

# Material and design efficiency

Reducing the environmental footprint in construction

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# The impact of the construction to the climate change

## Actions to reduce carbon footprint (on a yearly basis)

Cut one return flight from New York to Chicago



Save 1.000 kgCO<sub>2</sub>e

Cut meat, dairy and beer from your diet



Save 2.000 kgCO<sub>2</sub>e

Stop driving your car



Save 3.000 kgCO<sub>2</sub>e

Achieve 20% structural steel embodied carbon reduction of a 200m high rise building



Save 6.000.000 kgCO<sub>2</sub>e



**The structural engineer has more opportunity to reduce carbon emissions than most other people**

**Designing a building in the right way can already decrease its carbon content by 35-40%.**

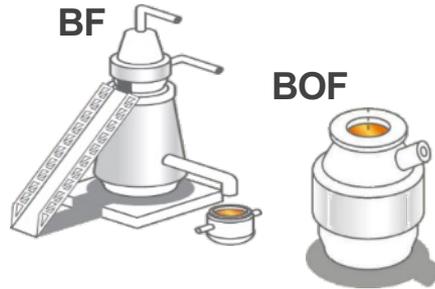


# Several action plans to decarbonise steel production

# Steelmaking routes and their main CO<sub>2</sub> sources

There are currently **three main technologies to make steel:**

the blast furnace-basic oxygen furnace (BF- BOF) route, electric arc furnaces (EAFs), and direct reduced iron (DRI) followed by an EAF



## Main CO<sub>2</sub> source:

Chemical interaction between carbon (coal) and iron. Process known as iron reduction, produces pig iron which is converted into steel. Main source is direct emissions.

**BOF + RM**

2,25-2,8 t CO<sub>2</sub>/t

## SCRAP-BASED EAF



## Main CO<sub>2</sub> source:

Emissions from purchased electricity. Main source is indirect emissions.

**EAF + RM**

0,62-0,85 t CO<sub>2</sub>/t

## DRI-EAF



**Main CO<sub>2</sub> source:** Emissions from the use of natural gas as the reductant. Also emissions from purchased electricity. Main sources are both direct and indirect emissions.

**EAF + DRI + RM**

1,12-1,35 t CO<sub>2</sub>/t

## XCarb<sup>®</sup> recycled and renewably produced



The infographic is a dark grey horizontal bar. On the left, there is a green recycling symbol containing a white image of a steel mill. To its right, the text reads 'Up to 100% recycled scrap', with '100%' in red. In the center, there is a blue circular icon containing a white image of a solar panel and a wind turbine. To its right, the text reads '100% renewable electricity', with '100%' in red.

XCarb<sup>®</sup> recycled and renewably produced steel has a carbon footprint as low as 0.3 tonnes of CO<sub>2</sub>e per tonne of steel product when the metallics are 100% scrap.

This is significantly lower than the average for the global steel industry which is around 2.3 tonnes of CO<sub>2</sub>e emissions per tonne of steel products.<sup>(1)</sup>

(1) <https://www.sustainablefinance.hsbc.com/-/media/gbm/sustainable/attachments/4016-hsbc-csf-steel-report-2019v5.pdf>

