Smarter steels for people and planet



Focus on Framing

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ArcelorMittal 2nd largest producer, but industry leader with largest global reach

Top steel producers (2021)



In million tonnes of crude steel production Source: Worldsteel



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European Long Products' manufacturing sites (Flat Products have more)

Structural sections from Luxembourg and Spain:

- Rodange: Heavy merchant bars
- **Differdange:** Medium and Heavy beam mills
- Belval / Olaberria / Bergara: Light beam mill

Shipments:

 Worldwide: from Antwerp port or rail / road for smaller inland distances

Rolling frequencies:

Every 3 to 4 weeks: Any grade or XCarb[®]

Lead-in time:

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- 8 to 12 weeks: Export regions
- **5 to 6 weeks:** European continent

25 years of importing EAF steel to the UK EAF steel comprises over 40% of the structural market





ArcelorMittal Europe produces the largest and strongest range of hot-rolled Sections



Check our sales programme for more and grade-to-section availability

Understanding the emissions of steel and ArcelorMittal's leadership ambition



Each steelmaking route has its own carbon footprint (example for section/coil products)

	BF + BOF	DRI-EAF	Scrap-based EAF	Scrap-based EAF + renewably produced electricity XCarb [®]
Steelmaking route	Blast furnace - Basic oxygen furnace (BF-BOF)	Directly reduced iron (DRI) followed by an EAF	Electric arc furnace (EAF)	EAF with renewably produced electricity
Main input	Coal and iron ore	Direct reduced iron (sponge iron)	Up to 100% scrap	Up to 100% scrap
Main CO ₂ source	Chemical interaction between carbon (coal) and iron ore: iron reduction produces pig iron, which is converted into steel	Emissions from the use of natural gas as reductant Emissions from purchased electricity	Emissions from purchased electricity	Remaining emissions from Scope 1 & 3
Emissions (incl. rolling mill) Modules A1-3	2.25 to 2.8 tCO ₂ /t 2.5/2.6	1.12 to 1.35 tCO ₂ /t 1.2/-	0.62 to 0.85 tCO ₂ /t	As low as 0.3 tCO ₂ /t 0.3/0.8
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There is no shortage of scrap but ...

Global steel demand (all sectors)



Global scrap arisings



(predicted to rise to circa 900 mtpa by 2050)

The **primary steel** we make **today** must be the **zero carbon** scrap of **tomorrow**



Being magnetic, steel is easy and affordable to recover from almost any waste stream.

worldsteel.org

What are the processes used to make XCarb[®] Coil recycled and renewably produced?



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XCarb[®] Recycled and Renewably Produced (RRP) comparison

Product Global warming potential kgCO2e/tonne modules A1-A3	Rebar & mesh	Structural sections	Sheet piles		Hot rolled coil	Hollow sections		Magnelis®	Heavy plates	Decking*	Sandwich panel*
UK Norm – from local EPDs. Or AM value.	615 Local	2450 Local	2440		2230	2590 Local		2570	2530	2955*	2968*
EAF from ArcelorMittal	-	560	_		_	_		_	_	—	_
XCarb	300	333	409		532	640	Γ	797	914	952*	1415*
XCarb saved CO2e % compared to UK Norm	51	86	83		76	75		69	64	68	52
XCarb cost extra %	—	4	_		—	_		-	-	-	-
* Strictly these EPDs are given 'per m ² ' as laid, then converted to 'per tonne' fo ease of comparison. Based upon 9 and 12kg/m EN 15804 + A2 (some +A ²	n r 1)		Magne	Ilis ^a	[®] versus po (salt spray	est-galvanised test)				A	rcelor/Mittal

EPD A1-A3 comparison Blast furnace v ArcelorMittal XCarb RRP® route

Product	Blast furnace kgCO ² e/t	XCarb RRP kgCO ² e/t	% reduction CO ² e
Hot rolled	2,230	532	76%
Cold rolled	2,380	700 tbc	70%
HDG	2,560	800 tbc	69%
Magnelis	2,570	797	69%
OC (Granite & Estetic)	2,719	1,030	62%





XCarb® RRP Organic coated steel cols Granite® and Estetic® All mills Arcelor/Mittol







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https://europe.arcelormittal.com/flipbook/Europe/XCarb_FlatProducts_brochure/

XCarb[®] recycled and renewably produced – Sections and merchant bars GWP in kgCO₂e/t for module [A1-A3] (product stage) + transportation to destination port *(appendix to EPD)*



Embodied CO₂ reduction by specifying XCarb[®] products



Sheds - Basecase



Sheds + XCarb[®] family



Focus on UK market : LETI - Best practice 2030



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XCarb® recycled and renewably produced Sections





Smarter steels for people and planet



If you like what you see, how do you support it?

