

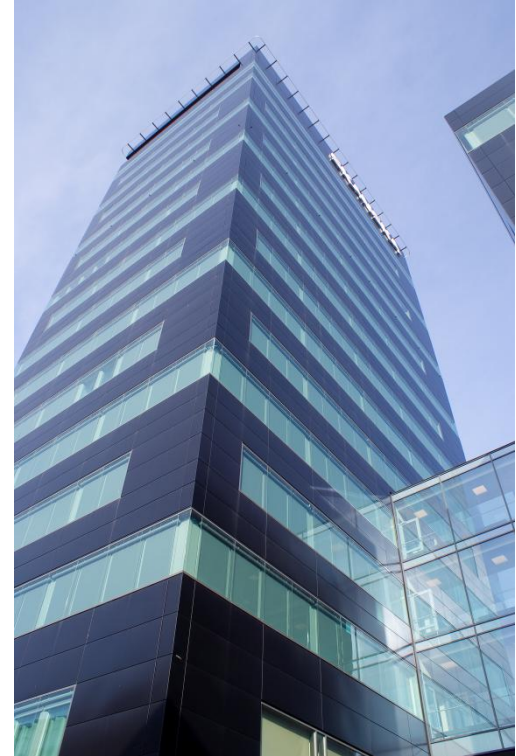
Environmental product declarations for Ruukki Construction products



RUUKKI
Energy-efficient steel solutions for better LIVING. WORKING. MOVING.

Ruukki environmental product declarations

- EPDs for Ruukki Construction products
 - Structural steel products for construction
 - Structural steel products for construction, European steel
 - Sandwich panels
 - Colour coated building products
 - Hot-dip galvanized building products
 - Tubular products, steel sections and piles
- Increased demand for
 - Calculation of building life cycle environmental impacts
 - EPDs enable credits in environmental assessment schemes (BREEAM, LEED)



Contents of the EPDs

- Product life cycle environmental impacts
- Product material content, including hazardous substances
- Environmental impacts and their management in production
- Environmental impacts and their management in sourcing and transportation
- Packages
- Waste management of the product and its package
- Safe installation and use

Table 1. Example of the composition of a typical steel structure

Material	Content (% of total product weight)	Name of ingredient	Maximum part content, % (w/w)	Content % (w/w) of total product weight	EK1 number	Risk and hazard phrases and other data on the ingredient
Steel	> 90*	Iron (Fe)	95.8	91.0	7439-89-6	-
		Manganese (Mn)	1.7	1.64	7439-96-5	-
		Silicon (Si)	0.8	0.77	7440-21-3	-
		Carbon (C)	0.22	0.22	7440-44-0	-
		Nickel (Ni)	0.5	< 0.49	7440-02-0	SKD-43; H351, H331
		Cobalt (Co)	0.012	< 0.012	7440-48-4	H360D3-E1; H334, H373, H413
Coating	< 3.7*	Zinc powder**	50-70	< 0.54	7440-66-6	850-51-53; H400, H411, H413
		Zinc borate***	< 2.5	< 0.37	1332-07-6; 1332-07-7	850-51-53; H400, H411, H413
Welding consumables	< 0.3	Iron (Fe)	97.5	< 0.003	7439-89-6	-

Remarks
 * In the protected structure, the content of steel may be lower and the coating higher, see Table 2.
 ** Data in commonly categories (31-41) only when zinc paint is needed.
 *** Data in the protected structure only.
 Measurements are done to a level of 0.01 mg/kg (0.00000001%). Concentrations below this degree of measuring accuracy cannot be determined. According to supplier notifications, none of the constituent substances within the whole product exceeds the limits of the EU's chemical regulation (REACH) and recommendations phasing out hazardous substances in the building sector such as the requirements of BOD6 (group 4) and Byggnadsbestämmelser (Building Material Assessment, B6, 2013), Swedish Building Product Declarations (Sveinigen FR Byggnadsdeklarationer, B6 3, 2013) and the priority list in Norway. No product contains substances restricted under REACH or included on the candidate list (PVC).