# The XCarb® recycled and renewably produced first EPDs

Our low CO<sub>2</sub> emissions are externally certified

## Global warming potential (GWP) in kg CO<sub>2</sub>/tonne (product stage, modules A1-A3)

sections and merchant bars

**333 kg CO<sub>2</sub>/t**



EcoSheetPile™ Plus

**370 kg CO<sub>2</sub>/t**



XCarb<sup>®</sup> recycled and renewably produced

Focus on construction

# Is the solution only focused decarbonizing material production?

World population

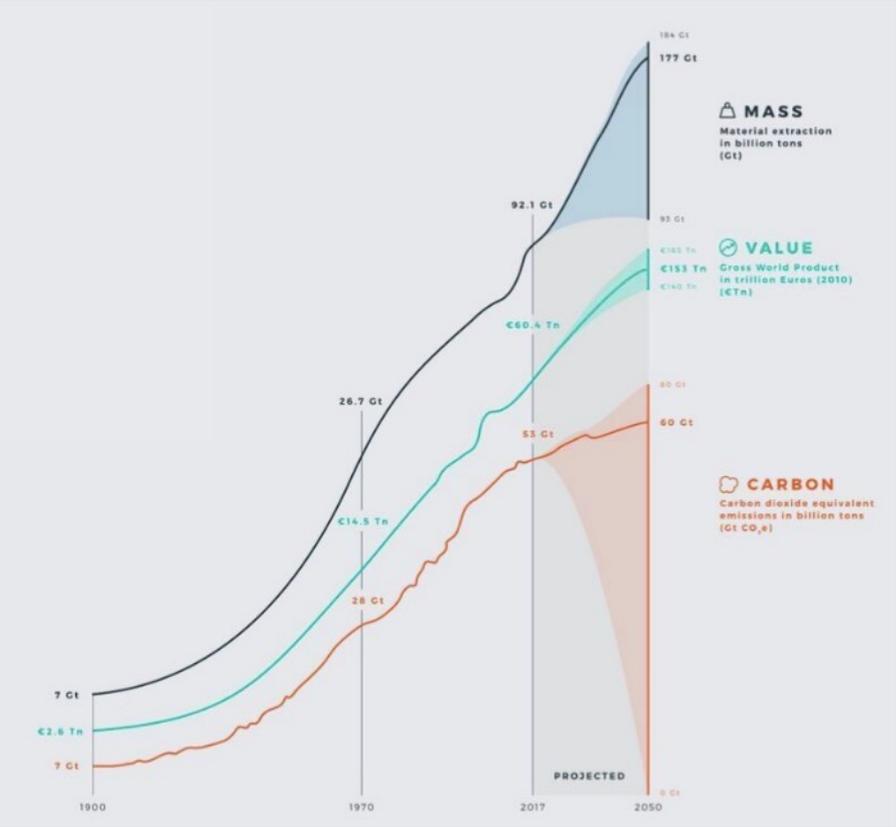
**9 billion**

people by **2050**

Habitat

**200,000**

people are moving to the cities **everyday**



# Intelligent material selection makes ALL the difference

## High rise construction

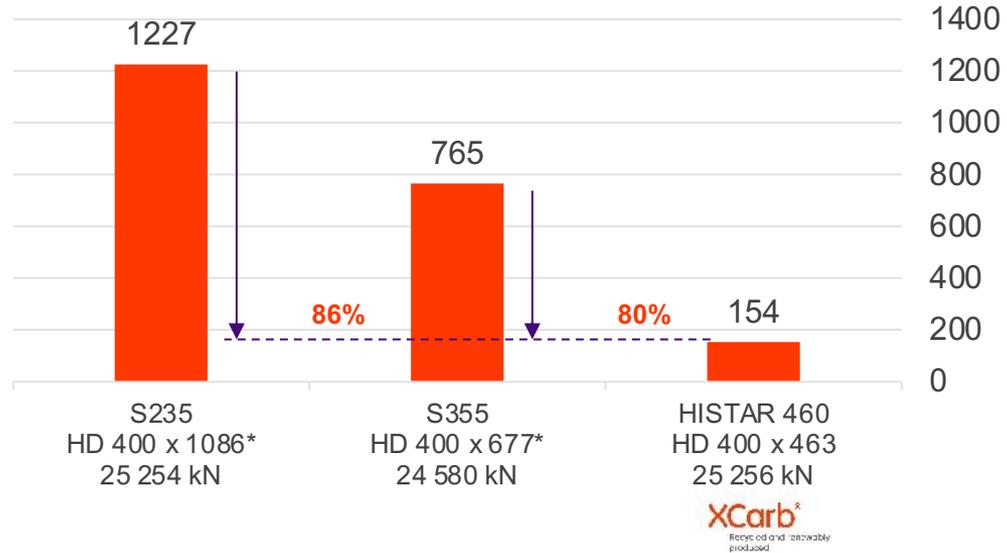
Multi-storey column subject to axial load, buckling length 3.5m

