2023-2025

ADVANCE

ACCOMPANYING MEASURE FOR DISSEMINATION, VALORISATION AND COLLABORATIVE EXPLOITATION OF CIRCULARITY OF CONSTRUCTIONAL STEEL PRODUCTS

Overview and State of the Art

ADVANCE Final Workshop

17.6.2025, the HUBB, Brussels

Petr Hradil, VTT Technical Research Centre of Finland

Picture credits: Purkupiha

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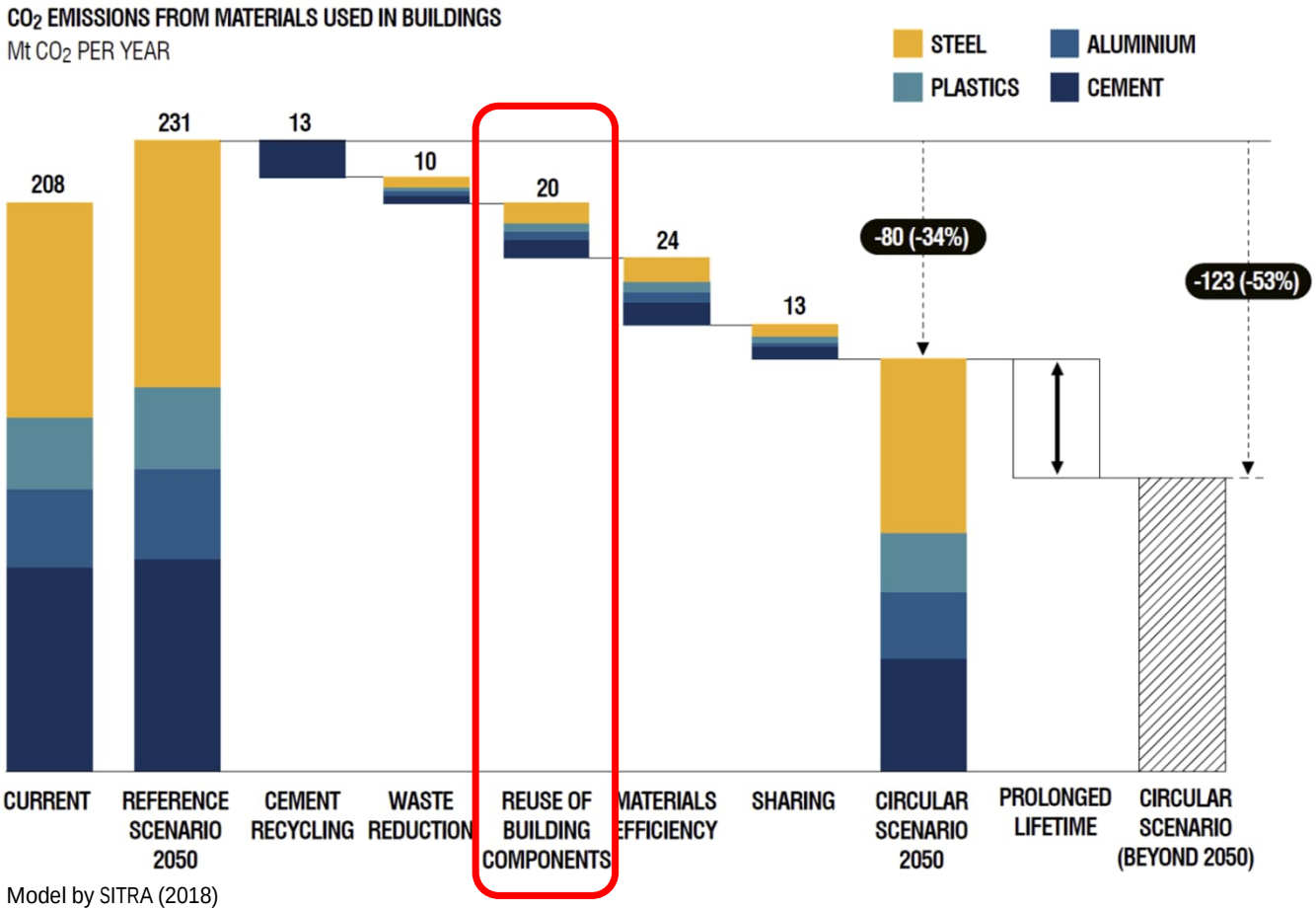
Recycling is fast and cheap, but we can do better

Picture credits: Paul Kamrath

Reuse of building components

Dismountable modular systems can reduce up to 20 $MtCO_2$/y by reuse and another 10-20 $MtCO_2$/y by enabling flexible spaces for sharing, prolonging lifetime and improving material efficiency.



Model by SITRA (2018)

Reuse of building components

Reduction of embodied carbon/energy in buildings

- Embodied carbon from materials production is directly related to their embodied energy. For instance, steel components, when reused, can save up to 90% of energy needed for recycling or new material production.

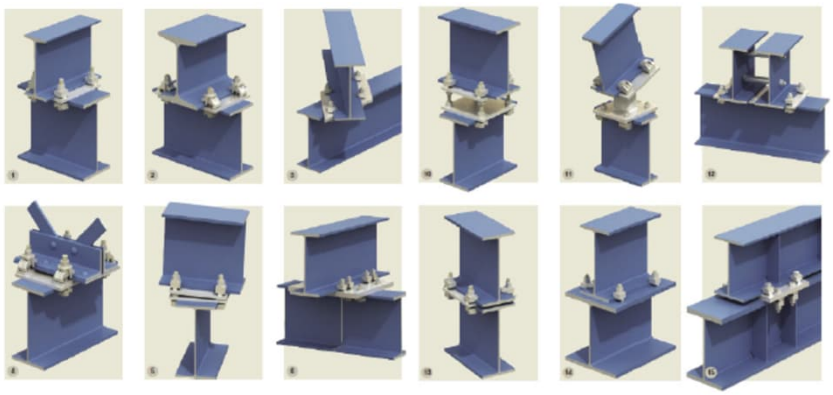
Reduction of air (and other) pollutants

- Avoided virgin materials production will also remove all its polluting side streams. Comprehensive LCA is the tool to demonstrate such effect.

Reuse of building components

High potential for replicability

- Design for deconstruction and reuse will become standardized practice by 2030. The revision of Eurocodes and CPR is already taking this aspect into account.



Low construction/retrofitting time and cost

- Modular construction is entirely prefabricated with regular interfaces and interchangeable elements. This will not only reduce construction time and cost but also increase on-site safety.

Is it profitable?

STAD ANTWERPEN.

BLAUWE TOREN.

Verkoop voor afbraak.

Burgemeester & Schepenen

Brengen ter kennis der belanghebbenden dat er op Maandag 10 November aanstaande, ten één uur namiddag, in eene der zalen van het stadhuis, zal overgegaan worden tot het openen der inschrijvingen voor het afbreken van den Blauwen Toren.

Het lastkohier en het plan liggen ter inzage op het 4e bureel van het stadhuis.

TEN MINSTE ÉÉN DAG vóór de besteding, zullen de inschrijvingen moeten gestuurd worden, onder toegezegelden omslag, aan den Burgemeester der stad Antwerpen, bij aanbevolen brieven, op de post besteld. De omslag zal moeten voor opschrift dragen het adres van den Burgemeester met aanwijzing van het werk voor hetwelk men ingeschreven heeft.

Antwerpen, den 25e October 1879.

Voor den Burgemeester,
DE SCHEPEN,
Jac. CUYLITS.

BIJ VERORDENING: DE SECRETARIS,
J. DE CRAEN.

VILLE D'ANVERS

TOUR BLEUE.

Vente pour démolition.

Les Bourgmestre & Échevins

Portent à la connaissance des intéressés qu'il sera procédé le Lundi 10 Novembre prochain, à une heure de l'après-midi, dans une des salles de l'hôtel de ville, à l'ouverture des soumissions pour la démolition de la Tour bleue.

Le cahier des charges et le plan sont déposés au 4e bureau de l'hôtel de ville.

AU MOINS UN JOUR avant la date fixée pour l'adjudication, les soumissions devront être adressées, sous enveloppe cachetée, au Bourgmestre de la ville d'Anvers, par lettres recommandées, remises à la poste. L'enveloppe portera pour suscription l'adresse du Bourgmestre et indiquera l'entreprise pour laquelle on a soumissionné.

Anvers, le 25 Octobre 1879.

Pour le Bourgmestre,
L'ÉCHEVIN,
Jacq. CUYLITS.

PAR ORDONNANCE: LE SECRÉTAIRE,
J. DE CRAEN.

Antwerpen. — ED. DONNÉ, stadsdrukker, Begijnenpoortvest, 99 (nabij het Leopoldsplein).

Public sale of building for demolition,1879
Collection Felixarchief / stad Antwerpen

Reuse of constructional steel

- Most of the steel structures are already dismountable
- Many individual reuse cases are available to study
- Several business models have been already tested