Table 2. Average and maximum content (%) of coating of total product weight in steel structures

Consistency category†	Thinner and structural tubes and sections, average content (%)	Thinner and structural tubes and sections, maximum content (%)	Wig beams, average content (%)	Wig beams, maximum content (%)
□	0.52	1.03	0.09	0.32
□	1.04	1.82	0.21	0.28
□	1.36	3.66	0.22	0.52
□	1.85	2.91	0.27	0.62
□(H), □SM(H)**	0.49	0.83	-	-
Fire protected □	6.67	16.57	0.48	0.96

† According to EN 10350-1
 ** Typically in bridge superstructure

How can be EPDs be used?

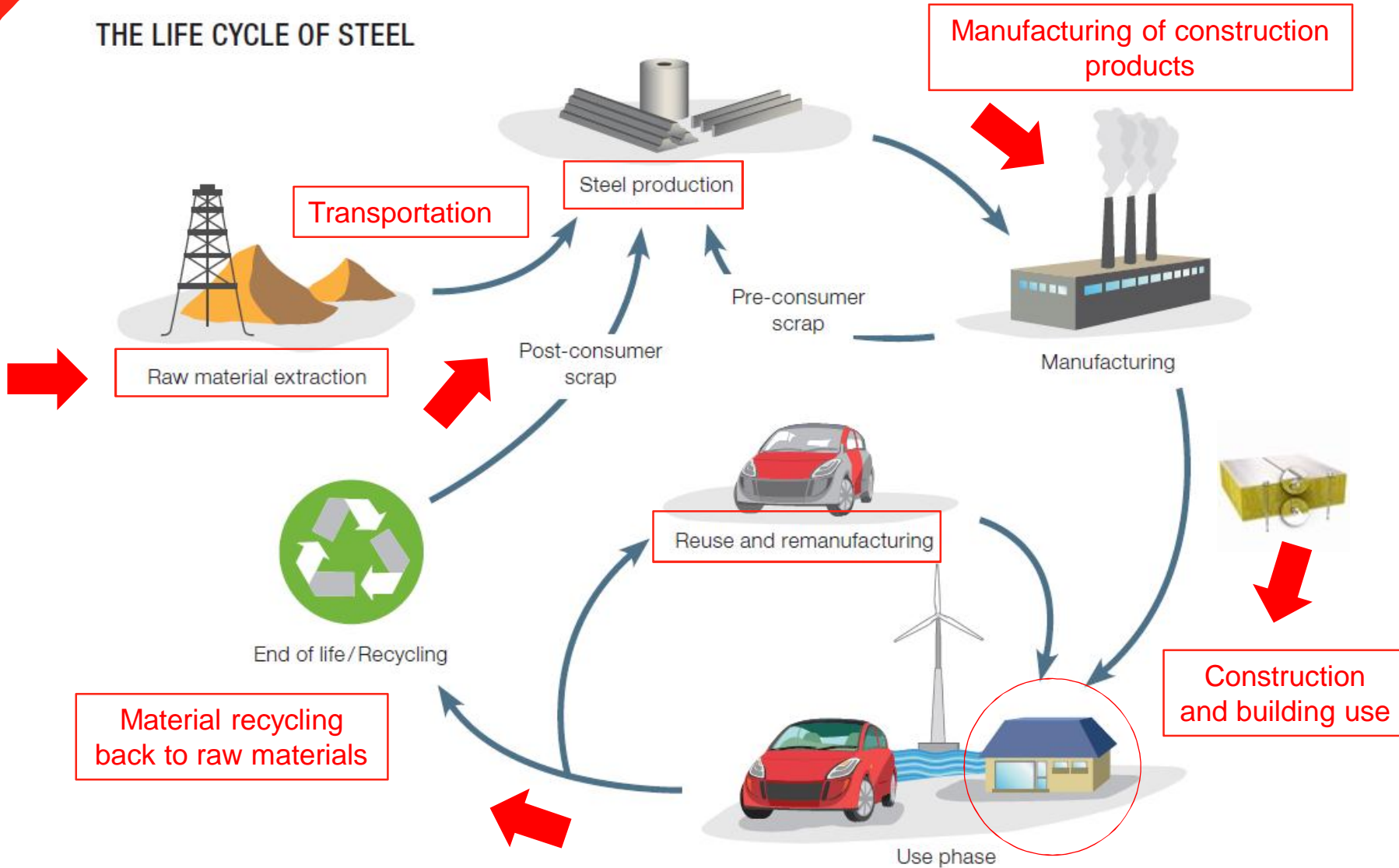
- As a certificate for
 - Product life cycle environmental impacts, when EPD is required
 - General life cycle environmental impacts, like global warming potential or energy usage
 - Product material content and included hazardous substances
- Answer for questions about
 - General environmental information related to production
 - How product and its package waste can be treated