CO<sub>2</sub>e saving is 3755 kg for each 3.5m column



shutterstock\_1011269995

In kg CO<sub>2</sub>e/m



\* Central Europe Bauforumstahl EPD | A1-A3 | 1130 kgCO<sub>2</sub>/t

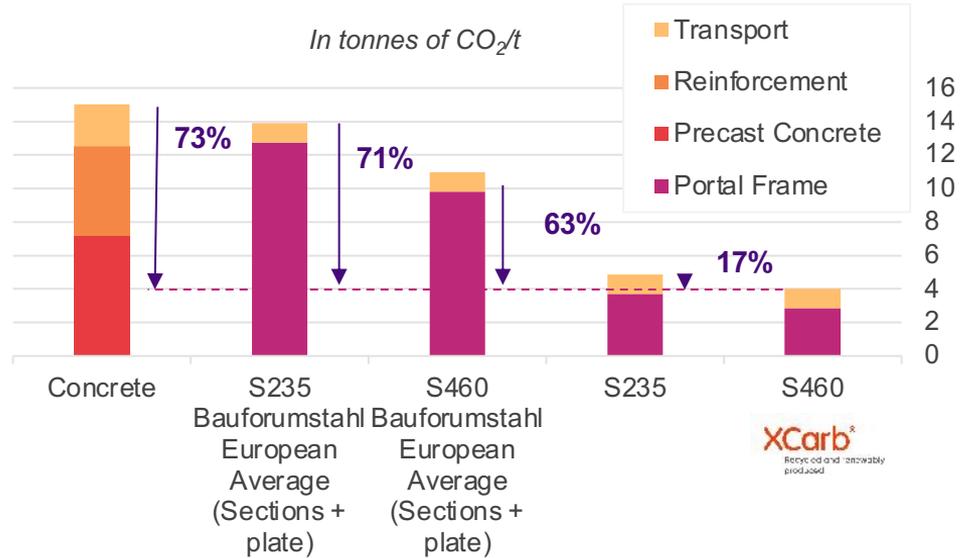
# Intelligent material selection makes ALL the difference

Single-storey industrial building  
LVS3 \* without envelope



CO<sub>2</sub>e saving can be as high as 73%

## Module A – Concrete vs Steel S235 vs Steel S460



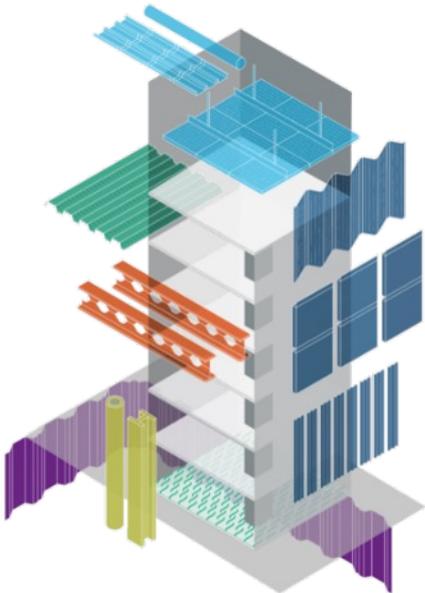
\* LVS3 European project

<https://op.europa.eu/en/publication-detail/-/publication/cbb3472d-fbbe-11e5-b713-01aa75ed71a1>

