

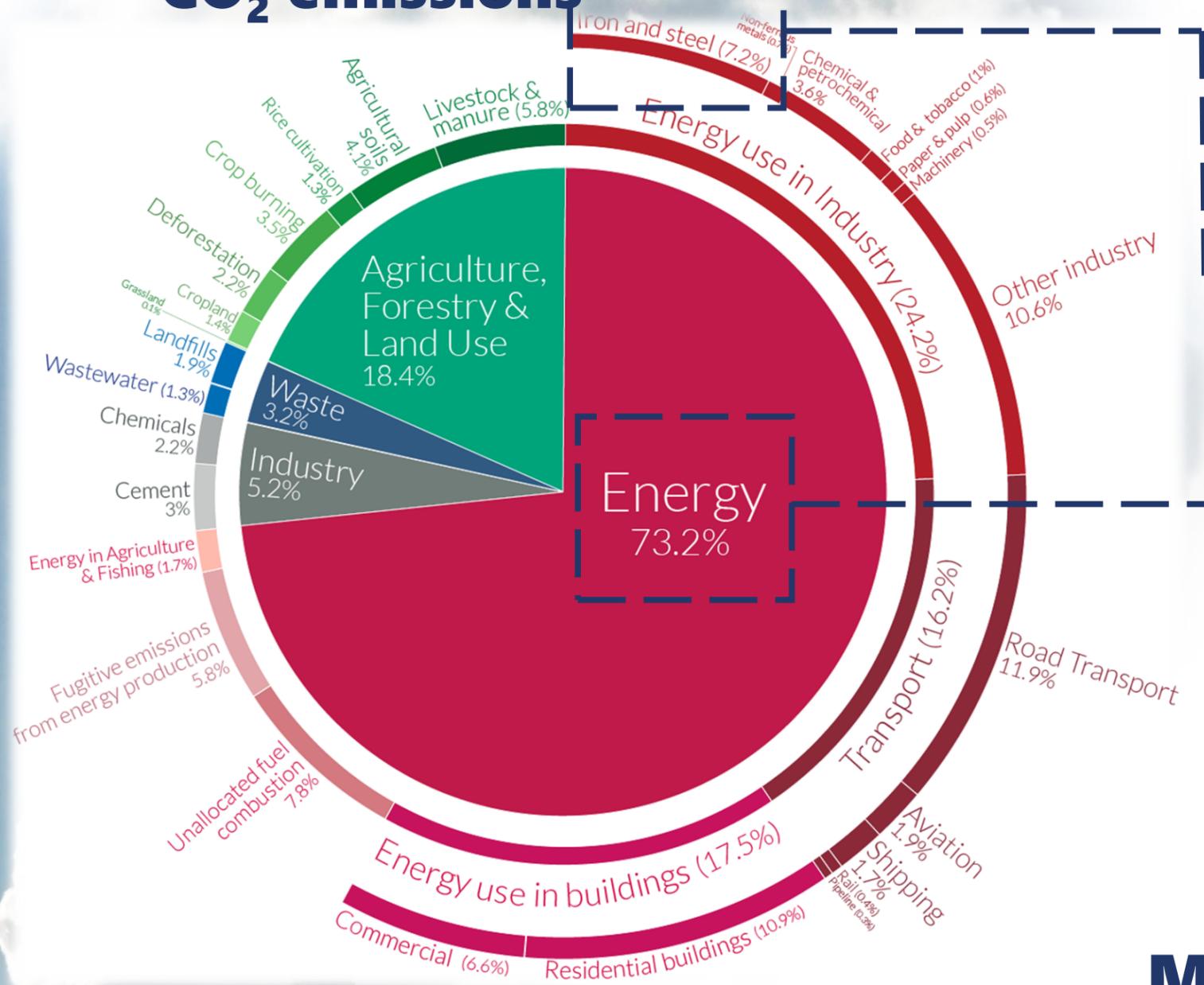
Niobium solutions
For a sustainable future



Outlines

- ✓ Global Challenges
 - ✓ Steel as the main driver for niobium applications
 - ✓ Dematerialization
 - ✓ How niobium can help?
 - ✓ Niobium in CBMM business fronts – Mobility / Energy / Structural
- 

CO₂ emissions



35 Gt CO₂

(2020)

73%

Energy

Coal + oil + Gas Fossil Fuel

7%

Iron & Steel

2.6Gt CO₂

Main driver for niobium applications

Urbanization



7,8 bi people
(2020)

50%
living in urban areas

9,8 bi people
(2050)

2/3
living in urban areas

More industrial & energy demands

A large industrial ladle pouring molten steel, glowing bright orange and yellow, into a container. The ladle is part of a complex steel-making process.