Product life cycle environmental impacts

- Product life cycle
 - Raw material extraction → The end of product use
- **LCA = Life cycle analysis**
 - Environmental impacts for all stages of product life cycle
- Life cycle information of a single construction product is a tool for calculating the environmental impacts of a building
 - Target may be e.g. low global warming potential (GWP)



THE LIFE CYCLE OF STEEL

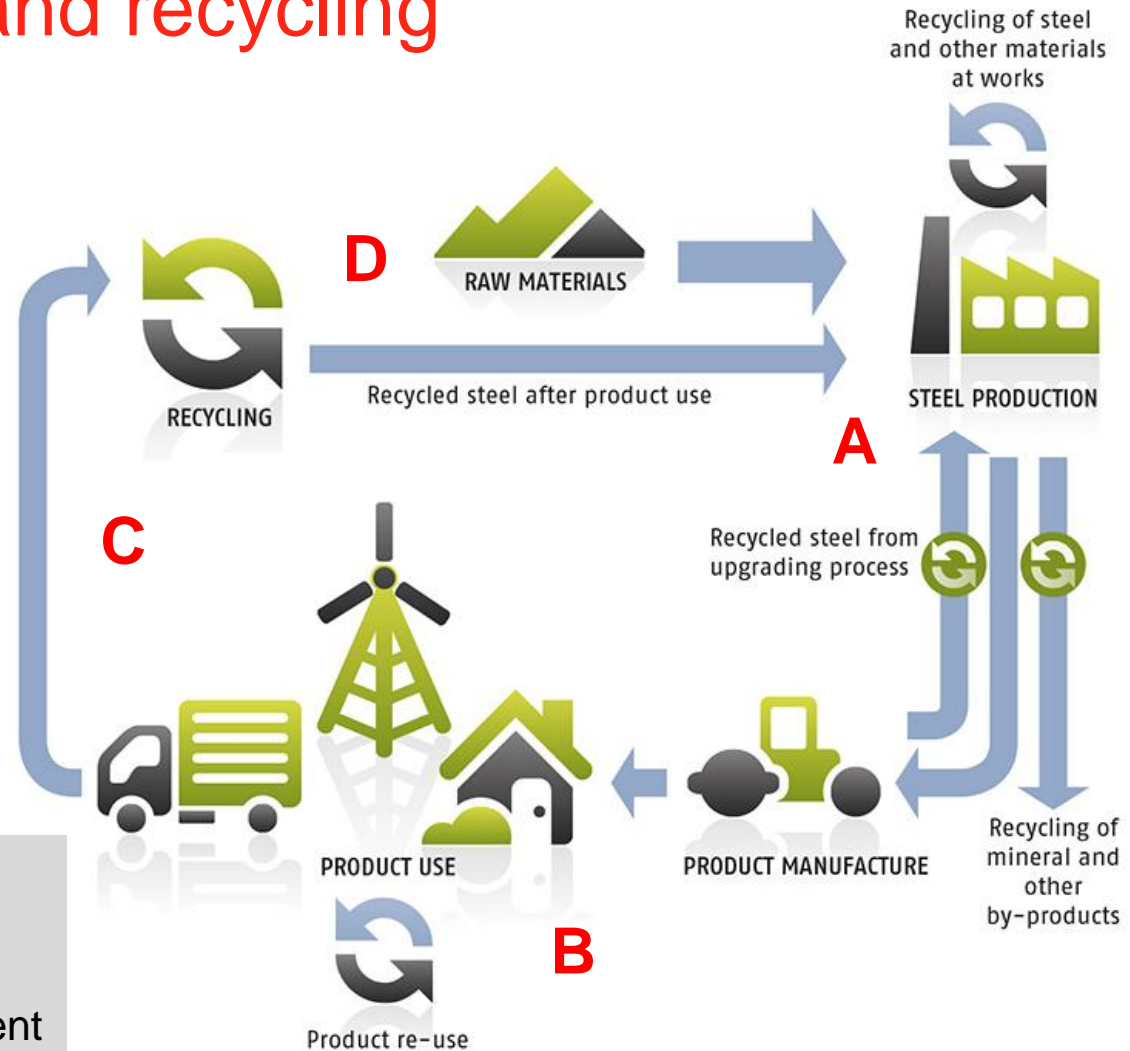


Source: worldsteel



Steel life cycle and recycling

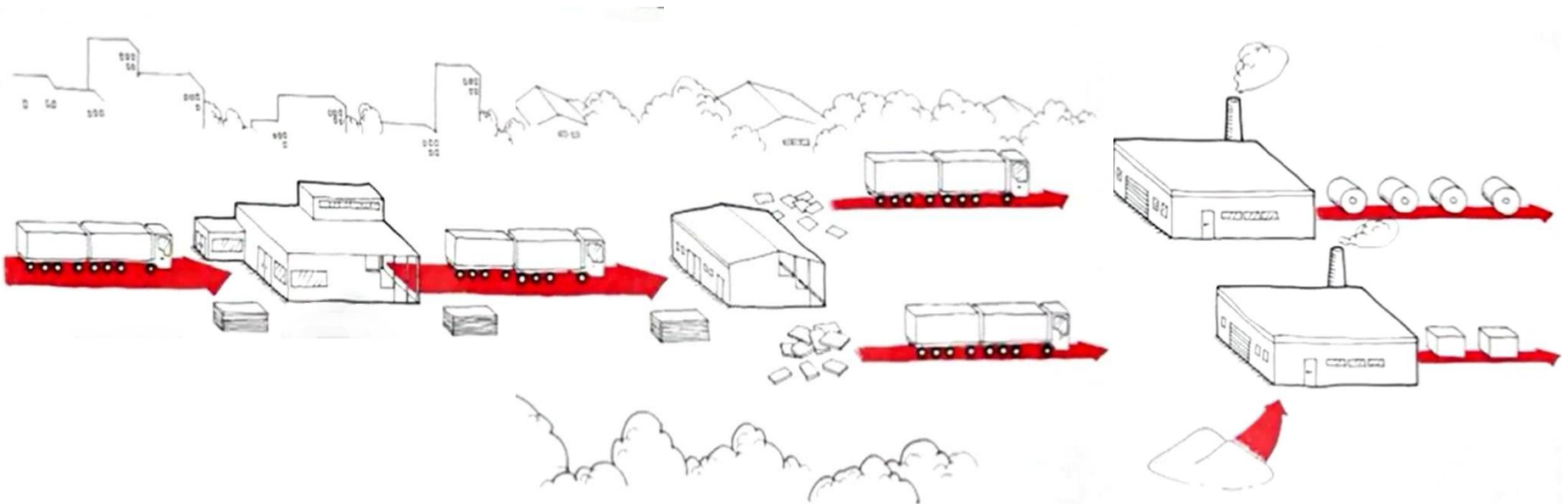
- Steel can be recycled back to raw material to substitute virgin raw materials
- Quality does not decrease



- A:** Product raw materials and production
- B:** Construction stage
- C:** Demolition and waste treatment
- D:** Material recycling and reuse

In a demolished building, typically
**more than 90% of the steel is
recycled.**

(International Symposium on Life Cycle Assessment and Construction 2012)



EPD Content requirements

- According to standards EN 15804 and EN ISO 14025
- Verified by third party

according to EN ISO 14025:2010

standard EN 15804

Owner of environmental product declaration	Suolakkienkatu 1, FI-00810 Helsinki, Finland tel. +358 20 5911
Product	Welded and coated steel structures made of hot-rolled plates, sheets and coils, and cold-formed tubes and sections
Manufacturer	Ruukki
Manufacturing sites	Peräseinäjoki and Ylivieska (Finland), Gargsdal (Lithuania), and Oborniki (Poland)
	Frames of buildings and structures
	1 kg of steel structures
	31 August 2010
	31 August 2010

The environmental product declaration contains several different steel structures for buildings and other structures. The results of environmental indicators stated in this declaration are average values for these products.

