

inspire: Net Zero 2024

Grüner Stahl: Chancen und Herausforderungen der Transformation in Richtung Net Zero

31. Januar 2024

Robert Baron

Director Corporate Strategy



Swiss Steel Group is leading global supplier of special long steel solutions

1,663 kt
Sales volume
in 2022

>70
Locations

77%
Engineering
Steels

>30
Countries ...

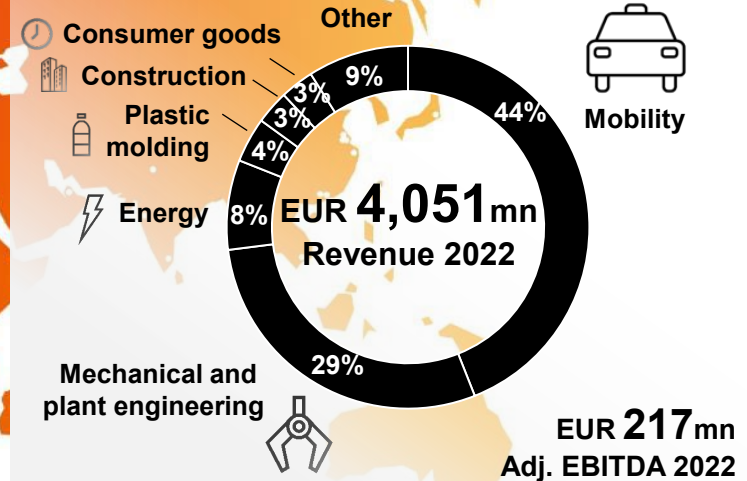
15%
Stainless
Steels

~10,000
Employees

8%
Tool
Steels

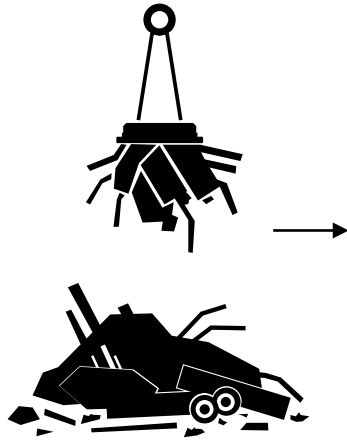
>20,000
Customers

HQ in
Lucerne,
CH

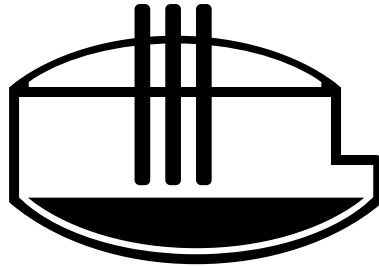


Swiss Steel Group's production is 100% EAF-based

Steelmaking with Electric Arc Furnace



Scrap



Electric Arc
Furnace

+

Decarbonized electricity



Our production processes range from scrap collection and assortment to producing black and bright materials



Scrap +
alloy
selection



Steel
melting



Remelting



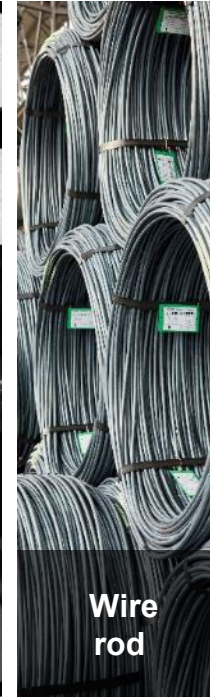
Forging



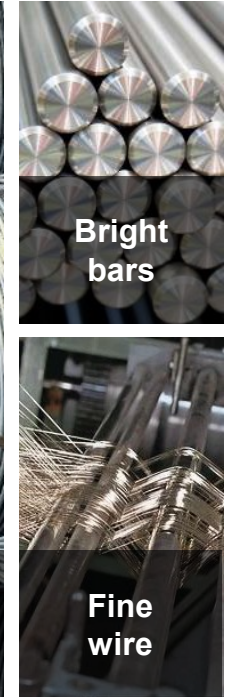
Hot rolling



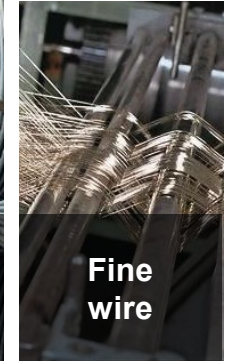
Bars



Wire
rod

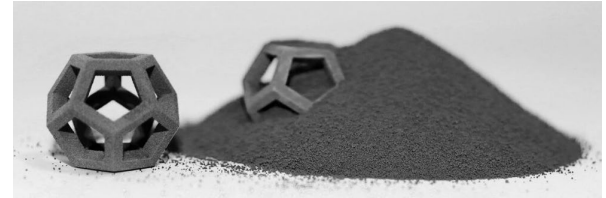
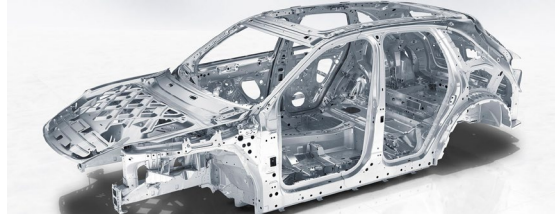


