of components that are to be removed as a result of refurbishment/demolition activities. This requires estimating the quantity of materials that are in the building, in relevant metrics (i.e. volume, tonnage and area). This information can be used as a starting point, to review reuse and recycling opportunities (preferably closed-loop recycling). These opportunities may vary dependant on the product and the project – for example, some materials/products could be reused on the new scheme; on other client scheme's; donated/sold to other projects, community schemes etc. There may also be opportunities to send materials and products back to manufacturers.

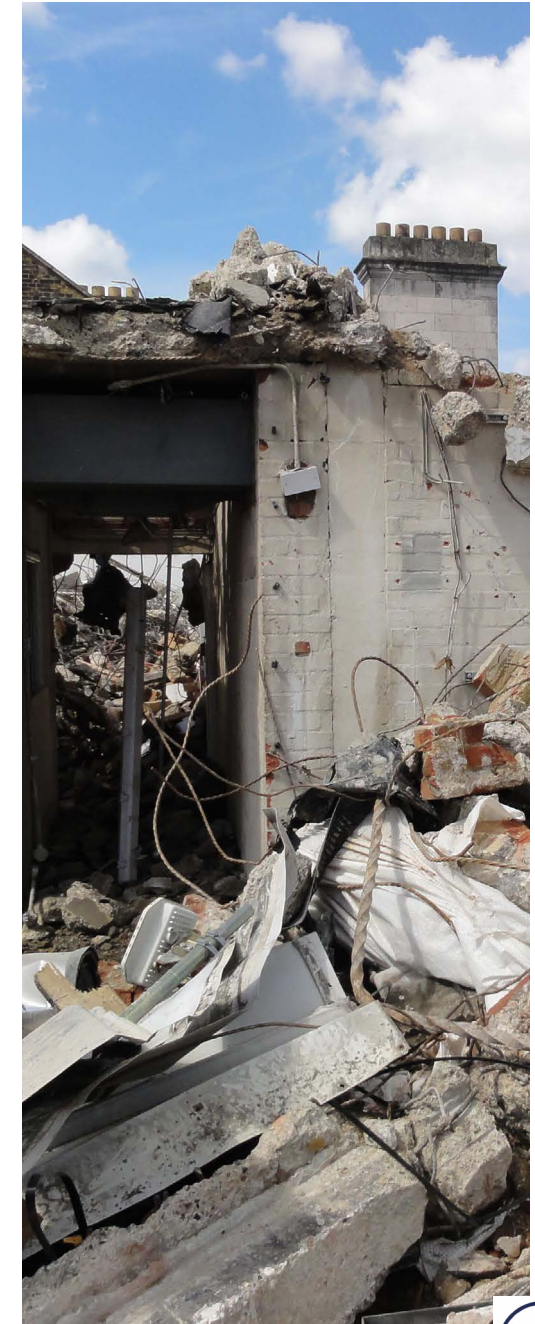
The scope of them will depend on the scope of the project, but they should include structural materials, if these are to be removed. This includes structural steel.

There are various names for these audits, including pre-refurbishment audits, material inventories, pre-redevelopment audits, deconstruction audits etc, but, in essence, they all involve assessing the materials that are in a building/structure.

Are they a requirement?

- There is no legal obligation in the UK to undertake pre-demolition audits. However, some planning authorities may require them. In London, referable developments to the Greater London Authority (GLA) require [Circular Economy Statements](#) which include pre-demolition audits at the early planning stages. Some London boroughs now also require Circular Economy Statements and Pre Demolition Audits as well – for example, Islington, Camden and Westminster.
- They are also required to be undertaken for the waste credits within [BREEAM \(Wst01\)](#).
- Increasingly clients are requiring that they are undertaken for projects where demolition is involved. For example, British Land requires in their [Sustainability Brief](#) for all their developments to *'carry out a detailed pre-demolition Materials Mapping Audit [and to] use this audit to explore where materials can be reused on site or elsewhere'*.
- They may also be required to feed into whole life carbon assessments, particularly for when elements of a building are being retained.
- And of course, demolition contractors will often undertake pre-demolition audits, to price up a job. They shouldn't be confused with structural surveys/audits or refurbishment/demolition surveys which are a legal requirement for asbestos.

Other counties such as France have a legal requirement ([PEMD](#)) in place for pre-demolition audits and the [EU Taxonomy](#) (a system that helps investors and companies determine if an economic activity is environmentally sustainable) has criteria for pre-demolition audits to be undertaken.





Why are they useful?

The results of pre-demolition audits are used to identify and quantify products and materials, that can be a) reused and b) recycled (preferably at higher value). This information is useful to feed into the decision-making process such as when reuse can occur onsite, or for when reuse can occur offsite (in other developments, donated to charities, advertised on material exchange platforms).

The findings can feed into the procurement of demolition/refurbishment works in terms of identifying items for reuse and the implications of this (e.g. the need for a longer programme, storage etc). They can also be used in setting requirements and/or targets in the new scheme.

If a [whole life carbon assessment](#) is being undertaken, then any embodied carbon savings can also be factored in. They are also a first starting point of talking with manufacturers on the potential to take back materials for reuse, re-manufacture or recycling.

What do they involve?

A pre-demolition audit should involve the analysis of information on existing buildings – this could include floor plans, architectural drawings, structural information, M&E layouts, O&M manuals, asbestos surveys etc.

A site visit is usually undertaken to visually record the products and materials that are present and their potential suitability for reuse.

Number crunching is then undertaken to produce a report which details the types and amounts of materials and products present, and recommendations for reuse and recycling. This includes information presented in the relevant format i.e. m², volume, tonnes, number of items etc.