The EPD of construction products may not be comparable if they do not comply with the standard EN 15804 and EN ISO 14025.

The information in the environmental product declaration is based on production data for 2010. CER standard EN 15804 serves as the core PCR.

Independent verification of the declaration, according to EN ISO 14025:2010

External Internal

Third party verifier



Thomas Andersson, Insinööritoimisto Ecobio Oy

• Product Application

Steel structures are highly prefabricated, ready-to-install, energy-efficient solutions for single- and multi-story premises. Typical single-story premises consist of workshop-primed WQ beams and columns. Typical single-story premises consist of many fire protection solutions available.

Assessment of buildings for LEED and BREEAM and www.ruukki.com/LEED

Produced by Ruukki in Peräseinäjoki and Ylivieska production sites determined according to EN 10204. Steel made in Raabe steel mill in Finland

Welded and embedded fixtures made in combination with hot-rolled, plate, sheet and

Third party verifier



Thomas Andersson, Insinööritoimisto Ecobio Oy

Special characteristics of steel life cycle

- Ruukki EPDs cover life cycle stages A1, A2, A3 and D
- Company specific data from Ruukki
- End of life recycling benefits of steel are declared in module D

Table 3. The environmental profile of welded and coated sections, trusses and beams made of hot-rolled plate, sheet and coil

Parameter	Unit	Product stage				Benefits and loads beyond the system boundary D Re-use, recovery, recycling potential
		A1 Raw material supply	A2 Transport	A3 Manufacturing	Product stage Total	
Parameters describing environmental impacts						
Global warming potential GWP	kg CO ₂ equiv.	2.44	0.01	0.25	2.71	-1.30
Stratospheric ozone layer ODP	kg SO ₂ equiv.	4.85x10 ⁻⁴	1.07x10 ⁻⁴	7.90x10 ⁻⁴	5.48x10 ⁻⁴	9.16x10 ⁻⁴
Acidification potential of soil and water sources AP	kg (PO ₄) ⁻³ equiv.	5.00x10 ⁻⁴	2.19x10 ⁻⁴	5.29x10 ⁻⁴	5.75x10 ⁻⁴	-8.78x10 ⁻⁴
Eutrophication potential EP	kg ethane equiv.	3.77x10 ⁻⁴	1.20x10 ⁻⁴	1.50x10 ⁻⁴	1.89x10 ⁻⁴	-6.43x10 ⁻⁴
Formation potential of tropospheric ozone POCP	kg SB equiv.	1.26x10 ⁻⁴	5.29x10 ⁻⁴	2.26x10 ⁻⁴	1.28x10 ⁻⁴	-1.31x10 ⁻⁴
Abiotic depletion potential of tropospheric ozone (ADP-elements)	MJ net calorific value	34.19	0.19	3.21	27.59	-13.70
Abiotic depletion potential ADP-fossil fuels	MJ, net calorific value	0.44	0.01	1.71	2.16	0.75
Parameters describing resource use and primary energy						
Use of renewable primary energy used as energy carrier	MJ, net calorific value	0.0	0.0	0.0	0.0	0.0
Use of renewable primary energy resources used as raw material	MJ, net calorific value	0.44	0.01	1.71	2.16	0.75
Total use of renewable primary energy resources	MJ, net calorific value	12.84	0.19	4.74	17.78	-0.87
Use of non-renewable primary energy used as energy carrier	MJ, net calorific value	12.10	0	0	12.1	1.67
Use of non-renewable primary energy resources	MJ, net calorific value	12.10	0	0	12.1	1.67