Bright
bars



Fine
wire

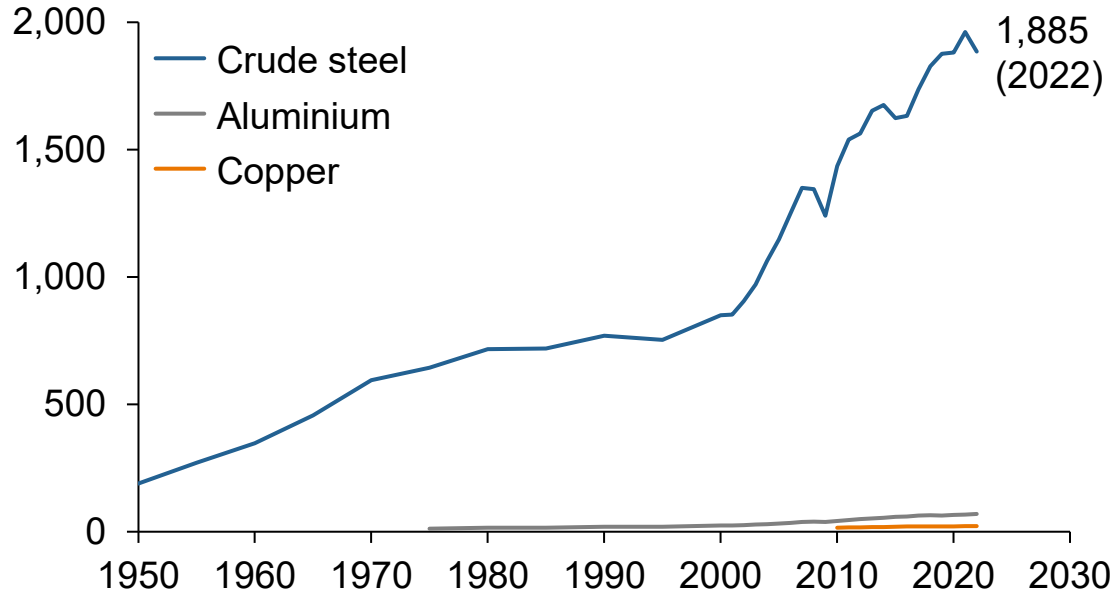
What is steel?



Success story of steel

Global production figures

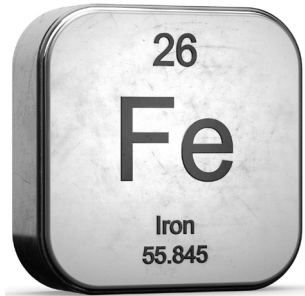
Million tons



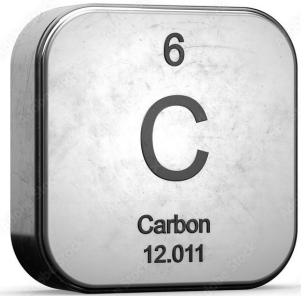
Properties

- Strong
- Durable
- Elastic
- Tough
- Melttable
- Castable
- Forgeable
- Machinable
- Recyclable
- Proven
- ...

Steel = Iron + Carbon + (...)



4th most abundant element in earth's crust



Basically everywhere



Chrome



Molybdenum



Nickel



Manganese

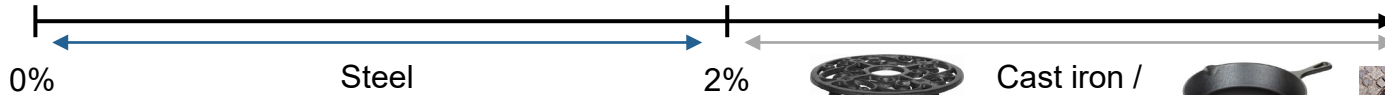
... more



- Reinforcement steel
- Engineering steel
- Stainless steel
- Tool steel
- Hot working steel
- Cold working steel
- Bearing steel
- Non-magnetic steel
- High-speed steel
- Free-cutting steel
- Deep drawing steel
- ...