Picture credits: Purkupiha

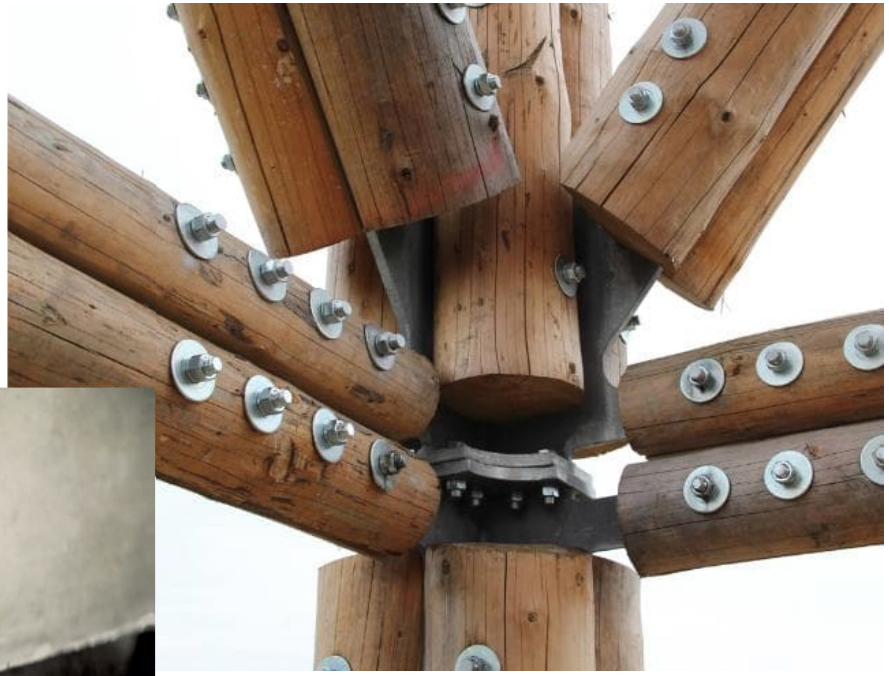
Steel can be reused multiple times

1942 London
1958 Rotterdam
2015 Schiphol

1958 Brussel's World Fair
1959 "Zoo-Brücke" in Duisburg
2000 Bridge on A3 motorway Duisburg Sud

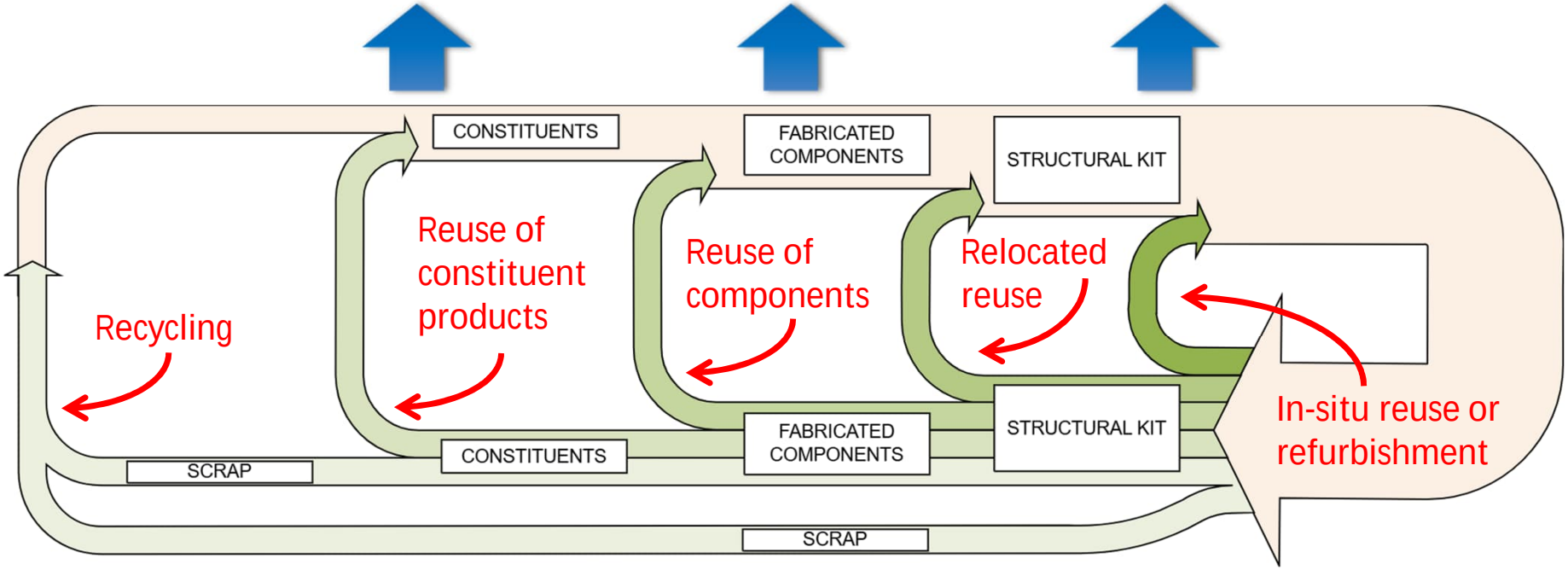
Steel enables reuse of other materials

Picture credits: Peikko Group



Picture credits: Taros Nova

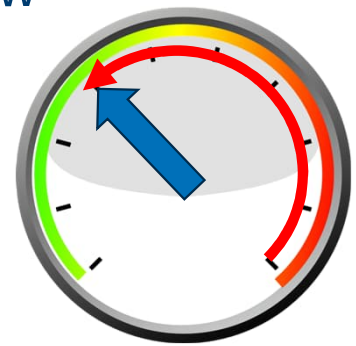
Reuse is not always the same



Reuse is not always the same

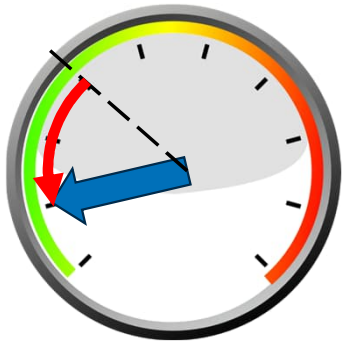
Reuse of existing steel

- Not designed for reuse
- Uncertain origin and quality of the material
- Standardized sections and connectors
- Environmental savings now



Design for future reuse

- Designed for reuse
- Material has traceability
- Standardized modules and joints
- Environmental savings decades in the future



Reuse in EU legislation

EPBD (2024):

Life-cycle GWP
· according to EN 15978 + Level(s) or nat. methodologies,
· 2025: EU delegated act, 2026: limit values, 2030: targets

Renovation Passport
· information about improving products' circularity

ESPR (2024):

Digital Product Passport
· substances that hinder circularity of products,
· information/instructions on disassembly and reuse,
· ease of reuse/remanufacturing/refurbishment

CPR (2024):

Declaration of Performance and Conformity
· products directly reused should not be subject to CPR
· other reused products: to long-term harmonization
· if the scope of hEN excludes used products, economic operators can use CPR as if the product was new.


Picture credits: Purkupiha

Circular steel standardisation

EN 1090-1
· CE marking of reused steel constituents

TS 1090-201
· testing protocol for reused steel

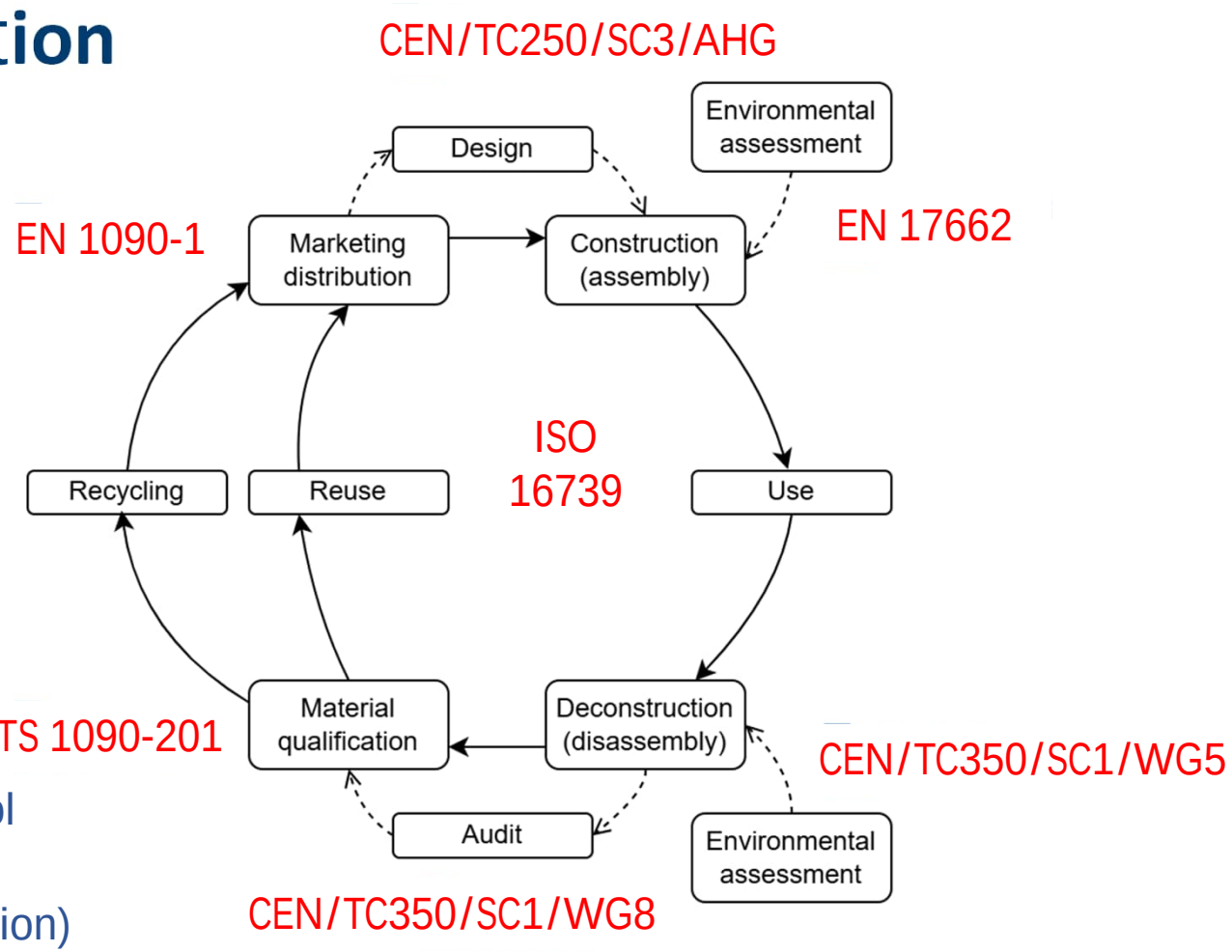
CEN/TC250/SC3/AHG
· development of design rules for reused steel

EN 17662
· PCR for steel (including reuse)

CEN/TC350/SC1/WG5
· development of circularity assessment

CEN/TC350/SC1/WG8
· development of pre-demolition audit protocol

ISO 16739
· building information modelling (IFC specification)



2023-2025

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RFCS
Dissemination project

https://www.steelconstruct.com/eu-projects/advance/

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Research Fund for Coal & Steel