Recommendations can be provided on local organisations (for reuse), waste management companies etc. Any materials that could be hazardous should be referenced. Some will also include targets for reuse, recycling by materials and/or overall, as well as data related to embodied carbon and transport etc.

Ideally, the report should be presented at a workshop with the project team to evaluate the opportunities. These can then be tracked as the project progresses through a resource tracker or similar. It may be that material passports can be produced for certain materials and/or can be advertised on various platforms ([e.g. ASBP Reuse Portal](#)) for reuse.





Who should be involved?

A competent person/company should undertake a pre-demolition audit. They should have knowledge of buildings/structures, materials and how they can be reused and recycled. Sometimes it is the demolition contractor that undertakes them, but they may be more specific to their own needs rather than recommending reuse, recycling and other circular economy activities, and they may be too late in the project at this point.

Relevant members of the project team should be involved to review the findings and integrate opportunities into the new scheme or agree reuse opportunities elsewhere. As a minimum this should be the client, architect and structural engineer (if structural materials are being removed). It is also useful to engage with a demolition contractor to understand any practicalities.

If a whole life carbon assessment is being undertaken, then any embodied carbon savings can also be factored in. They are also a first starting point of talking with manufacturers on the potential to take back materials for reuse, re-manufacture or recycling.

When should they be undertaken?

As early as possible, ideally in RIBA Stage 0-2 (Strategic Definition, Preparation and Briefing and Concept Design), when there are still opportunities to influence any new design. See [High level Steps for managing the recovery of steel for reuse](#).





What are their limitations?

Pre-demolition audits are non-intrusive and as such it can be difficult to know what materials are present and how components can be fixed together. A lot of assumptions may be used to determine the quantities and type of materials present, this is particularly the case if there isn't much information available on the existing building. They are a starting point for recommendations not the end point. Products that may have been 'identified as suitable for reuse', may not always be, if for example, they are difficult to remove for reuse without damage. Further surveys may need to be undertaken, especially for items that may be hidden.

Are there any standards?

There is no European or British Standard for pre-demolition audits, however, there is work occurring at the European level on writing a standard, which should be produced in the next few years (2026).

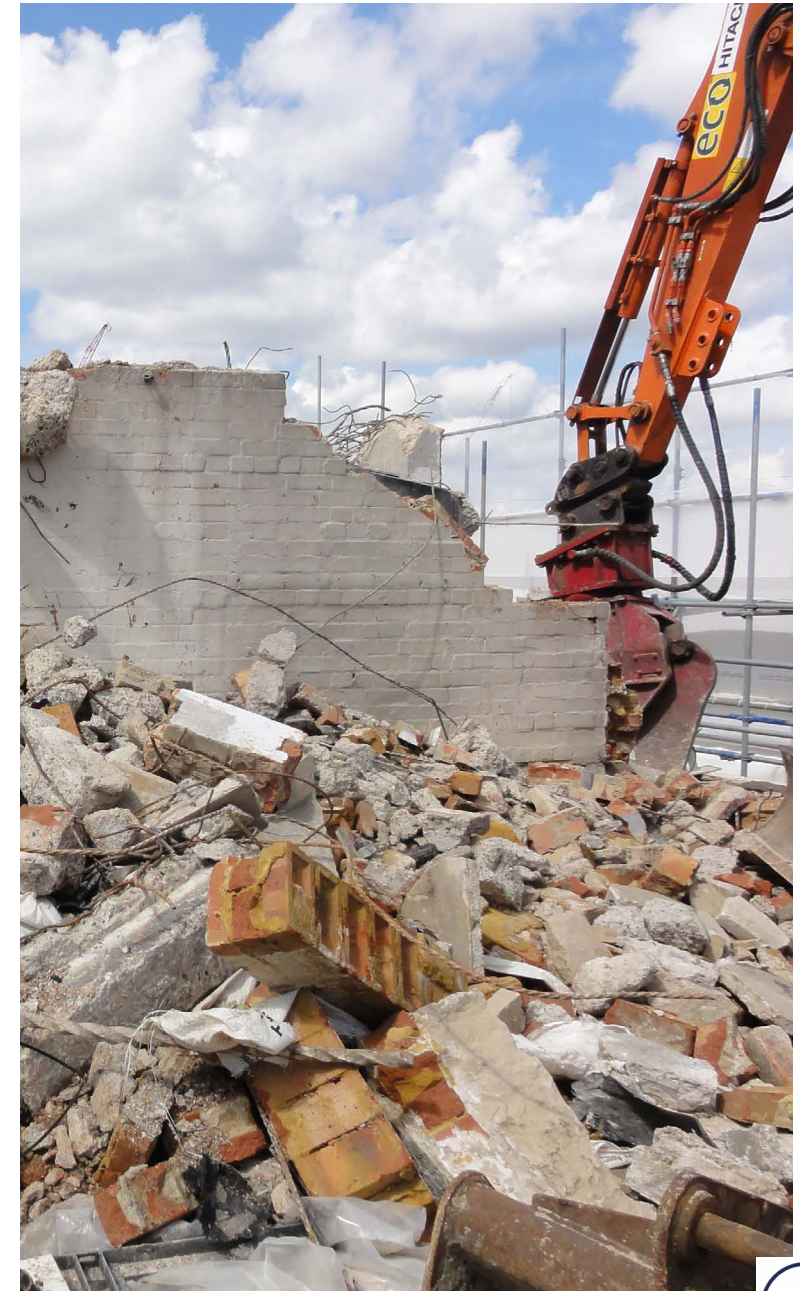
Is there any guidance available?