XCarb® recycled and renewably produced, used in the UK

Worship Square : 850t XCarb[®] R&RP Sections HISTAR[®] 460 columns

> Distribution Centre Groveport : 650t XCarb[®] R&RP Sections

The synergy of scrap and renewable electricity

ArcelorMittal

XCarb

In making XCarb* recycled and renewably produced steel, Arcelor/littal uses up to 100 percent scrap and all of the electricity needed to transform the scrap comes from renewable sources such as solar and wind power.

This combination allows ArcelorMittal to offer steel with very low embodied carbon.



Worship Square raises the bar for the planet with XCarb® recycled and renewably produced steel

Described by developer HB Reavis as more of a living system than a building – with people, planet and business at its heart, Worship Square raises the bar in creating an altogether better place to work.

ArcelorMittal has supported this vision by supplying 850t of its XCarb* recycled and renewably produced and Histar* 460 rolled sections.

Fabricated by BHC, the structural frame offers embodied carbon savings through lighter sections using high grade Histar" 460 and XCarb" recycled and renewably produced rolled sections at 333 kgCO₂e/t.

90% reduction with two complementary carbon partners

When lean design using high strength HISTAP: 460 sections is combined with XCarts' recycled and renewably produced steel, designers can drive down low carbon solutions. Pairing a low embodied carbon manufacturing process with high strength steel can delver carbon reductions of up to 90%.



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Canada Water : 750t XCarb[®] R&RP Sections







What else is available in XCarb[®]?





What else is available in XCarb[®]?





Mesh (300-450 kgCO2/t)

Cable trays (700-900 kgCO2/t)



Nails (500-550 kgCO2/t)



Bolts (650-700 kgCO2/t)



Engineered flat wire (500-550 kgCO2/t)



Welding wire (- kgCO2/t)



Cabion Cages (700-900 kgCO2/t)



- NewDeterrent
- Universal
- Resistant
- Alternative

Fencing (700-900 kgCO2/t)



Grating (500-650 kgCO2/t)



Strands (400-500 kgCO2/t)



Smarter steels for people and planet

ArcelorMittal – Much more than just a material supplier. Partnering and collaborating with Developers, Contractors and Specifiers.



Steligence Engineering – Who we are?

We work closely with all the EAC Stakeholders to advise and deliver cost-effective, innovative and sustainable ArcelorMittal solutions via our Steligence® Network.

We offer free technical assistance worldwide from structural concept design, value engineering, until delivery to site.



- Composite systems (steel+concrete, steel+timber)
- Structural Fire Engineering
- Life-Cycle-Assessments
- FEM modelling
- Technical Committees (Eurocodes,...)
- Etc.



Some of our Solutions – A holistic approach



Flooring

- Cofraplus[®] 60
 composite floors
- Cofraplus[®] 220
- Fibers

Beams

- Angelina[®]
- Composite Slim Floor
 Beam

Columns

- HISTAR®
- HD sections
- Tubular products

Interiors

- Magnelis®
- Estetic[®] BioAir

Envelope

- Magnelis[®]
- Coque MD
- Mascaret®
- Pearl pre-painted steel
- Irysa[®] pre-painted steel
- Granite[®] Silky Shine

Foundations

Sheet Piles



Steligence Engineering – Structural options and Embodied Carbon assessment

- Trusting relationship already established with client/developer/ engineer etc.
- Agree the structural grid, allowable depth, deflection/vibration limits and loadings.
- Understand any other practical factors or aspirations.
- Agree the carbon intensity factors for each material.
- Suggest additional steel framing options to that originally envisaged. Considering cost/production/delivery/erection to assess if worth pursuing.
- Structural calculations and present embodied carbon calculations.











construction



$\frac{\partial f_{i,j}(\vec{x},\vec{c})}{\partial x_i} = \int_{k \neq i}^{k,j} k_{k \neq i}$ Steligence case study #5: Modular Buildings

27/03/2023

The right formula for the steels of the future

Steligence[®] case study #5: Modular Building Steel types - Weight comparison

For modular construction, steel structure consumption is around 85kg/m²

- 67% for Cold Formed Profile
- 15% for Hot Rolled sections
- 18% for Tubular Profile





Page 26 Date 06/10/2022 Steligence® case study #5: Modular Buildings

5 Tubular Profile

∑ Cold Formed Profile

∑ Hot Rolled sections

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Case study on a Data Centre building (modules A-C) – Base line UK, SEA, ME, AU/NZ

-including transportation from Europe to SEA



Initial solution

(S275 MPa Steel)*





* EPD values acc. to world average from World steel Association

How to reduce the footprint of a project with steel?

Enable highperformance design

- Do not overdesign
- Use less but stronger steels
- → direct CO₂ savings up to **30%** (e.g. 460MPa vs.
 355MPa steel in strength-governed members).

Understand how steel and steel products are made

- Steel embodied carbon varies with its origin
- Be aware of averages
- Look for low CO2 EPDs
- Savings > 85% are available today

Understand where is the embodied carbon in your project - Some elements will be an "easier win" than others

Act early and work together

- Plan and seek for early collaboration with suppliers and the rest of the supply chain
- Time can be the enemy of sustainable



Thank you



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