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2023-2025

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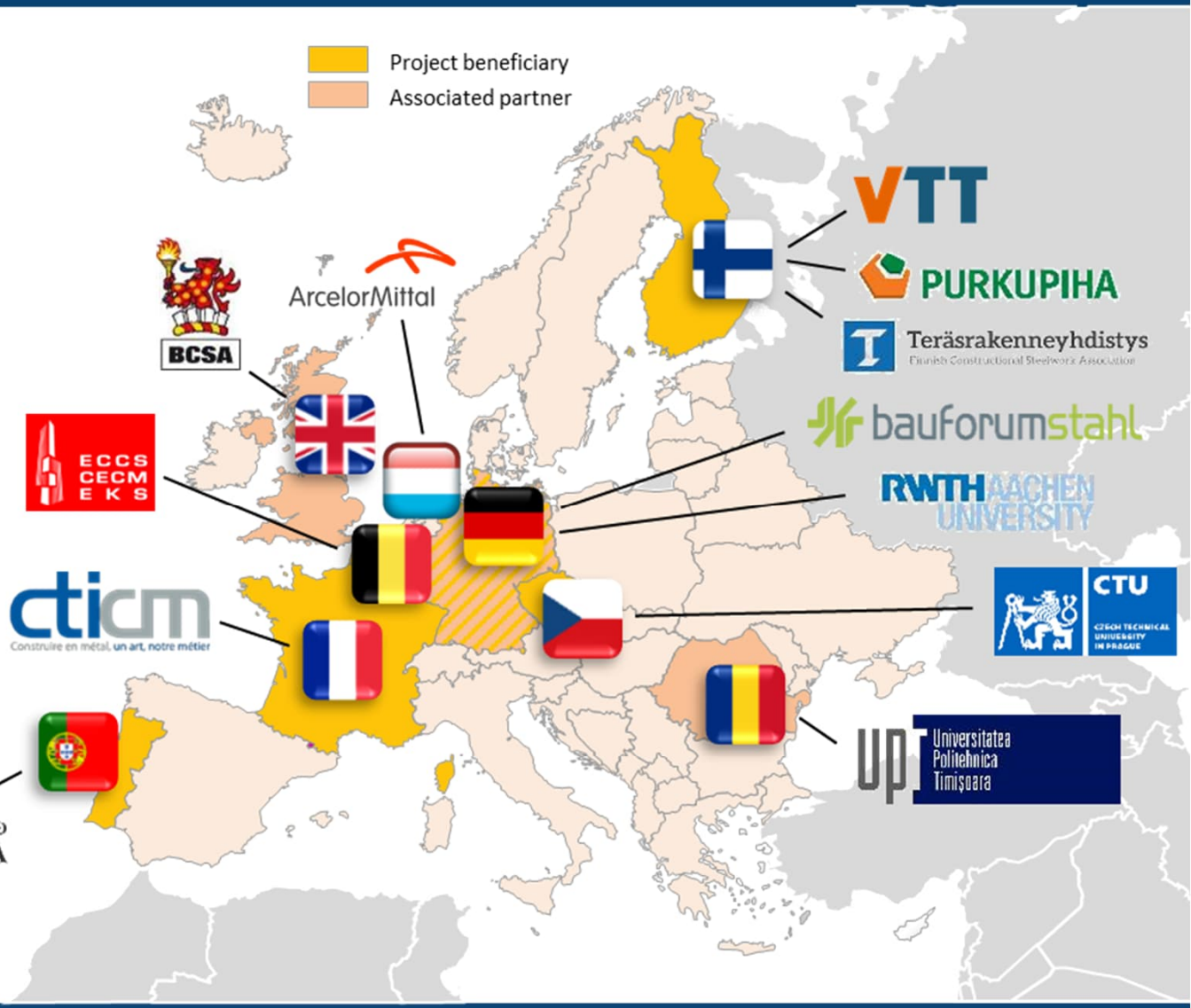
- VTT Technical Research Centre of Finland
- European Convention for Constructional Steelwork
- Finnish Constructional Steelwork Association
- Bauforumstahl
- British Constructional Steelwork Association
- CTICM, France
- ArcelorMittal
- Purkupiha Group
- University Politehnica Timisoara
- Univeristy of Coimbra
- RWTH Aachen University
- Czech Technical University in Prague



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ADVANCE objectives

- Provide guidance for reuse of existing components or structures and design of new ones, introduce recommendations for product/waste status and material testing protocol for re-certification of steel products in the updated Recommendations for Reuse
- Support declaration of the environmental benefits of steel reuse implemented in the mobile LCA app and web tool
- Increase awareness about the alternative end-of-life options for constructional steel and steel-based products
- Identify the possibilities and roadmaps for scaling up the outcomes of the background projects beyond their original focus area

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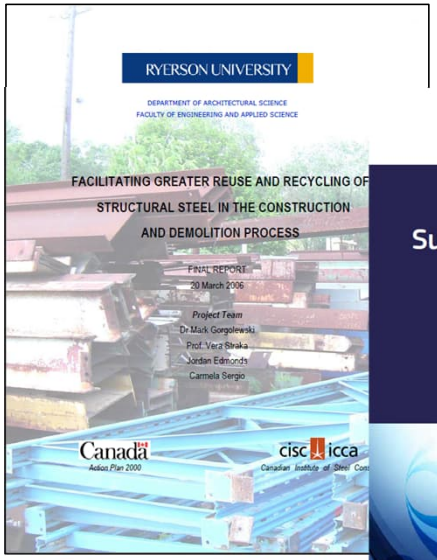
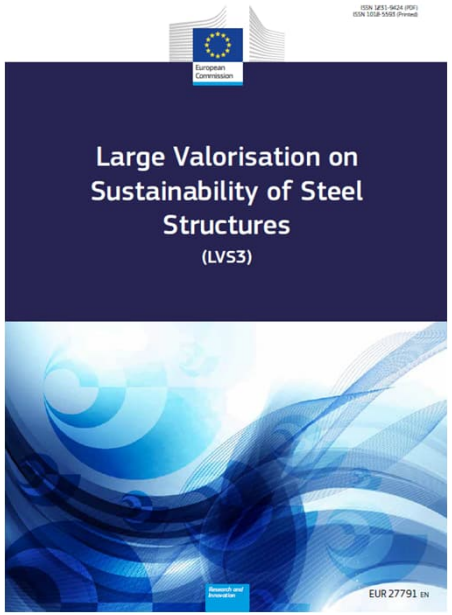
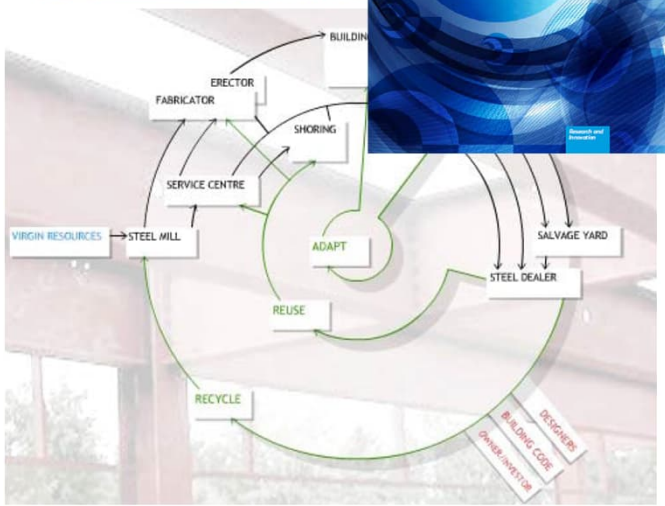
Background projects

- 2006: Facilitating Greater Reuse and Recycling of Structural Steel in the Construction and Demolition Process Methodologies
- 2013: Sustainable building project in steel (SB STEEL)
- 2014: Large Valorisation on Sustainability of Steel Structures (LVS3)
- 2019: Reuse and demountability using steel structures and the circular economy (REDUCE)
- 2023: Delivering Innovative Steel Reuse Project (DISRUPT)







ASBP The Alliance for Sustainable Building Products

DISRUPT Delivering Innovative Steel ReUse ProjecT

DISRUPT PROJECT ON STEEL REUSE

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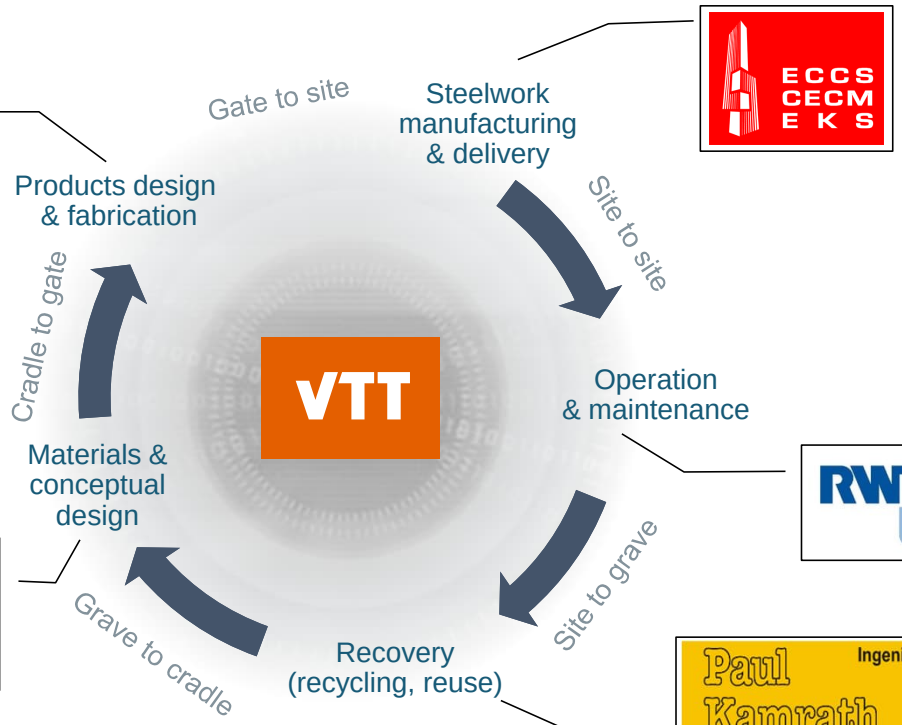
Background projects

2017-2020

PROGRESS

PROVISIONS FOR GREATER REUSE OF STEEL STRUCTURES

- Design guides
- Methodologies
- Protocols
- Case studies



Picture credits: Purkupiha

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Definition of product and waste