There is some UK guidance available, some of which may need updating:

- [CIWM Code of Practice for Redevelopment Audits](#)
- [NFDC Demolition and Refurbishment Protocol](#)
- [IStructE Circular economy and reuse: guidance for designers \(not free\)](#)
- [Elliot Wood Full Circle to Reuse](#)
- The Alliance for Sustainable Building Products (ASBP) also has a webinar on pre-demolition audits which can be access here: <https://asbp.org.uk/webinar-recording/pre-demolition-audits>

There is also European guidance including:

- [EU Construction & Demolition Waste Management Protocol including guidelines for pre-demolition and pre-renovation audits of construction works](#)
- [FCRBE - How to identify reusable materials in a building scheduled for demolition](#)
- [FCRBE GUIDE FOR DEMOLISHERS AND DISMANTLERS](#)
- [Cityloops Guide for Pre-demolition audits](#)
- A project from VTT (Finish research institute) on pre-demolition audits [PARADE - Best practices for Pre-demolition Audits ensuring high quality Raw materials \(vtt.fi\)](#)





Structural steel

Structural steel should be identified within the pre-demolition audit. This can be done through structural drawings, which may show the universal columns and beams, or through a visual survey (if they can be seen). 3D models may also be available although these are more common for retrofit projects. On site, where possible, it is useful to measure the beams' height, flange width and thickness and web thickness as this will help to define the type of beam/column (if not known from drawings). Sometimes, estimations on the type and number of beams and columns may be needed if the steel cannot be seen or is encased and there is limited information. Where there is steel that may be suitable for reuse, and there is enough information, it may be useful to do a more detailed steel schedule/inventory as part of the pre-demolition audit. It may also be useful for a structural engineer to do a more detailed survey if there is a likelihood that the steel could be reused back in the scheme.

Note, the age of the building is a factor in establishing if some of the steel will be suitable for reuse. For example, steel reuse is much more difficult if the steel is pre-1970s, however, newer steelwork could have been added in older buildings.

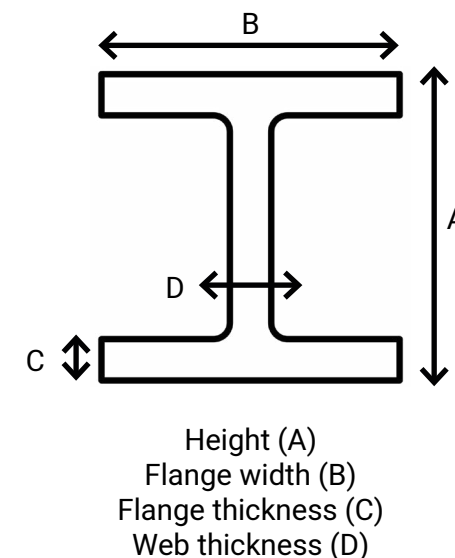
There are some useful guides for helping to work out the steelwork, this includes:

- [Historic Structural Steelwork Handbook](#) - providing detailed dimensions, mass per length, and other information of steel to historic standards. Also provides conversions where units of measurement are in imperial units. There is a newer one available (2019) which can be purchased from [BSCA](#).
- [The Blue Book](#) - is the essential aid for the design of steelwork. Comprehensive section property data is provided as well as tables of member resistances, which are given for grades S275 and S355
- Dorman Long Company Handbooks - these can be searched for online, and include details of the steel members which were produced by this company (from 1895 to 1964)
- [Dlubal](#) - detailed data on dimensions, mass per metre, structural performance etc of various different steel sections available in the UK and elsewhere.

Steel manufacturers will also have details of their products and may also have historical information.

An example of steelwork survey schedule is shown [on the next page](#). This should include where possible, geometry, location, condition, connection details and strength/grade. Sometimes the original manufacturer will also be known, and this can be captured

Photographs should also be captured to show the steel sections, and if plans are available these can be marked up also. These can also be sent to the reclaimed steel stockists such as [Cleveland Steel and Tubes](#) and [EMR](#) to gauge their interest. [Refer to acceptability criteria from steel stockholders](#).



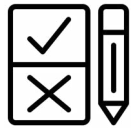
Guidance for a pre-demolition audit (6/6) Example of a steel schedule survey



Location	Type/element	Approx/ assumed section size or section label	Assumed kg/m	Length per member (m)	Number	Total length (m)	Tonnes	Condition	Coatings / encase- ment	Fixing method (if known)	Age	Notes/ comments
GF-RF	Concrete encased steel columns	152x152	39	7.5	27	202.5	7.87	Unknown	Concrete encased		Post-1972	
First floor	Steel beams	250x150	32	Various	-	187.5	6.01	Good (where visible)	Painted		Post-1972	
Roof	Steel beams	250x150	32	Various	-	187.5	6.01	Good (where visible)	Painted		Post-1972	
GF-RF	Concrete encased steel columns	152x152	39	7.5	15	112.5	4.37	Unknown	Concrete encased		Post-1972	
Roof	Steel beams	250x150	32	Various	-	180	5.77	Good (where visible)	Painted	Welded	Post-1972	
Portal frames	Portal frame rafters	250x150	34	12	14	168	5.75	Good	Painted	Bolted	Post-1972	
Portal frames	Portal frame columns (concrete encased)	300x150	47	4.5	18	81	3.78	Unknown	Concrete encased		Post-1972	
Ends of building	End columns (concrete encased)	300x150	47	Various	6	35.8	1.67	Unknown	Concrete encased		Post-1972	
Roof	Purlins	100x50	-	40	18	720	2.24	Unknown	Painted		Post-1972	Uncertain, couldn't see properly
Extension (offices)	Other beams and columns	Various	Various	Various	-	110.5	4.06	Unknown	Unknown		Post-1972	



This section helps determine which steel elements are worth recovering for reuse and which are currently less suitable. It includes a decision-making tree and specific acceptability criteria from leading UK steel stockholders, Cleveland Steel and Tubes, and EMR. A photographic library shows images of steels in situ and post-deconstruction/demolition, along with notes on their acceptability by steel stockholders. The section also includes notes on the reusability of various structural and non-structural steel elements.