C-content range

%

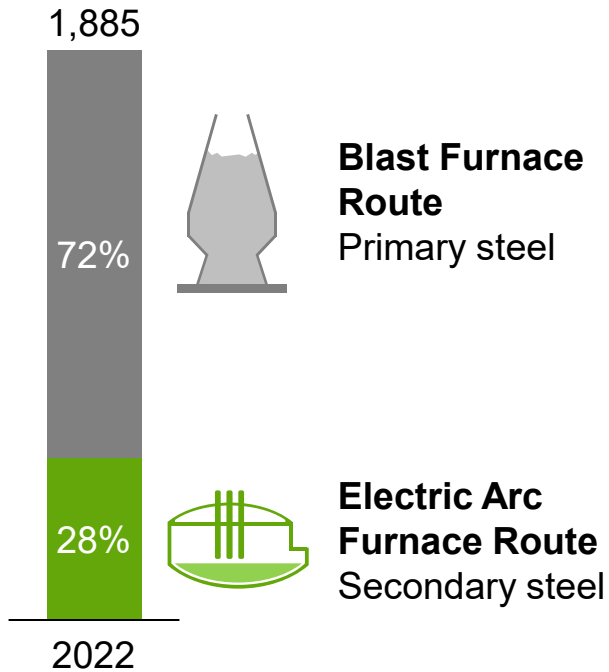


Cast iron / Gusseisen

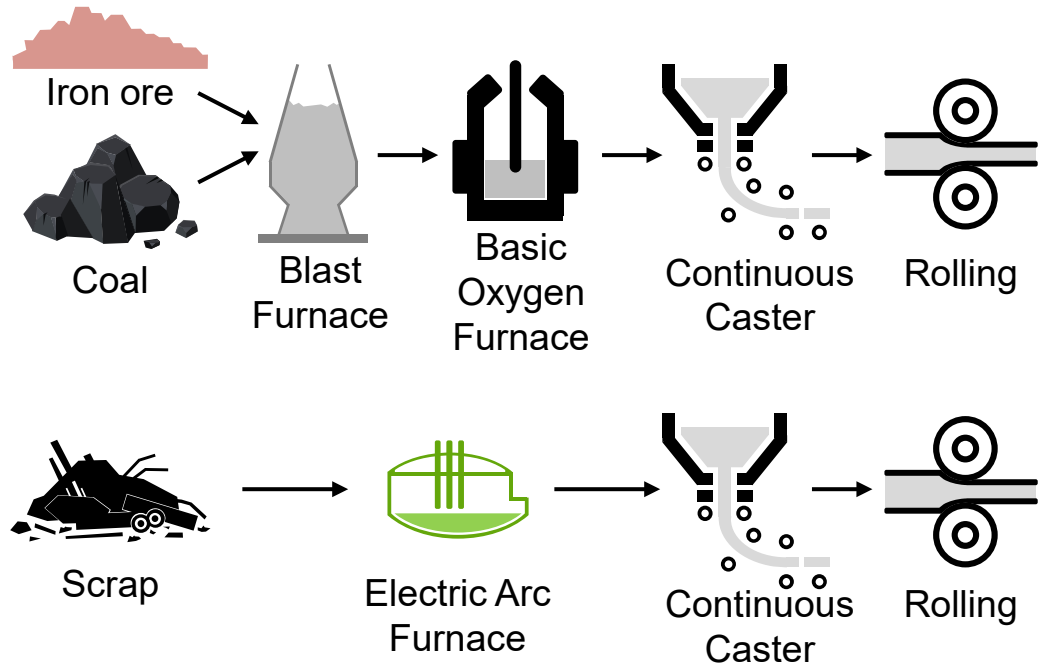


Steel production routes (simplified)

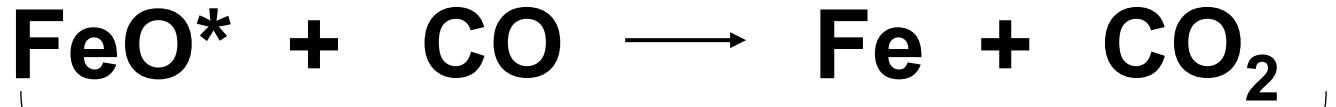
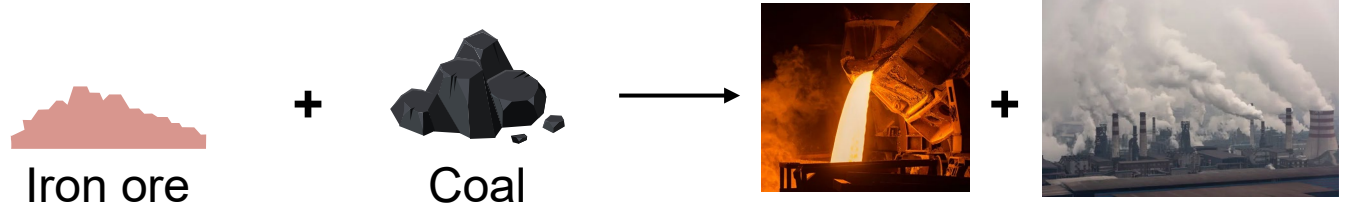
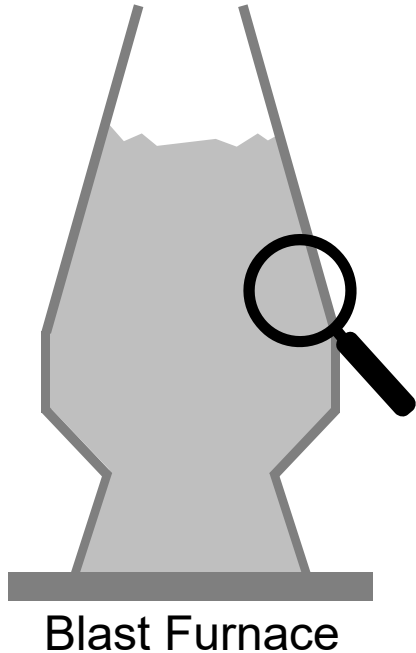
Million tons