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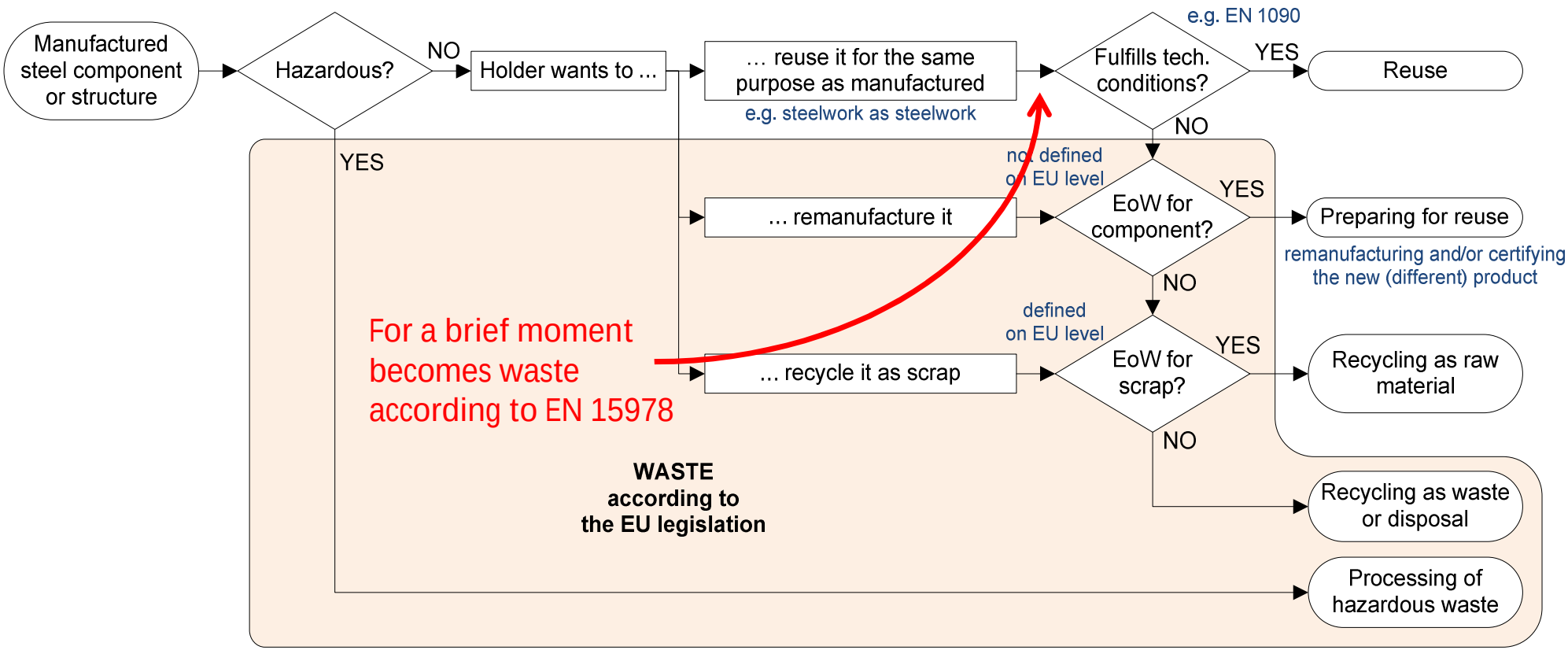
PROVISIONS FOR GREATER REUSE OF STEEL STRUCTURES



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Reusability index

2017-2020
PROGRESS
PROVISIONS FOR GREATER REUSE OF STEEL STRUCTURES

Technical reusability (similar principle to BRE Design for Deconstruction)

Component $r = \sum \rho_i w_i$

Performance assessment result (%)

Weighting factor for each performance category (%)

Building $R = \frac{\sum m_i r_i}{\sum m_i}$

Component mass (t)

Economic prospect (complementary score based on building statistics)

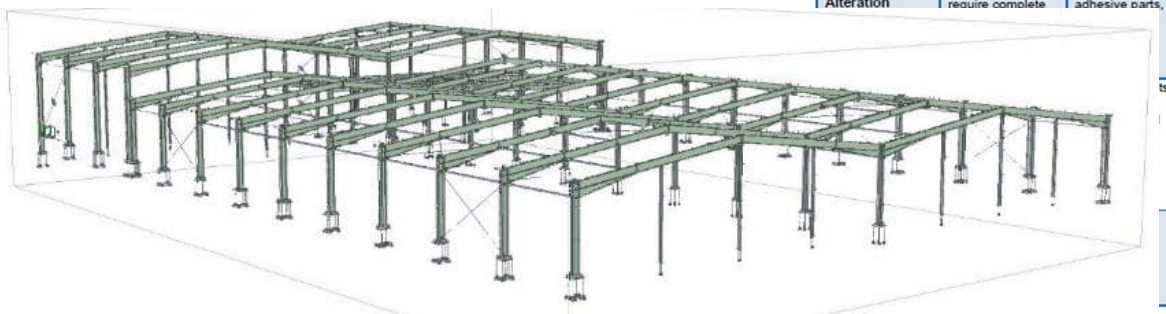
Component $e = P(c_1 \cap c_2 \cap \cdots) n$

Criteria (e.g. span, height, floor area)

Number of new buildings in the selected area and time span

Building $E = \frac{\sum m_i e_i}{\sum m_i}$

Performance criteria	very difficult $\rho_i = 0.2$	difficult $\rho_i = 0.4$	moderate $\rho_i = 0.6$	easy $\rho_i = 0.8$	very easy $\rho_i = 1.0$
Deconstruction Disassembly $w_i = 20\%$	Adhesive connections, high risk of damage during deconstruction	Rivet connections between components with difficult access	Rivet connections between components	Drilling screw connections between components with difficult access	Easily accessible drilling screw connections between components
Handling Manipulation $w_i = 5\%$	Exceeding standard transport dimensions, prone to damage, requires special protection	Standard transport, prone to damage, requires special protection	Manipulation by crane, not damage sensitive	Small lifting devices	Manipulation by hand
Separation Cleaning $w_i = 15\%$	Adhesive and rivet connections need to be removed for separation	Removal of joint sealing elements	Hand tools for cleaning/cutting can be used to separate other materials	Screwed connections need to be removed for separation	Separated Profiles requiring no cleaning
Redesigning $w_i = 15\%$	Components would not fulfil the standard design requirements without modification	New design is required, similar environmental conditions	Similar design required with different environmental conditions	Loading and maintenance history, same design required and similar environmental conditions	Designed to be reused, documentation and maintenance records in digital format
Repurposing $w_i = 5\%$	Unique sizes and shapes, no other application possible	Possible to reuse for another purpose with some re-manufacturing	Limited possibility to use for another purpose	Possible to use for another purpose even outside the construction sector	There is a larger demand for another application than the original purpose
Alteration	Sizes are unique, reuse would require complete	Requires removal of adhesive parts,	Requires addition and easy adjustment of screw-holes	Requires only addition of new components	Requires no modification
ts	Documentation available, loading history known, on-site test needed to check material properties			Material documentation available incl. loading and maintenance history	Material documentation available Exploited in less demanding environment
	Moderate separation of different materials			Easy separation of recyclable materials	Separated or free-standing recyclable materials and profiles



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Pre-deconstruction audit and deconstruction protocols

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PROVISIONS FOR GREATER REUSE OF STEEL STRUCTURES


Picture credits: Purkupiha

1.1 Description of the building
1.1.1 Building description .....
1.1.2 Address, site number .....
1.1.3 Year of steelwork fabrication .....
1.1.4 Floor area .....
1.1.5 Main dimensions .....
1.1.6 Envelope .....
1.1.7 Crane (description, type, tonnage).....
1.1.8 Steelwork is already deconstructed yes / no

1.2 Purpose of the deconstruction (if 1.1.8 is yes)
.....

1.3 Description of the future use of deconstructed components (if known)
.....

ıone)
.....

lress, e-mail, phone, certification(s))
.....

struction company (if known)
.....

yes / no
yes / no
reports yes / no

yes / no
ts or steelwork yes / no
.....

Condition evaluation checklist	
✓	Selected structural systems or components can be reused;
✓	Steelwork is not older than 1970 (in order to use Eurocode rules);
✓	Material is not classified as hazardous or can be decontaminated;
✓	No built-up members unless welds are tested;
✓	No spliced members (the individual lengths of a member with a bolted or welded splice can be disassembled/cut and reclaimed; otherwise welds need to be tested);
✓	No significant section loss due to corrosion (loss exceeding 5% of the element thickness is considered significant);
✓	No signs of fire exposure;
✓	No evidence of plasticity observed in the steel surface or coating;
✓	No other defects or signs of deterioration;
✓	Members meet the geometric tolerances of EN 1090-2 (straightening can be performed if tolerances are not met).
✓	The suitability of other non-reusable materials and components for high-level recovery and recycling is evaluated;
✓	(optional) Additional indicators required by the facility owner (e.g. cost, residual value, remaining service life or carbon footprint) are evaluated.

- Templates
- Checklists
- etc.

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New scanning and deconstruction techniques

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Picture credits: Paul Kamrath

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Testing protocol

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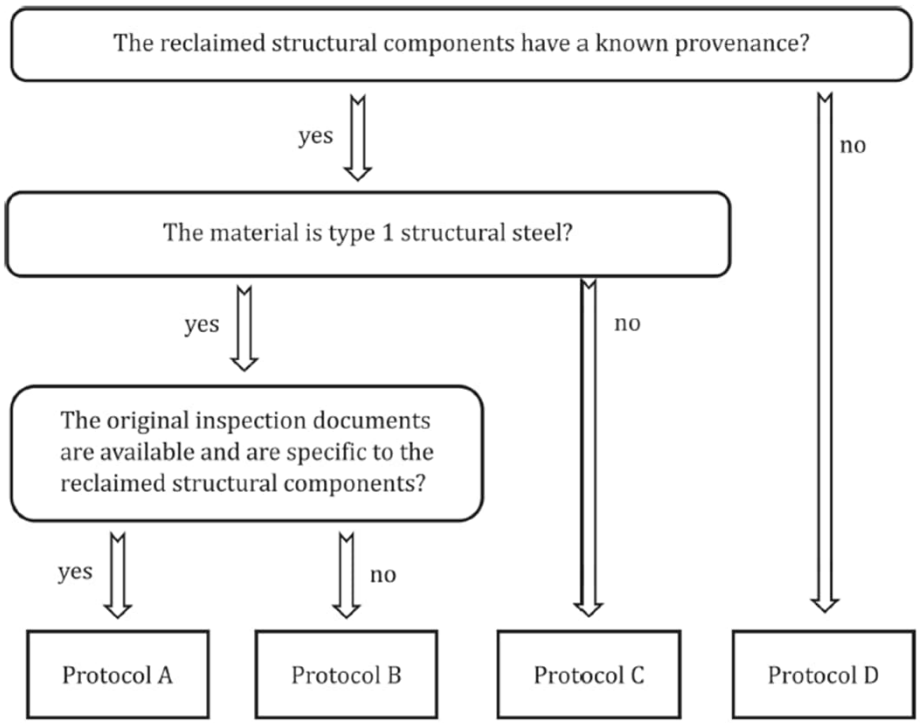
PROVISIONS FOR GREATER REUSE OF STEEL STRUCTURES