Acceptability of steel for reuse

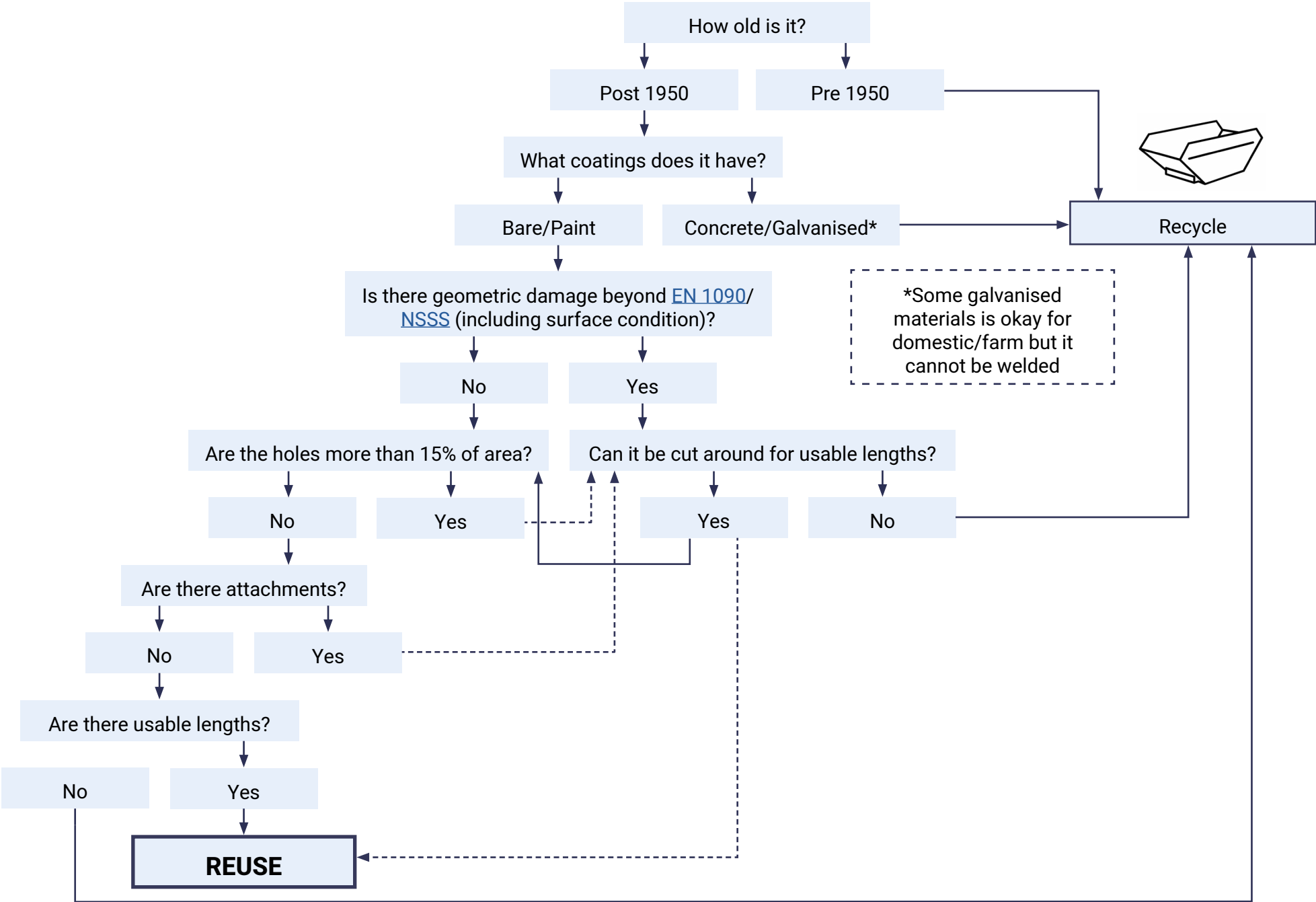
Decision tree: acceptability of steel for reuse

Acceptability criteria from steel stockholders

Photographic library with steel in situ and after recovery

Non-structural steel products

Decision Tree for reusing steel



Acceptability criteria of steel sections for reuse by reclaimed steel



	European Metal Recycling (EMR) Reusable Steels	Cleveland Steel and Tubes
Information required	Proof of post 1970 construction is required for each building, e.g. archive drawings or any information for the original construction.	
Notes on condition	Dents, bends, and twists may prevent reuse or reduce usable length. Visually straight steel sections.	
Length of steel sections	Beams: 8m+ Columns: 4m+	3m+
Weights	Heavier sections (50 kg/m) are less likely to be damaged	Steel sections of all weights are considered
Measurements	Depth, width, flange thickness measurements are required	
Type of steel sections	Accepted: +UC and UB hot rolled sections are accepted Not accepted: Closed sections (SHS/CHS/RHS), bracing, plate girders, castellated beams	All sections apart from fabricated ones i.e. plate girders and castellated beams
Types of construction	Trusses: challenging to reuse due to complex construction. Usually formed of light sections which are at high risk of damage. Composite slabs: Breaking out of slab risks damage to top flange. Heavier sections are more likely to survive recovery, whereas lighter steel sections risks damage. Portal frames: Usually cut at the haunches; longer haunches reduce usable length. Bridges: Risk of fatigue; not suitable for reuse.	Same + crane rails
Connections	Take photos of the connections, if visible. These can be cut or unbolted during removal. Cutting is usually quicker and connections are removed, as standard, prior to reuse.	Not interested in this detail; just discuss the demolition/deconstruction process
Level of fabrication and openings	Accepted: + 'Clean' sections with minimal fabrication and opening are ideal Need consideration: Web stiffeners - one or two are ok; lots can be an issue; service holes - the less the better; these limit where new connections can go; shear studs - will be present with composite slabs and removed during defabrication. Not accepted: Flange plates - challenging to remove without damage; usually prevents reuse.	Most are accepted but avoid multiple service holes and not keen on shear studs
Coatings	Accepted: +Oxide paint, +Insumescent paint Need consideration: Cementitious coating Not accepted: Concrete encased, galvanised	Accepted: +Oxide paint Need consideration: Insumescent paint, cementitious coating, galvanised (smaller sizes can be accepted) Not accepted: Concrete encased