Steel

1.8 Gt/year crude steel
(2020)

↳ **2,6** Gt CO₂e/year

21% with **Nb**

↳ **15%** weight reduction in
general applications

↓ resulting

105mi t CO₂e/yr
savings

Only by

Dematerialization

500mi tCO₂e/yr considering **100%** of Nb
market share

Reducing **CO₂** emissions in **Steel** value added chain

Recycling by using more scrap in production

Adopting renewable energy sources

Depends on the production process

Using higher grades and lean design concept

Dematerialization

Concept

Dematerialization

- ✓ Increasing **designers awareness**
- ✓ **Adopting lean** design concept
- ✓ Overcome old **standardization paradigms**
- ✓ **Conservative** minimum requirements
- ✓ Overspecification

**Do more
with less**



How

Niobium

Can help?





Niobium

for a sustainable world

Creating, more efficient and smart solutions

Business Fronts

-  Mobility
-  Energy
-  Structural

Less than **0.1%**

Small amounts of niobium during the steel making process can lead to



New and better properties



Performance



Cost benefit

Why adding niobium makes a difference?





Enables **miniaturization and improved safety** systems



Energy **efficiency**

Niobium applied to the **mobility** industry



Lighter and stronger components



Increased **autonomy and faster** recharging for electric vehicles

Niobium

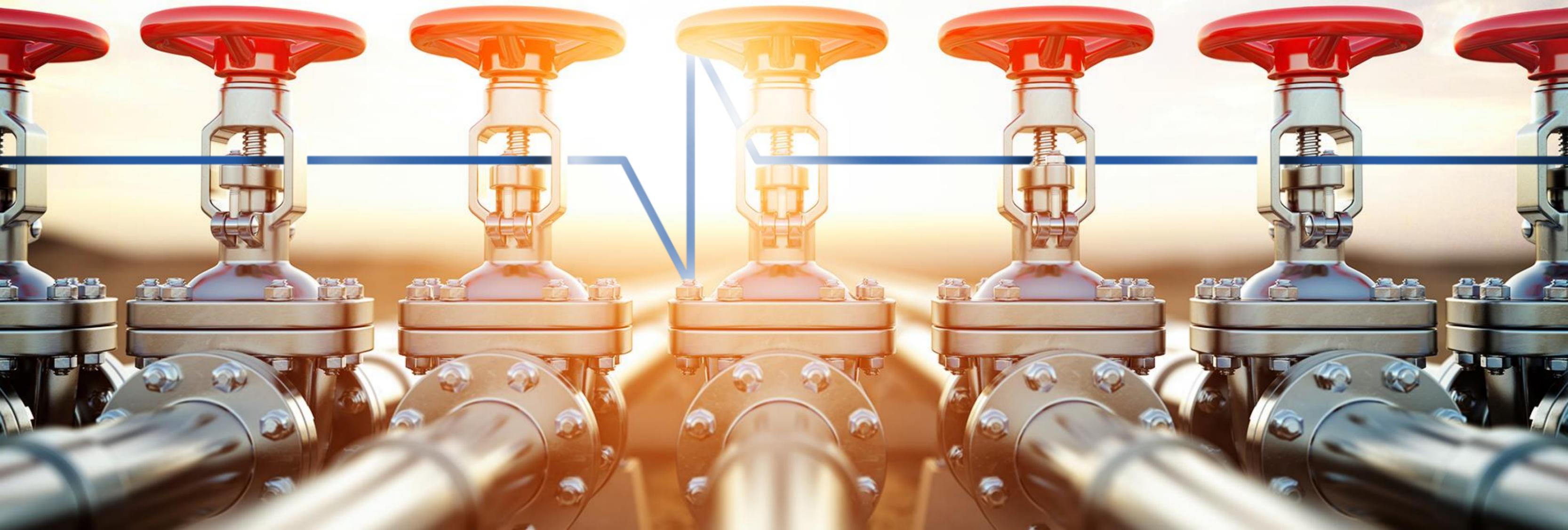
applied to the energy sector



Increased
safety



Reduced
total costs





Improved
cost-benefit



Material
optimization



Increased
strength



Innovative
design

Niobium

applied to structures



Dematerialization in Construction

Global Cases

China Zun Tower - China



130kt total steel weight

12kt steel savings

9% less CO₂e

0.02% Nb

Rebars, beams, sections and plates

Residential Multi Storey Building - China



6.5kt total steel weight

0,6kt steel savings

9% less CO₂e

0.018% Nb

Rebars

Sinter II CBMM industrial Plant - Brazil



360kt total steel weight

79kt steel savings

21% less CO₂e

0.02% Nb

Beams and sections

Dematerialization in Construction

Global Cases

Moor Place - UK



2.9kt total steel weight

S355

25% faster than on-site construction

30% lighter in foundations

20% less site management cost

Stiga Sports Arena - Sweden



100t only trusses

S355 / S420 / S700

3 mth to build the whole steel structure

52 m free spans between columns

27 kg/m² total weight of the trusses.