	Class A	Class B	Class C
Classification	Original material test certificates are available and constitute evidence of conformity with the relevant product standard	Original material test certificates are not available. Comprehensive testing protocol is applied.	Original material test certificates are not available. Most conservative steel grade in accordance with structure age and location is adopted.
Adequacy assessment	**Optional minimal testing** Original material documentation used for the adequacy assessment. If required, minimum NDT can be carried out to confirm material provenance.	**Comprehensive testing** Reclaimed steel is tested for the adequacy assessment. All required material characteristics are justified according to EN1090-2 section 5.1 shall be justified and declared.	***No adequacy assessment***
Reliability assessment	**Original certification** Original inspection documents are available and it is possible to trace back the material and ensure that it meets the relevant product standards	**Material re-certified** Reclaimed steel is tested and it is demonstrated that it meets all reliability requirements (frequency of testing to be specified in the protocol)	***No reliability assessment***



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New material testing methods

2017-2020
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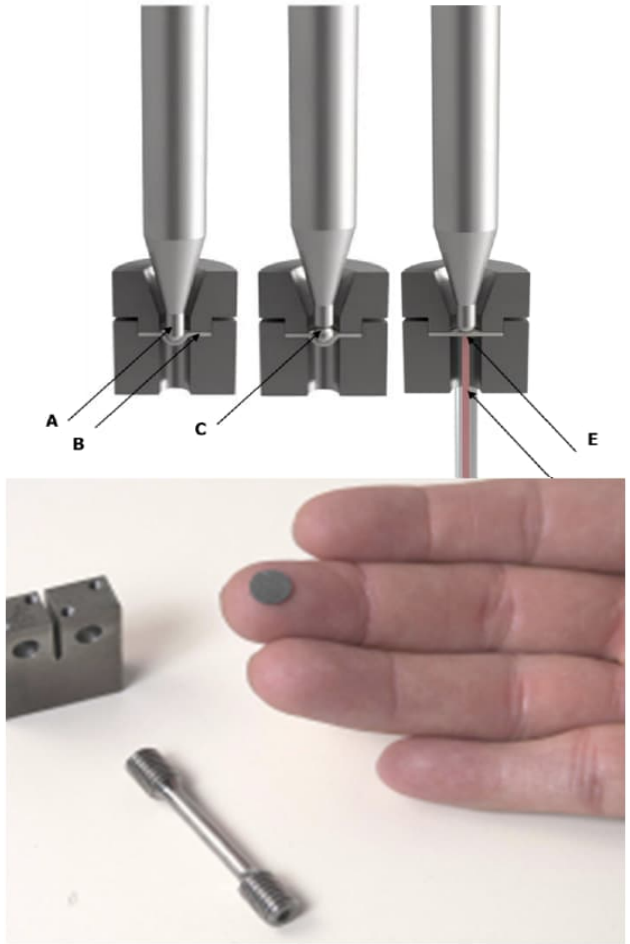
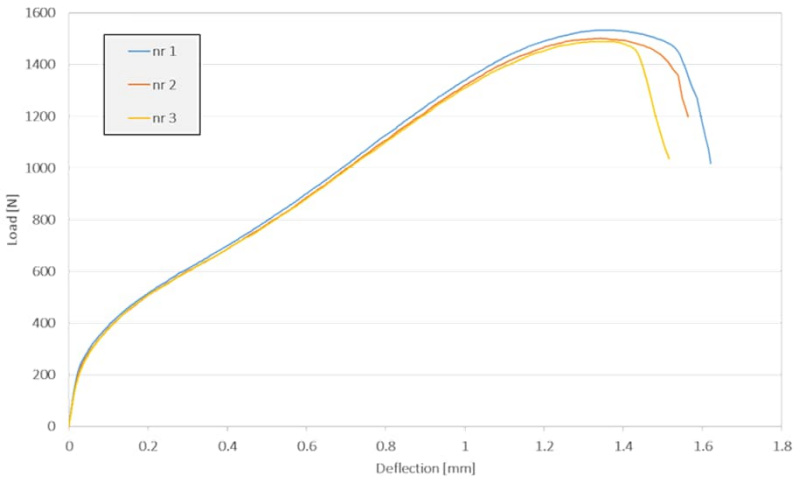
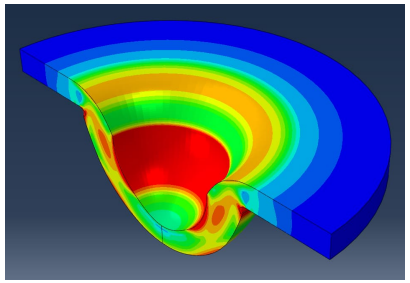


Load-deflection diagram



Yield and tensile strength from EN15627

Full material model using reverse FEM calculation



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New solutions for envelopes

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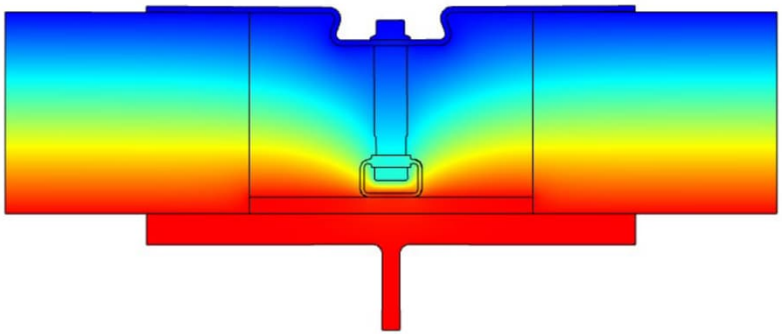
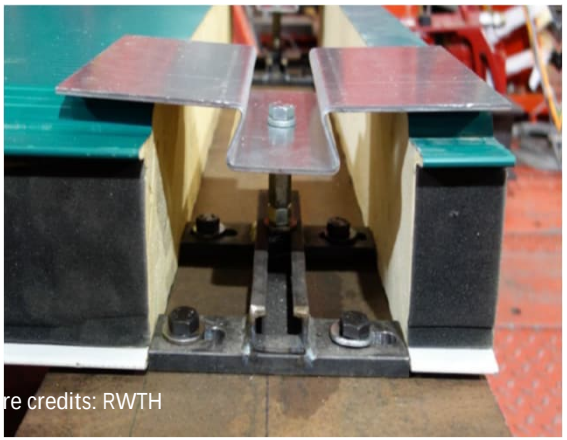
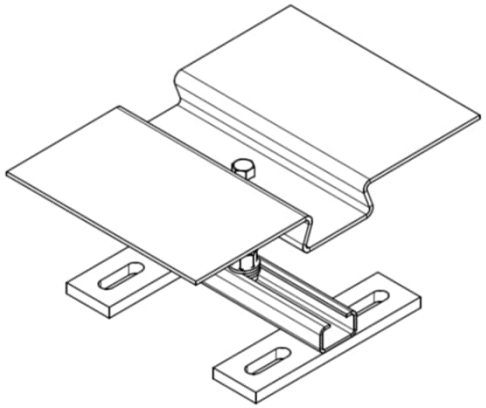
Smart Flashing Connector







Overcladding

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European Recommendations for Reuse of Reclaimed Steel Products

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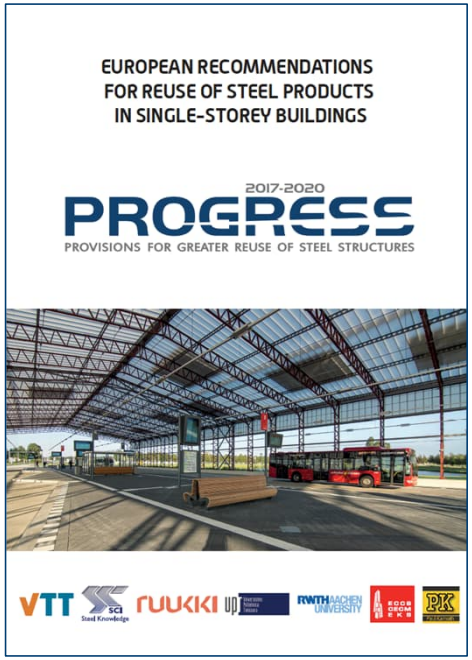
ACCOMPANYING MEASURE FOR DISSEMINATION, VALORISATION AND COLLABORATIVE EXPLOITATION OF CIRCULARITY OF CONSTRUCTIONAL STEEL PRODUCTS

- based on PROGRESS guide for single storey buildings
- extended to cover all constructional steel
- updated to reflect new standards and regulations



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LCA methodology

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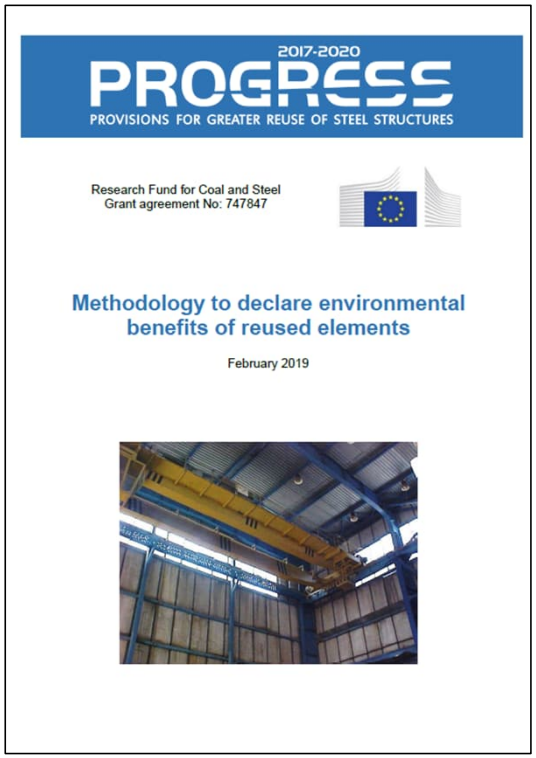
ACCOMPANYING MEASURE FOR DISSEMINATION, VALORISATION AND COLLABORATIVE EXPLOITATION OF CIRCULARITY OF CONSTRUCTIONAL STEEL PRODUCTS