Cost considerations are divided between projects where steel recovery is driven by clients and those driven by demolition contractors. Following the advice of the Working Group on Steel Reuse, we do not provide current cost figures, as they will quickly become outdated and are highly project-specific. Instead, we provide guidance on aspects that will impact the economics of recovering steel for reuse, with some approximate proportions where applicable.

Procurement guidance covers arrangements between demolition contractors and other actors in the supply chain and how these can be improved to promote steel reuse.



Cost and procurement

Cost considerations for recovering steel for reuse

Procurement guidance (coming soon)



Client Project Manager-Driven Project Cost Considerations

The reuse of structural steel retained by the client involves several considerations regarding cost savings and programme timelines, with distinct project scenarios to be taken into account.

Reused Steel Obtained from the Client's Donor Building:

Reusing steel from a donor building offers significant raw material cost savings for the client, with estimates suggesting it can be 20-30% cheaper than new raw materials.

However, fabrication and testing costs need to be factored back into the overall cost of the reused material, with fabrication costs increasing by 15-20% due to the additional labour and processes required. Reclaimed steel often cannot be processed using automated systems, necessitating more manual labour. Additionally, there are de-fabrication, testing, and stock matching costs. These factors may offset some of the perceived financial benefits of steel reuse.

A clear advantage of client retention is the guaranteed availability of steel sections held in stock on their behalf, along with the embodied carbon value gained from the reused steel.

The selected deconstruction contractor will also incur additional costs that need to be factored into the project cost plan in both loss of steel credit value and additional recovery, handling, and transport costs.

Reused Steel Sourced from a Stockholder:

Steel from a stockholder will already include various additional costs by the time it is delivered to the project, such as testing and defabrication costs.

The deconstruction contractor will have covered their costs by selling the steel directly to the stockholder, as such the maximum credit value for the material will have been invested within the project cost plan.

Embodied carbon values will be retained within the reused product.

The limiting points for consideration are the fluctuating market values for steel. A deconstruction contractor could sell to the stockholder at a high value, which may subsequently drop, reducing the selling price of the repurposed steel sections. Conversely, the market could go the other way, increasing the value of the reclaimed material.





Contractor Driven Project Cost Considerations

There are numerous reasons why a contractor might consider the reuse of steel on a particular project, including competitive edge over other contractors, steel price uplift, and carbon footprint reduction.

Competitive Edge: Demolition contracting is an extremely competitive industry, with almost all contract work awarded through competitive tendering. Anything a contractor can salvage may give them a crucial competitive advantage.

Cash Flow: The working group on steel reuse formed within the DISRUPT II project mentioned cash flow; however, discussions with stockholders indicate that this is generally well-managed, with prompt payment terms guaranteed.

Project Programme: The working group has often indicated that additional time is needed to recover steel sections. This can have a significant impact on the project programme, requiring additional resources.

Cost: More time inevitably means higher costs or the need for additional resources. Unfortunately, under open competitive tendering, contractors often lack the flexibility within the contract to allocate extra resources, limiting the scope for material reuse.

Steel Price Uplift: The market price for reusable steel varies in line with steel scrap market prices. As such, contractors must confirm negotiated prices at the commencement of work, which can differ significantly from prices at the tender stage. The steel reuse uplift can often provide contractors with the all-important competitive edge.

Carbon Footprint: While this is an important consideration, open tendering often limits contractors' ability to prioritise green initiatives. More needs to be done to ensure contractors minimise their carbon footprint. Planning restrictions and greater industry awareness are essential to driving this forward.

Additional Resources:

Plant: Additional plant may be required, though many city centre sites already have adequate cranes. Feedback suggests that micro cranes are often used to reduce tower crane lifting time. ([see: Extra equipment that might be required for reuse vs business as usual](#))

Labour: Extra labour may be needed to dismantle the steel sections, potentially involving 'hot works burners' to trim the steel for transport.

Management: It is unlikely that additional management will be needed, but it is essential that existing management engage fully with the procurement team to maximise recovery targets.



Guidance note on WLCA and limitations includes recommendations on assessing the carbon impact of reused steel. It also covers Module C and Module D aspects and signposts to carbon measurement conducted by certain demolition contractors and carbon targets set by developers.

Toolbox training/talk provides information on reuse specifically intended for demolition contractors.

Reporting portal. Based on discussions with demolition contractors, a key theme that emerged is the need for an easy-to-use platform to capture steel reuse statistics, and potentially data on other materials. Currently, there is no standardised system for recording this information, and contractors' methods can vary. This reporting portal offers a centralised platform, allowing data to be aggregated across projects.



Training and reporting

Guidance note on WLCA and limitations

Toolbox training - introduction to steel reuse

Reporting portal



Reused steel and carbon

There is a carbon benefit from reusing steel in projects. This can be determined through a whole life carbon assessment at a building level, where the carbon impacts of the products that are used in the building are determined.