Zandhazen Bridge - Netherlands



8.4kt total steel weight

S355 / S460

30% total steel savings

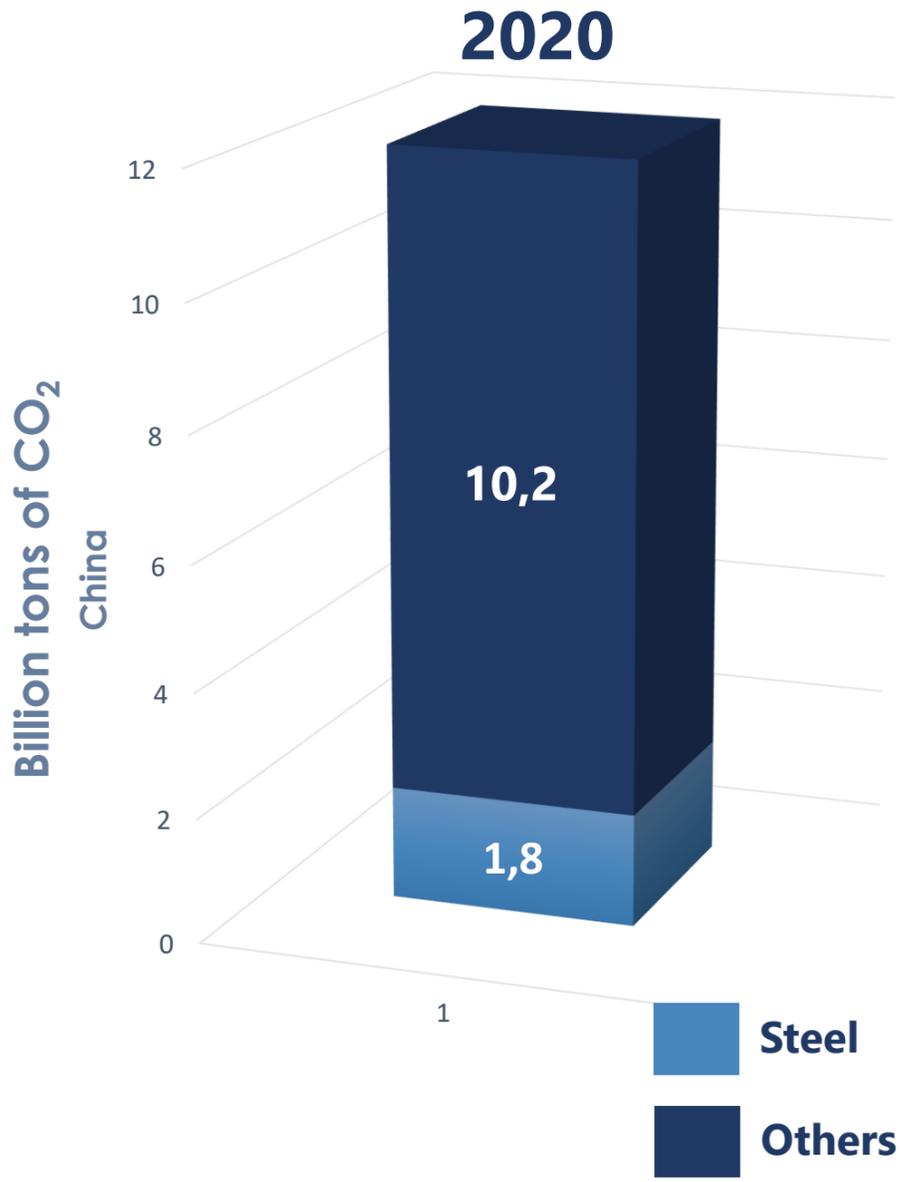
255 m free span. Slender and "transparent"

12 h roadway closure due to the reduction in total weight

Source: SCI and CBMM

Dematerialization Potential

China at a glance



1.0 t Nb steel

Reduces **150kg** regular steel



350kg CO₂e

Potencial steel savings

by using Nb in Rebars **54mi t/yr**

by using Nb in Beams **14mi t/yr**

158mi t CO₂e/yr



Source: Carbon Brief Clear on Climate – www.carbonbrief.org

Expand
the demand for
niobium

Decrease **raw material** extraction

Decrease **energy consumption**
in the material industry

Lighter structures for mobility, energy
and infrastructure industry

Reduction of **CO₂**
emissions



THANK YOU!