EN 15804+A2:2019



World Steel Association Guide (2024)

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LCA methodology

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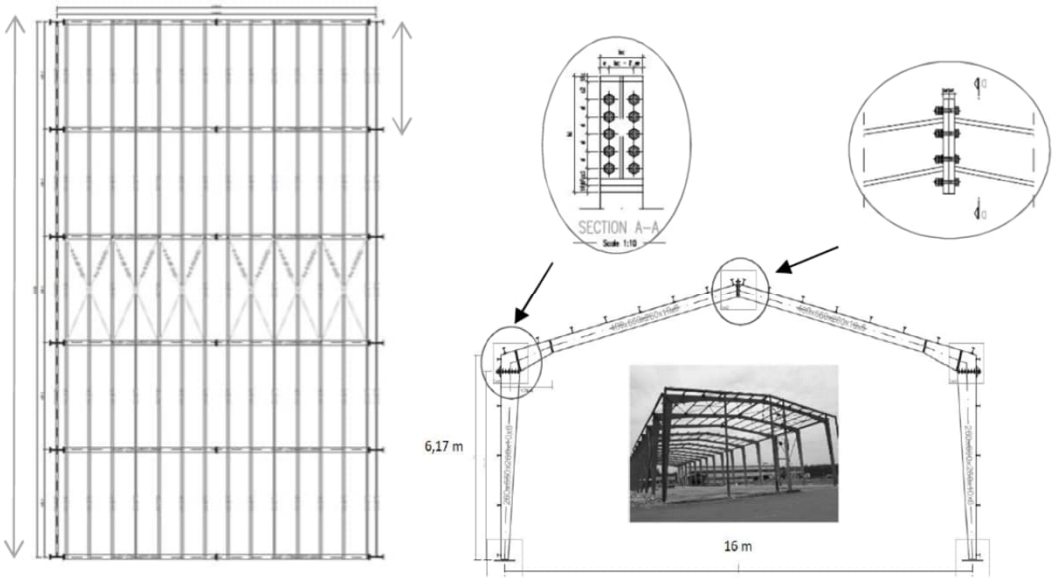
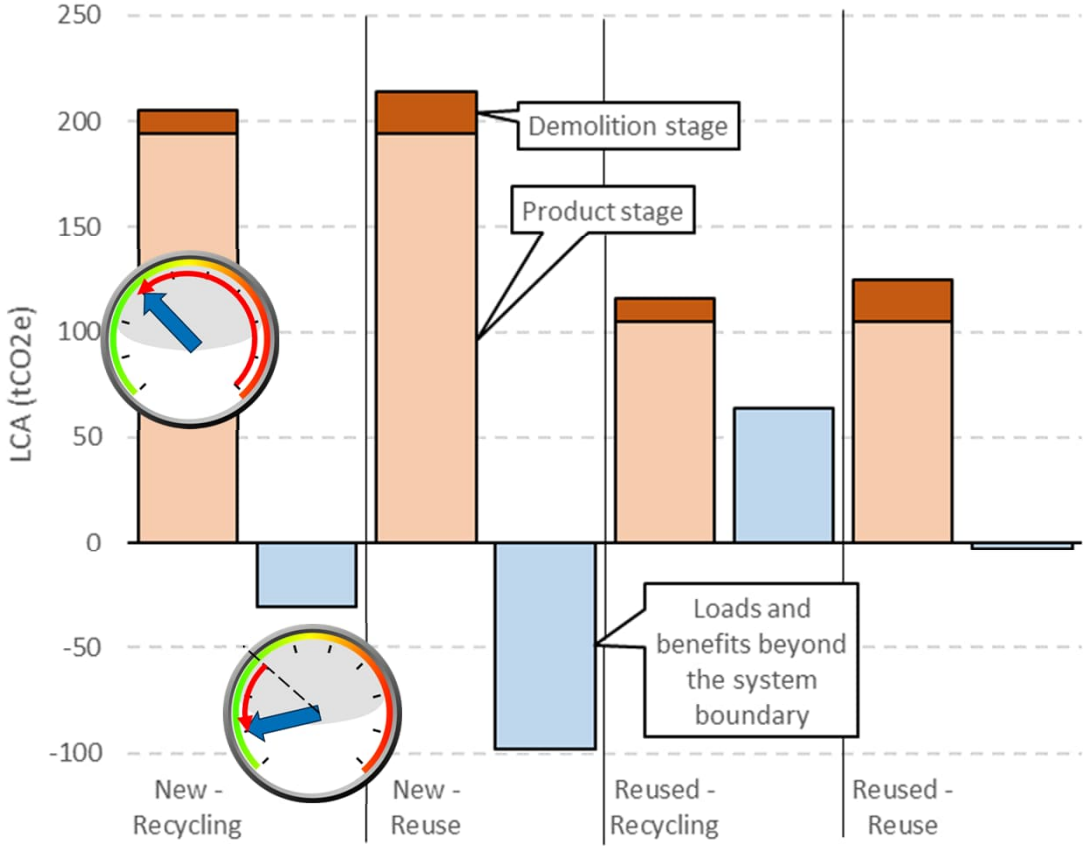


- Pre-designed steel hall from PRECASTEEL[1]
- EPD data from Ruukki Construction[2]
- LCA includes steelwork, concrete slab and foundations, envelope, windows and doors[3]



[1] http://www.unav.es/Precasteel/

[2] https://cdn.ruukki.com/docs/

[3] S. Vares, P. Hradil, M. Sansom, V. Ungureanu, Economic potential and environmental impacts of reused steel structures, Structure and Infrastructure Engineering, September 2019

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LCA mobile app + web tool

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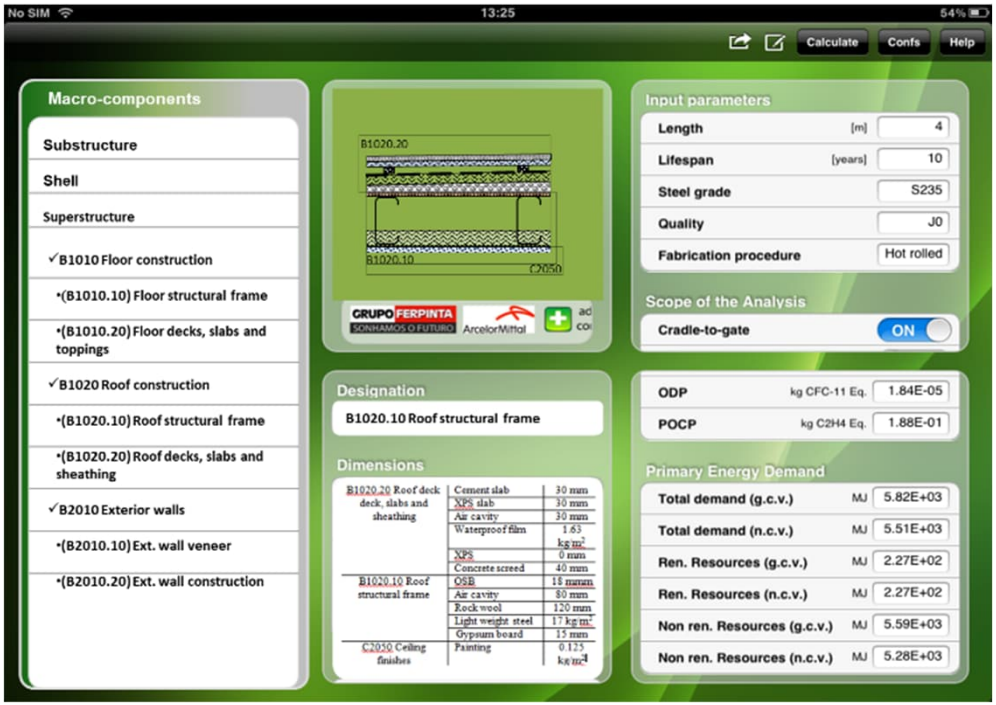

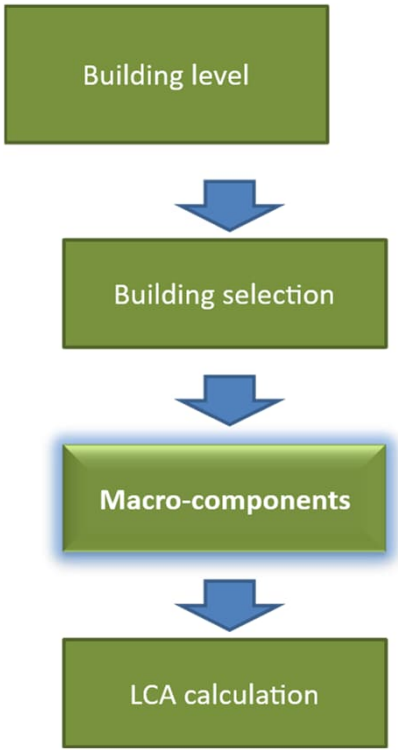

- based on BUILDINGS LCA mobile app https://apps.apple.com/us/app/buildings-lca/id553002291
- extended to cover reuse of components and include BIM inputs
- ported to web server (to be accessed from the browser), possible API access
- updated to reflect new methodologies