To understand how to evaluate the carbon impact of a reused product, there are two approaches:

- a. The manufacturers/suppliers of a reused product have carried out an EPD and information from the EPD can be used in building whole life carbon assessments
- b. There is no EPD for the product identified. Recommendations from the RICS Professional Statement on whole life carbon assessment are used.

The following sections provide more information on these two approaches:

- a. An EPD is available

To establish the carbon impacts of reclaimed steel, the reused steel stockholders Cleveland Steel and Tubes (CST) and EMR, have produced verified Environmental Product Declarations (EPD) for some of their products. For more information on EPDs, [see ASBP's guidance](#)

- b. There is no EPD

RICS Whole life Carbon Assessment (2nd edition) provides the methodology for how whole life carbon assessments should be undertaken, based on BS EN 15978. This document also provides guidance on how to calculate the carbon emissions of reused products where there is no EPD.

Using reclaimed steel will help clients and projects meet their carbon targets!

ASBP has guidance on embodied carbon and whole life carbon assessment, as well as an [EPD workstream](#).





a. an EPD is available

Cleveland Steel and Tubes (CST) [Recovered and refurbished used steel I-beams EPD](#)

- This was issued in 2024.
- This covers the modules A1 – A3 (product stage), Module C (end of life) and Module D (future recovery), based on data over a period of one calendar year (2023).
- The EPD includes the initial recovery and refurbishment of an I-beam that has been recovered as waste from a demolition site.
- The results and assumptions for A1-A3 are as follow:
 - A1 (product manufacturing): Based upon the cut off rules the I-beam is burden free at this point. Therefore A1 = 0 kgCO₂ eq
 - A2: transport from demolition site to CST has been assumed to be on average 277 km
 - A3: any reprocessing and factory activities are included in A3. Where some waste steel has been generated, it was assumed to be recycled.
 - For A1-A3 the kgCO₂eq is 69.8 per tonne.
- The results and assumptions for C1 to C4 are as follow:
 - It has been assumed that 93% of beams can be recovered - 47% assumed to be reused, 47% recycled and the remainder landfilled.
 - For C1-C4 the kgCO₂eq is 13.2 for 1 tonne
- For Module A and Module C the kgCO₂eq is 83.05 kgCO₂eq per tonne

Cleveland Steel and Tubes also have a verified [EPD for Recovered and reused mill surplus stock tubulars and mill downgrade steel tubulars and Recovered and refurbished steel tubulars from waste oil and gas pipelines and pipeline projects](#)

CST also has an LCA study on recovered and refurbished coated steel tubes which shows that there is an indicative savings for all CST refurbished tubes of between 95% - 97% when compared to an equivalent uncoated prime steel tube.

EMR – [Reusable Steel EPD](#)

- This was issued in 2022
- This covers the modules A1 – A3, Module C and Module D, based on data over a period of one calendar year (2021).
- This covers various structural steel and will include Universal Beams and Universal Columns (but not limited to these).
- This covers the steel that is extracted from demolition/deconstruction projects, transport to EMR and de-fabrication.
- For A1-A3 the kgCO₂eq is 46.6 per tonne (this is broken down as A1 (raw materials) at 25.5 kgCO₂eq/tonne; transportation to EMR (A2) at 13.4 kgCO₂eq/tonne and A3 (fabrication) at 7.7 kgCO₂eq/tonne.
- For C1-C4 the kgCO₂eq is 32.4 for 1 tonne
- For Module A and Module C the kgCO₂eq is 79.05 kgCO₂eq per tonne

These can be compared to specific EPDs or the BCSA provide average UK embodied carbon emissions for new structural steelwork or, for Modules A1-A3 and Module D; these are:

- For Modules A1-A3, 1.74 tonne CO₂e per tonne of sections
- For Module D, - 0.93 tonne CO₂e per tonne of sections





b. There is no EPD (1/2) - For refurbishment (steel remaining in-situ):

If reused steel is remaining in situ, as the building is being refurbished; there will be in most cases a carbon emission benefit compared to demolition and redevelopment or new-build (as less new materials are needed). Comparative assessments between refurbishment and new-build options should be done to clarify this.

It is assumed that any materials remaining in-situ have no impact as their impact (A1 to A5) has already been taken into consideration in the existing building. However, any future maintenance, end of life and future recovery should be reported.





b. There is no EPD (2/2) - End of life considerations for a new projects

Module C

- Module C impacts must be included for all components and materials that make up an asset at the end of the reference study period.
- Any impacts arising from decommissioning, stripping out, disassembly, deconstruction and demolition operations, as well as from transport, waste processing and disposal of materials at the end of life of the project, must be accounted for in Module C
- The end-of-life (EOL) scenarios must be clearly stated and explained in the whole life carbon report – default end of life routes for structural steel are 7% reuse and 93% recycling (see page 106 of [Whole life carbon assessment PS Sept23.pdf](#) (rics.org)). Scenarios can be based on improvements to the default (business as usual) rates if they can be justified. Designers must demonstrate a credible deconstruction and recovery strategy using current technology to increase the EOL scenario percentages from the default rates.
- For C1, the work required for deconstruction or demolition, can vary considerably depending on the end of life scenario. Data could be taken from a EPD, if the scenario is similar or an adjustment made. If no information is available, C1 data can be taken from the construction activity impacts (A5.2) as a proportion.
- For C2, transport of materials to their final destination, if reuse is on site there is no transport impact; for reuse/recycling elsewhere, then the average distance to two closest construction waste processing sites should be used.
- Any material that can be reused on or off site, should be modelled in C3, waste processing; this is also the material amount used for Module D1 as a net output (benefits and loads from reuse). This should include any removal of coatings of steel including their disposal and removal of removal of joints and fixings from structural steel, including their recovery.