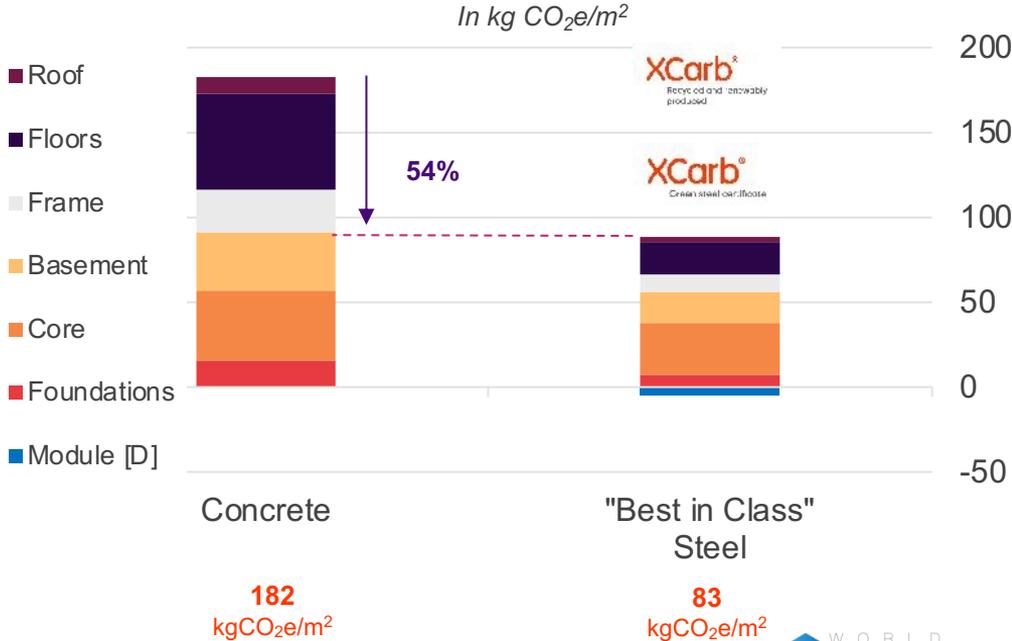
# Intelligent material selection makes ALL the difference

The Steligence® office building

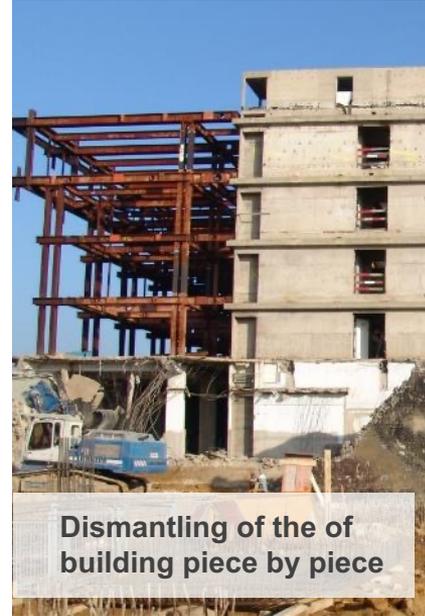
CO<sub>2</sub>e saving can be as high as 54%



Cradle to cradle | [A-C] + [D]



# Refurbish & Re-use: European Court of Justice in Luxembourg

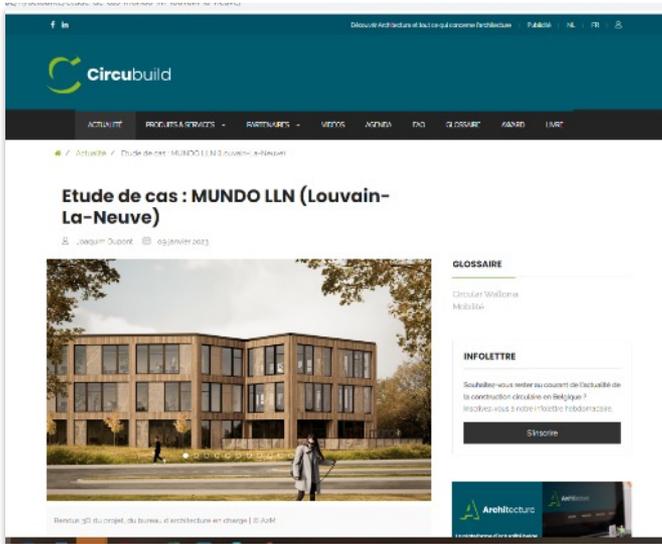


Dismantling of the of building piece by piece



Re-conditioning and reuse of each piece in the new building

# Re-use : Mundo Lab (Louvain-La-Neuve / Belgium)



## Re-purpose : project „Petite Maison“ (Esch-Belval / Luxembourg)