cmm SBI Norsk Stålforbund Norwegian Steel Association isise

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Brochures

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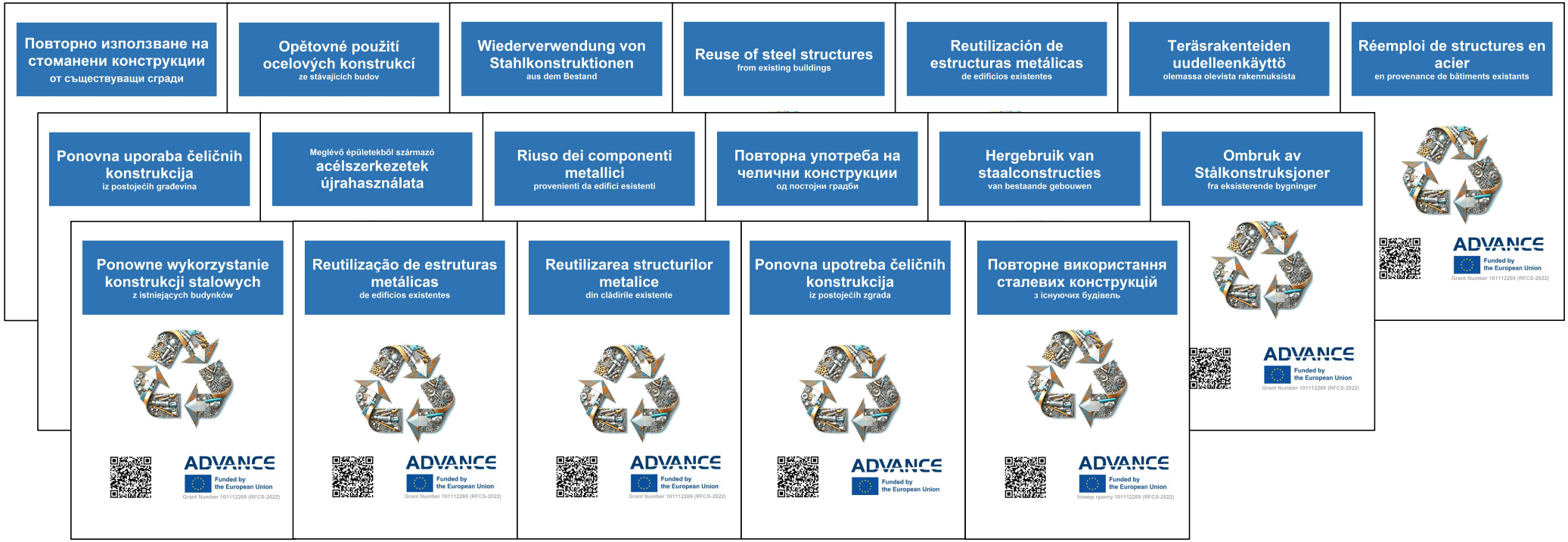

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Workshops

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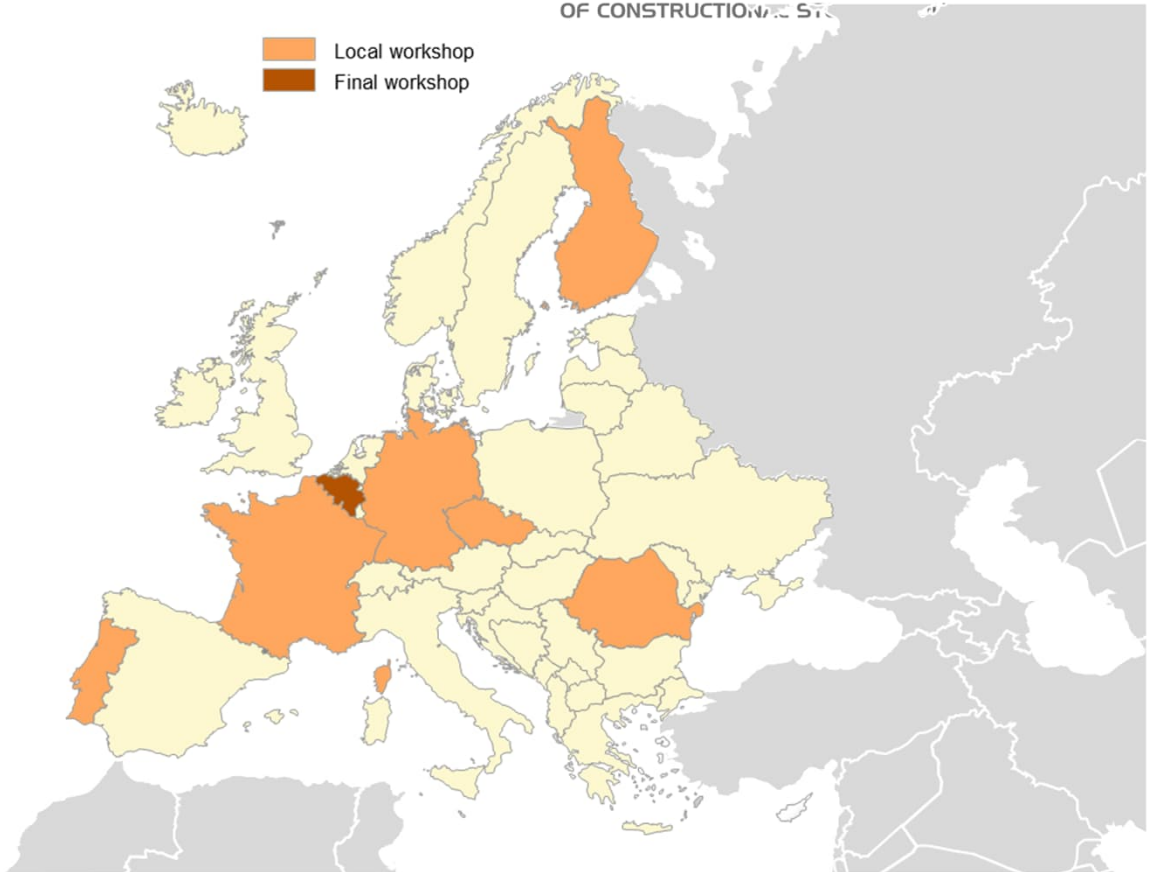
- 6 local workshops (FI, FR, DE, CZ, PT, RO)
- Final workshop in Brussels
- Introduction of the book LCA calculation app
- Sharing experiences, collecting feedback
- Distribution of brochure



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Factsheets

2017-2020
PROGRESS
PROVISIONS FOR GREATER REUSE OF STEEL STRUCTURES

Reuse of Steel Case Study no. 1

NTS building, Thirsk, UK

Figure 1 Erection of the NTS building primary structure (summer 2017)

Project summary

Client:	National Tube Stockholders (NTS)
Original designer/fabricator:	Severfield plc/Fisher Engineering
Project manager and fabricator:	Cleveland Steel and Tubes (CST)
Structural engineer	BHD partnership
Fabrication drawings	Rapid consulting
Steelwork erector	WHL Building Services Ltd

Project description

CST's main business involves buying surplus steel pipe from the offshore oil and gas sector and supplying structural steel tube and piling into the UK construction market. CST holds approximately 65,000 tonnes of pipe stock at their facility in Thirsk, UK. In addition to stock holding, CST offers steelwork fabrication services. CST project managed this reuse project on behalf of NTS. CST has good experience of procuring previously used steelwork and is keen to promote the reuse of structural steel. CST was responsible for the overall management and coordination of this project.

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detailed description of
the steel reuse projects

Picture credits: ArcelorMittal

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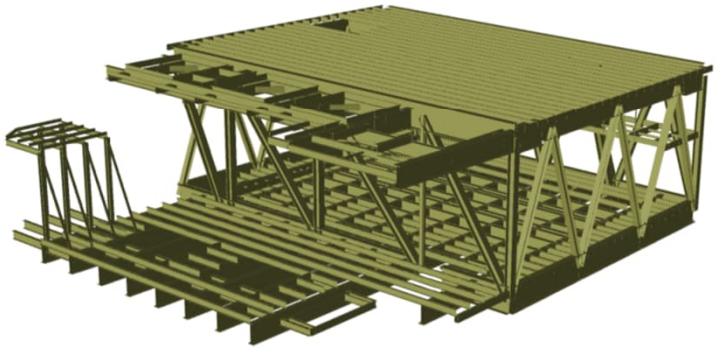
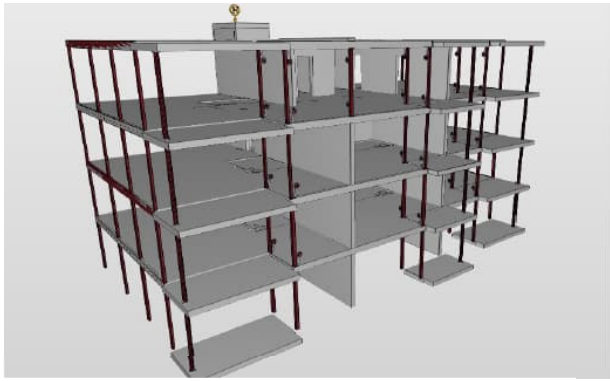
Reuse of offshore assets in construction

Module M4W of Brent Delta



Sweco apartment building, Sandefjord, Norway



University of Stavanger

SINTEF

VTT

NORCE

Relocation of industrial halls and warehouses

SEGRO warehouse, Slough, UK

The warehouse building from 2000 was relocated in a different layout in 2015 to enable the construction of a new road bridge. The original brick cladding was replaced by a new composite wall system. **Error! Reference source not found.**

Agrocolumna warehouse, Copăceni, Romania

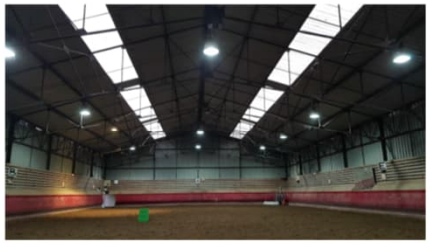
The building was erected in 2004 in Craiova, consisting of a two-storey office area and a warehouse. In 2012, it was moved to Copăceni (227 km east of Craiova) and one more bay was added to the warehouse **Error! Reference source not found.**.

Metis canopy, Otočcu, Croatia

The original structure was erected in Pula and was relocated for reuse in 2011 in Otočcu, 266 km away **Error! Reference source not found.**.

Production hall, Argeş county, Romania

The construction was redesigned and built in 2004, in Romania, based on a project and an existing steel structure relocated from the USA. The building is a single-story building with 36.2 m × 43.4 m plan dimensions. The structure is three spans of approx. 12 m each and 6 bays of 6.78 m and 7.62 m and a height of 8.5 m.



Indoor riding arena, Gennevilier, France

The original building from 1970s was deconstructed and inspected in 2023. Based on the inspection and risk analysis, it was decided that nearly the whole structure can be reused. It will be re-assebled and reused as canopy for a waste sorting centre in Epinal, France (see Annex B).