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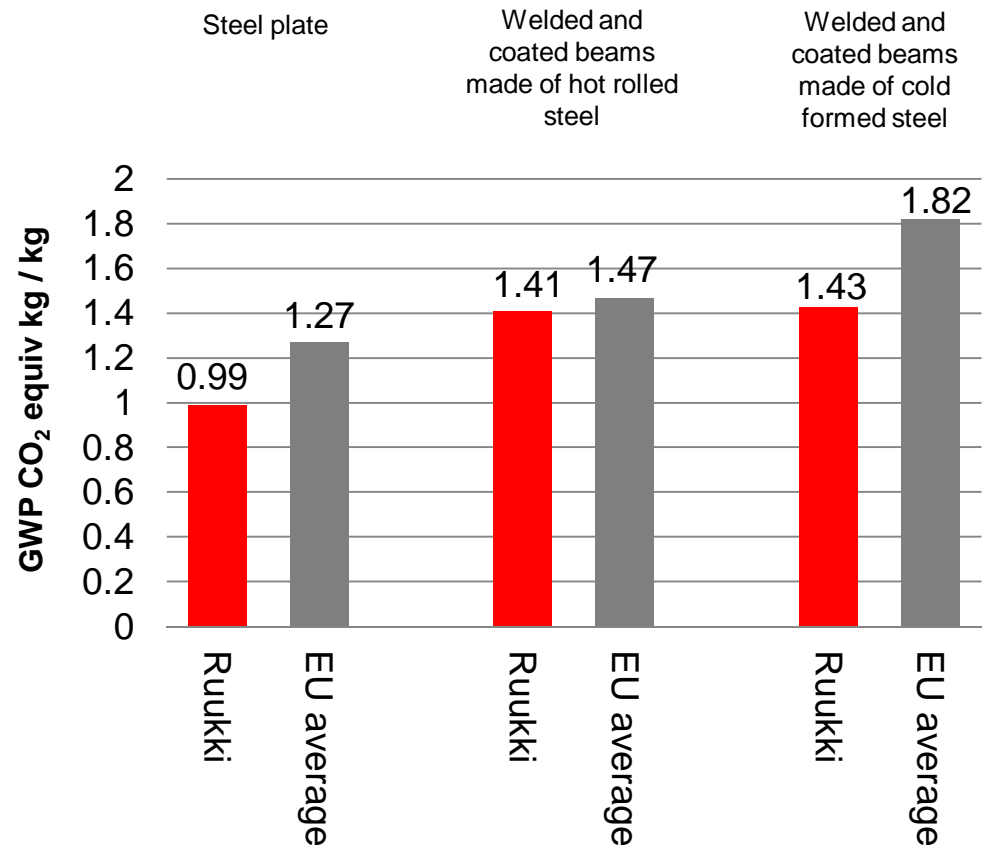
Raahe steel mill:
1.6 kg (66 %)

Parameter	Unit	Total
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	MJ per energy carrier	-0.04

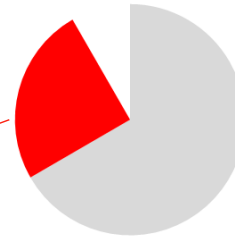
Steel manufacturer makes a difference

We are among the best in the world in iron making CO₂ efficiency. Ruukki uses nearly the minimum amount of carbon raw materials possible with current technology.

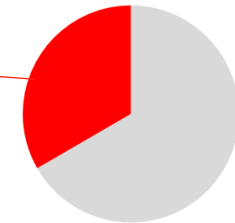
Ruukki and EU average steel products' GWP 2012





All beams welded and coated in Ruukki Construction production site in Europe, data based on year 2012. Steel production of EU average steels is based on worldsteel data 2005 - 2008. End of life recycling rate of 90 % is included. Most deliveries are a combination of hot rolled and cold formed beams.



Building materials GWP with Ruukki steel solution



Building materials GWP with average steel solution

-  Steel construction products' share of the building mass
-  Other construction products' share of the building mass

Building environmental impacts can be decreased with **Ruukki's steel solution**

For our customers:

A Promise is what makes
the difference

www.ruukki.com/epd



NUUKKI

LIVING. WORKING. MOVING.