Module D

see section 5.7.1 and Appendix K of [Whole life carbon assessment PS Sept23.pdf](#) (rics.org)

The RICS Professional Statement splits module D into two parts:

- Module D1: potential loads and benefits from materials
- Module D2: potential loads and benefits from exported utilities exiting the system boundary

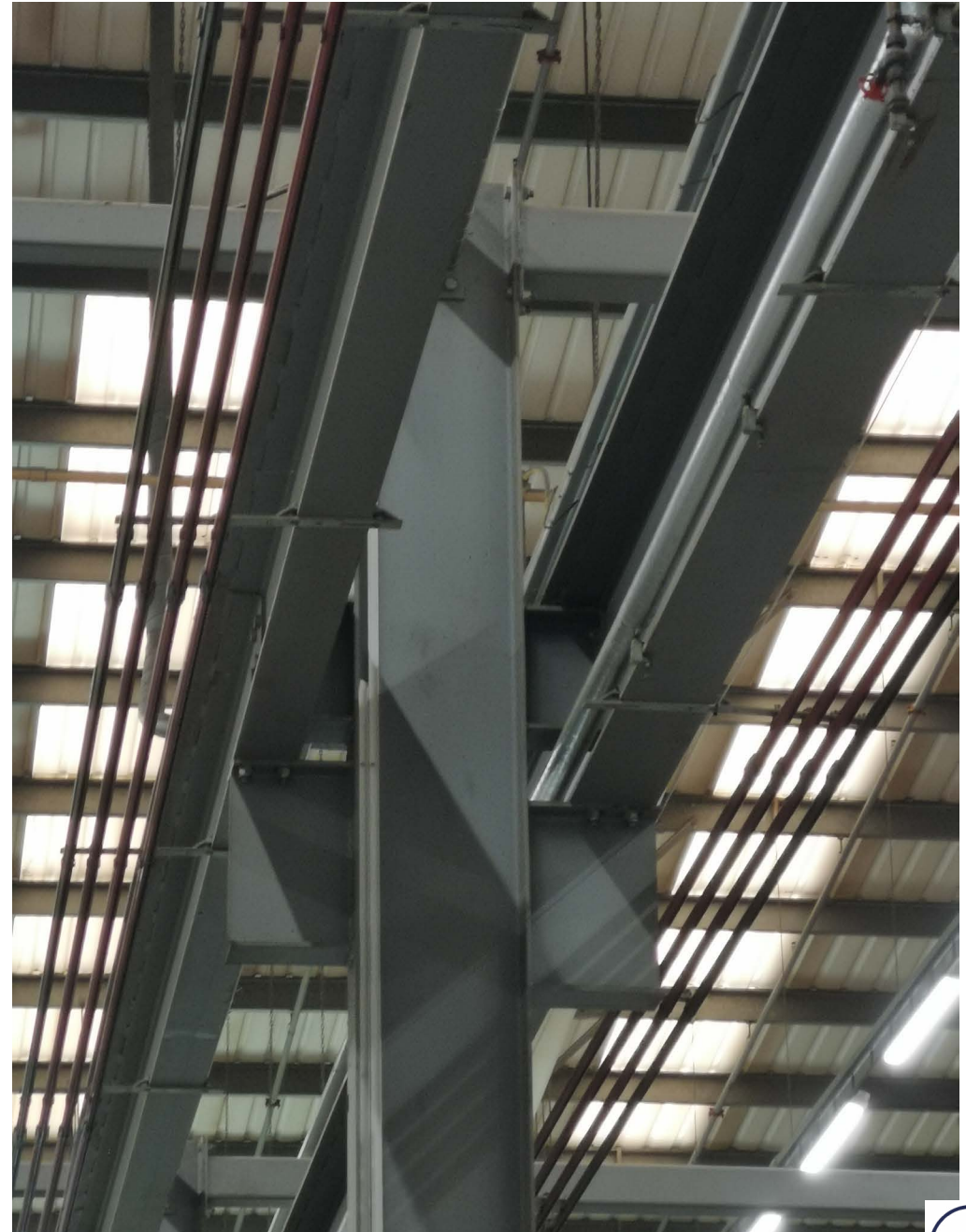
The RICS document states that “*Module D1 is intended to provide a broader picture of the environmental impacts of a project by accounting for the future potential of any primary materials used when these are recovered, for example if they are reused and/or recycled.*”

Module D can be complicated as it works on a net flow methodology to calculate the loads and benefits from recycling or reusing. This means that module D1 only accounts for the benefits of reusing or recycling primary resources. Therefore, if reclaimed steel has been used in the new design and then also modelled to be reclaimed for reuse at EOL (in the same amounts) in a future building, then there is no benefit to the project that is being assessed in Module D1. However, if the EOL scenario is reuse, but the new steel is from a primary (recycled) source then the benefits can be seen in module D1. It is important to note that Module D is reported separately.





- ✓ Retaining reused steel in-situ, should lead to a carbon saving
- ✓ Using reclaimed steel in a project should have a lower carbon impact than non-reused steel – EPDs can be used to show this
- ✓ The impact of deconstructing a building for reclaiming the steel for reuse should be measured (this maybe better than demolition e.g. if less equipment is used)
- ✓ The end of life scenario for structural steel has to be modelled. These scenarios should be clearly explained and evidence provided if they are better than the default rates (7% reuse for structural steel). Modelling the reuse of steel at end of life, will have less impact than recycling.
- ✓ Savings from the reuse of the steel at the end of the building's study period, into its next life can be accounted for in Module D
- ✗ If reused steel is being used in the project, there may be no benefit in future recovery for reuse of that steel (Module D) due to the net flow methodology





Demolition and whole life carbon assessment

There is no benefit when doing a WLCA, for the building where the reclaimed steel is being sourced from (i.e. the donor project). The benefit lies with the new project, in using a low carbon product.