West harbour, Helsinki, Finland

The od warehouse from the West harbour in Helsinki was relocated without disassembly using cranes because of the short distance. The building was then reused as the terminal building. **Error! Reference source not found.**

Relocation of industrial halls and warehouses

Braziliëloods shopping centre, Amsterdam, Netherlands

The steel warehouse was dismantled to its original components in the late 90s after 80 years of service. The structure was recoated and reused. **Error! Reference source not found.**

Honda Warehouse, Swindon, UK

Originally erected on Honda's Swindon site in 2001, this 10,300 sq. ft. steel warehouse building was dismantled in 2004 and put into storage. After 18 months, in September 2005, the structure was re-erected, at a different location on the same Swindon site. All the main frame structural steelwork was re-used including column base plates, as were all the cold rolled items. Unfortunately, changes to various aspects of the building codes, and the change of use for the building, meant that the original cladding system could not be reused. **Error! Reference source not found.**

Relocation and conversion of old hangars

Bus station Schiphol – Nord, Amsterdam, Netherlands

The original building was erected in 1958 and was used as a hangar by the Rotterdam Airport until the late nineties. In 2003, the structure was reused as a hangar for seven years by the Rotterdam Detention Center. In 2015, it was reused again as a bus station in Schiphol. **Error! Reference source not found.**

BRE test facility, Cardington, UK

Two sheds in Cardington were converted from hangars for building zeppelins in wartime. No. 2 shed owned by BRE was initially erected in Pulham but was moved to Cardington in 1928. The entire 3270 tonne steel structure was dismantled and reassembled. **Error! Reference source not found.**

Reuse of other structures

Hakaniemi Market Hall, Helsinki, Finland

The steel and glass hall in the Hakaniemi Square, Helsinki, operated for 5 years during the renovation of the historical Market Hall. The load-bearing structure of the 2300 m² hall is a steel frame assembled with bolted connections. The facade of the hall consists of glass elements and wood cladding. Deconstruction work was done in nine weeks by Purkupiha. The dismantled parts of hall were carefully protected and transported to Tuuri, a shopping village 350 kilometres to the north of Helsinki. There, the Hakaniemi Glass Hall was given a new life as the village's Fashion Outlet.

S-Market, Urjala, Finland

The owner of the retail stores chain in Finland decided to replace an existing building in Tampere with a new, larger one. At the same time, the need for a new grocery store emerged only 60 km far away creating a perfect opportunity for a relocated reuse. **Error! Reference source not found.**

Sydney Olympics aquatic centre, Sydney, Australia

Temporary seating for the aquatics stadium; deconstructed and re-erected as a permanent grandstand.

Partial reuse

NTS building, Thirsk, UK

The original building order was cancelled in 2008 after the fabrication of its steelwork and the elements were stored. Then the fabricated steelwork was divided in four parts and sold in auction. The new building was erected in 2017 by reusing one of the lots from the original building. **Error! Reference source not found.**

Kings Science Academy, Bradford, UK

A new secondary school was built on an existing industrial site on which there were existing portal frame structures. Two portals were retained to create the dining area and kitchen of the new school. Parts of the existing frame needed re-engineering to strengthen it using retaining columns. Although it was a challenging task, by reusing the frame, £10,000 was saved on the project. **Error! Reference source not found.**

Complex of buildings, Sibiu, Romania

A standard kit solution, developed in 2006, in Romania, to build steel structures adaptable for different climatic/seismic conditions and applications, was used in new complex of buildings. The dimensions of the standard kit structure were 6 bays of 6 m, with a single span of 15 m and a height at eaves of 7 m, with the possibility to connect several such kits for longer lengths. Four existing structures of the standard kit, located in various locations were disassembly, re-engineered (some of them including new intermediate floors) and integrated in a new complex of buildings in Sibiu, Romania in 2019. The total value of the economy for the four halls with transverse frames from reused elements was 35000 € (see Annex B).

Reuse of constituent products in multistorey buildings

Bedzed, London, UK

Temporary works from Brighton railway station, were used in the permanent structure of the mixed-use development in 2002. **Error! Reference source not found.**

55 Great Suffolk Street, London, UK

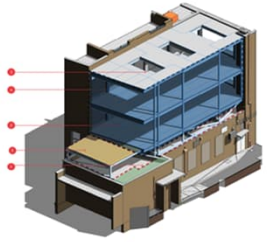
Reclaimed steel from demolition project in the City (1 Broadgate) was purchased to make up the structure fc a new external core of the Victorian style historic warehouse in Soutwark. 97% of the steel (over 20 tonnes) will be reused in this project. **Error! Referenc source not found.**

Elephant & Castle Town centre redevelopment, London, UK

Three of four new commercial and residential building in the emerging new town centre at Elephant and Cas will utilize reclaimed steel. The total amount of steel in buildings E2, E3 and E4 is 372 t, of which 26% (96 tonnes) will be reused. **Error! Reference source not found.**

Holbein Gardens, London, UK

24 tonnes of reclaimed steel (35% of total) was used f the extension of 1980s office building off Sloane Squa in Belgravia. **Error! Reference source not found.**



Sloane Square House, London, UK

Two storey extension of 1950s office block built on top of Sloane Square Underground Station achieved 100% sourcing of steel (21 tonnes) obtained from existing buildings across the country. **Error! Reference sourc not found.**

Refurbishment project, Lichfield, UK

Refurbishment of 1960s two-storey residential house i an example of rising public awareness about the sustainable choices in private construction projects. The homeowner contacted reclaimed steel supplier an received two sections matching the specification, one slightly oversized and one section that required splicin **Error! Reference source not found.**

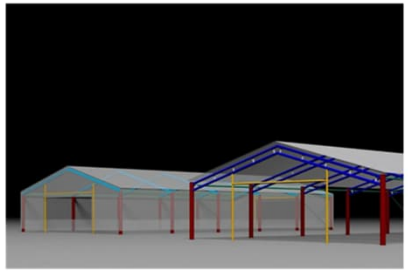
Reuse of constituent products in other projects

The London Olympic Stadia, London, UK

2500 tonnes of surplus oil and gas pipeline tube materi was used to build major stadia projects including C Trafford North & South Stands, Emirates Stadium & th Reebok Stadium. **Error! Reference source not foun**

Bent Cross Town Primary Substation, London, UK

Around 45% of the total designed steelwork was reuse in this project leading to around 40% carbon savings. Reclaimed steel tubulars were selected for the long columns of the structure, while virgin steel was used fo the façade support, where tubes would have been less efficient and clunky for connections. **Error! Reference source not found.**



Agricultural buildings from reused steel tubes, North Yorkshire UK

Simple Works is designing agricultural sheds using reclaimed steel supplied by Cleveland Steel and Tube The system utilises reclaimed steel tubes to create portal frame structures consisting of pitched welded trusses. **Error! Reference source not found.**

The Entopia Building PV canopy, Cambridge, UK

CISL develops leadership solutions for a sustainable economy, so it needed to lead by example when commissioning its new office base. The project incorporates the reuse of the original structure and material reuse including the reuse of steel for the PV canopy. **Error! Reference source not found.**

BCSA headquarters, Carwood Park, Doncaster, UK

The new steel-framed buildings in Carwood Park were constructed from 82 t of used steel. **Error! Reference source not found.**

Reuse of steel sheet piles

Steel sheet piles are versatile, modular, and reusable. In temporary scenarios, sheet piles are frequently reused multiple times, while acceptance of their reuse in permanent applications is growing. Examples of suc applications in “Schwarze Pumpe” brownfield site, Spremberg (Germany), Vienna tube extension (Austria), New Headquarters of the Bayerischen Versorgungskammer (BVK) in Munich (Germany), Gorinchem - Waardenburg dyke (the Netherlands) or Belval train station (Luxembourg) are given in Annex E

Reuse of secondary structure and envelope

Mac-Fab Systems department store, Monaghan, Ireland

Steel cladding was reused on a large department store in Monaghan, Ireland. **Error! Reference source not found.**

740 Rue Bel-Air, Montreal, Canada

Roof joists from existing industrial buildings were reused in the construction of a new government building on the same site. **Error! Reference source not found.**

Major refurbishment

PUT laboratory, Timisoara, Romania
The structure was erected in 1959, consisting of truss elements. Part of the structure was damaged in 2017 by a storm. **Error! Reference source not found.**

Blue Steel Building, Leeds, UK

The existing warehouse was thoroughly refurbished. Its portal frame was raised by 3 m, existing purlins, bracing and rafters were reused and a new office block was added with composite metal decking. **Error! Reference source not found.**

University Technical College, Leeds, UK

The construction company BAM was the main contractor for a University Technical College Leeds building project, involving the renovation of a 1900s historic building with a requirement that the steel structural frame be conserved. **Error! Reference source not found.**

Conversion of primary structure into a multi-storey building

HIDROTIM offices, Timisoara, Romania

The building was erected in the 1960s as a single storey industrial hall of steel structural elements with crane and converted into a five-storey office building in 2004. **Error! Reference source not found.**

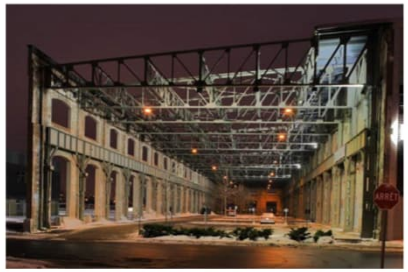
RWTH seminar building, Aachen, Germany

Following the closure of the RWTH heat and power plant in the 1990s, the decision was made to transform it into a seminar building by adapting the structure to meet the new functional requirements. **Error! Reference source not found.**

Changing the general purpose of the building

Musée d'Orsay, Paris, France

The Orsay railway station was built for the Universal Exhibition of 1900 and converted into museum in 1978 **Error! Reference source not found.**



Angus Technopôle Building, Montréal, Québec

A former locomotive assembly plant used by Canadiar Pacific Railway was converted into light industrial workshops and office spaces for community-focused businesses in 1999. **Error! Reference source not found.**

S-Market Urjala, Finland

Deconstruction and reassembly of a steel structure in a new location

The owner of the retail stores chain decided to replace a building in Tampere with a larger one. At the same time, the need for a new grocery store emerged only 60 km away creating the opportunity for relocated reuse.

New design was based on available building frame

Main features

- Degree of reuse ⇨ steel frame (columns, main girders, cross girders) and roof profiles ⇨ 100% reused.
- In-situ fire protection of frame with intumescent coating
- New plinth and wall structures, new bay for the small storage part.
- About 10% saving in total construction costs due to reusing of steel structures

2023-2025

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ACCOMPANYING MEASURE FOR DISSEMINATION, VALORISATION AND COLLABORATIVE EXPLOITATION OF CIRCULARITY OF CONSTRUCTIONAL STEEL PRODUCTS

THANK YOU !

CONTACT US:

https://www.steelconstruct.com/eu-projects/advance/

petr.hradil@vtt.fi

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Reuse is not a compromise on structural safety!