A separate sub-module A5.1 is now included in the RICS Standard, where the impacts associated with demolition/deconstruction should be measured – this should go back 3 years of the sale/new proposal. This includes the demolition, waste processing and transport of any material from the demolition/deconstruction. This also applies to any demolition works associated with refurbishment of a buildings.

An as deconstructed assessment should be undertaken to understand the actual impact of the asset's end of life. This might mean an update of the impacts in Modules C1 -C4 and D1 of the building (which is being demolished) – how likely this assessment will occur, is not clear.

Demolition and whole life carbon assessment

More demolition contractors are measuring and setting targets for their carbon emissions. Examples include:

- Keltbray, to be net zero carbon across their operations by 2040 and all activities by 2050
- McGee, committed to achieving net zero emissions by 2040
- John F Hunt to be net zero carbon by 2050, with a target to half by 2030, through developing more efficient technologies, recycling, and waste minimalization, monitored through the use of our in-house carbon accounting platform

Larger organisations have to report this due to the UK's Streamlined Energy and Carbon Reporting (SECR) legislation. Scope 1 (direct emissions) and 2 (energy) have to be recorded, Scope 3 (indirect emissions) is voluntary (but recommended).

Demolition companies can show carbon savings from reuse through projects, and how much this is in a given year in their annual reports and marketing materials. They can show how they are helping clients meet their own carbon targets both at a project and organisational level.

More and more clients are setting embodied carbon/whole life carbon targets and commitments to net zero carbon. The pilot version of the [Net Zero Carbon Building Standard](#), requires the meeting of upfront carbon limits (the impact of a product and its construction process) and reporting life cycle embodied carbon limits.

Client examples:

- Grosvenor, all developments will be low embodied carbon (<500kgCO₂e/ m² from 2025)
- Derwent, has an embodied carbon target of <600kgCO₂e/ m² from 2025 and 500kgCO₂e/ m² from 2030
- Great Portland Estates, reducing embodied carbon of their new developments and major refurbishments by 40% by 2030, from our baseline of 954kgCO₂e to 572kgCO₂e per m² for new build developments and from 340kgCO₂e to 204kgCO₂e per m² for refurbishments.
- British Land has a commitment of 50% reduction in embodied carbon, versus industry benchmarks.
- Royal London Asset Management is aiming to achieve net zero emissions in their property assets directly managed by them by 2030, and indirectly managed by 2040.



Steel Reuse

More than one million tonnes of steel scrap is produced every year in the UK by the construction sector¹. Conventional steel recycling sees a large proportion of this scrap exported to overseas plants, where it is processed and then re-imported to the UK. The ASBP DISRUPT II project aims to reduce this material export by promoting the closed-loop reuse of steel in construction projects.

¹ Hall, R., Zhang, W., & Li, Z. (2021). Domestic scrap steel recycling – economic, environmental and social opportunities (EV0490). The Warwick Research Archive Portal (WRAP). <https://wrap.warwick.ac.uk/152270/>

What is Steel Reuse

Steel reuse is not a new concept—the demolition sector has been reusing steel for many years. However, as planning conditions now require greater control over and measurable reductions in whole-life carbon on construction projects, steel reuse is experiencing a strong resurgence.

The ASBP DISRUPT II project has conducted detailed case studies of current projects to develop sector-specific guidance on steel reuse, which is seen as a valuable tool for reducing whole-life carbon (WLC).

Recovered steel sections are removed from structures as identified within the Pre-Demolition Audit and subsequent surveys, following the project method statement. These sections are stockpiled until sufficient material is available for transport to a stockholder, where they will be graded, assessed, and tested, ready for redistribution.

Every tonne of steel reused results in a significant carbon saving of 2,200kg of CO₂, greatly reducing the project's embodied carbon footprint.

What do we have to do?

Every effort will be made to use steel sections according to the project plan defined in the Pre-Demolition Audit. Sections to be recovered will be identified and marked in line with the audit, and removal will be carried out following the site RAMS (Risk Assessment and Method Statement).

Recovered sections will be trimmed and prepared for transport to the steel stockholder for further processing.





This simple online portal has been developed as part of the DISRUPT II project to track tonnes of steel recovered for reuse from deconstruction/demolition projects in the UK. Information submitted will initially be kept on file by ASBP as a record but the medium term aim is to create a map of steel reuse projects and a number counter showing total tonnes of steel reused and carbon saved.

The Portal asks for the following information:

- Project name or address
- Project postcode
- Amount of steel segregated/recovered for reuse (tonnes)
- Project completion date
- Company name
- Your company's role in project (E.g. Demolition contractor, main contractor)
- Your name
- Your email
- Any comments? (optional)

[Click here to visit the portal and add your project](#)



List of projects

List of projects with steel reuse focuses on recent projects where reclaimed steel was incorporated. Please note that descriptions include details on demolition or donor buildings where relevant. The list does not include adaptive reuse projects.

[Click here to download a list of projects with steel reuse \(Excel\)](#)

[Click here to visit the interactive map of projects with steel reuse](#)

Case studies

Case studies are based on site visits, offering valuable learning points from real-life projects, describing deconstruction/demolition approaches, challenges faced, and lessons learned.



180 Piccadilly



20 Giltspur Street



Former Honda Factory



J Mould's Recycling Centre



Unsuccessful Case Study - Recovering Steel for Reuse