Production process



Chemistry of primary steel making (simplified)



Indirect reduction

*Fe₂O₃

*Fe₃O₄

Volumes + Chemistry = ...

Volumes

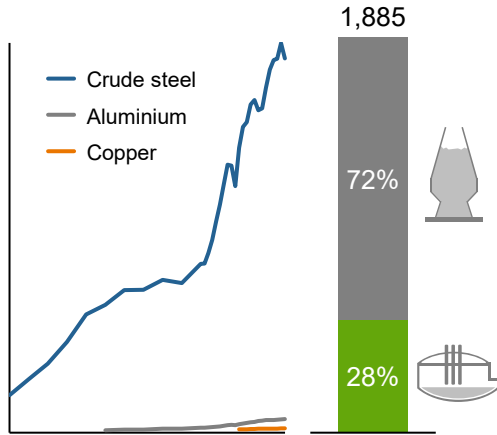
+

Chemistry

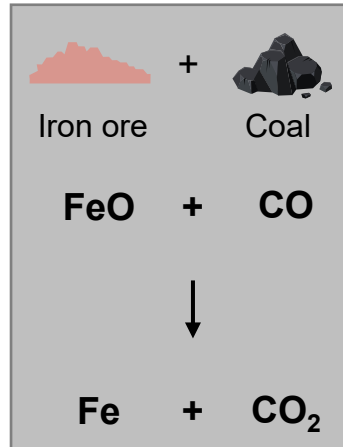
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Problem

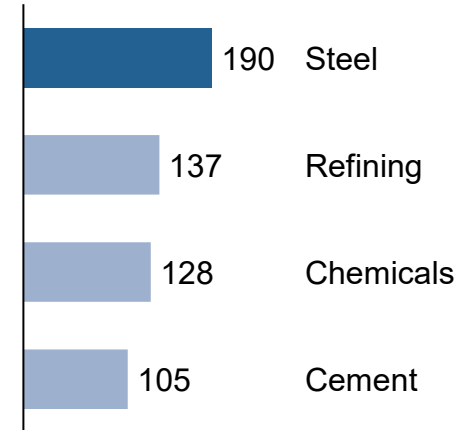
Direct CO₂-equivalent emissions in the EU by material group 2015
Million metric tons



+

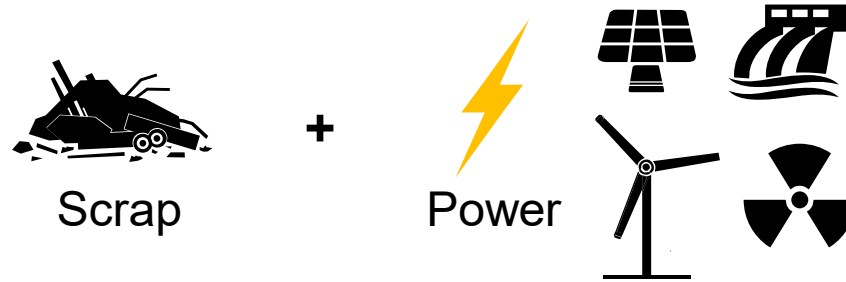


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Steel accounts for 8% of global CO₂ emissions

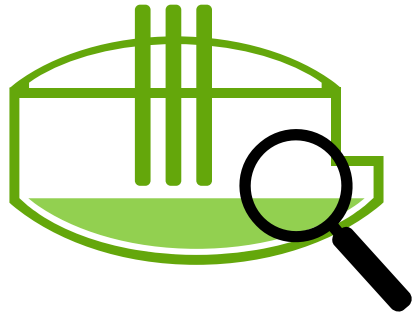
Chemistry of secondary steel making (simplified)



Fe_{solid}



Fe_{liquid}



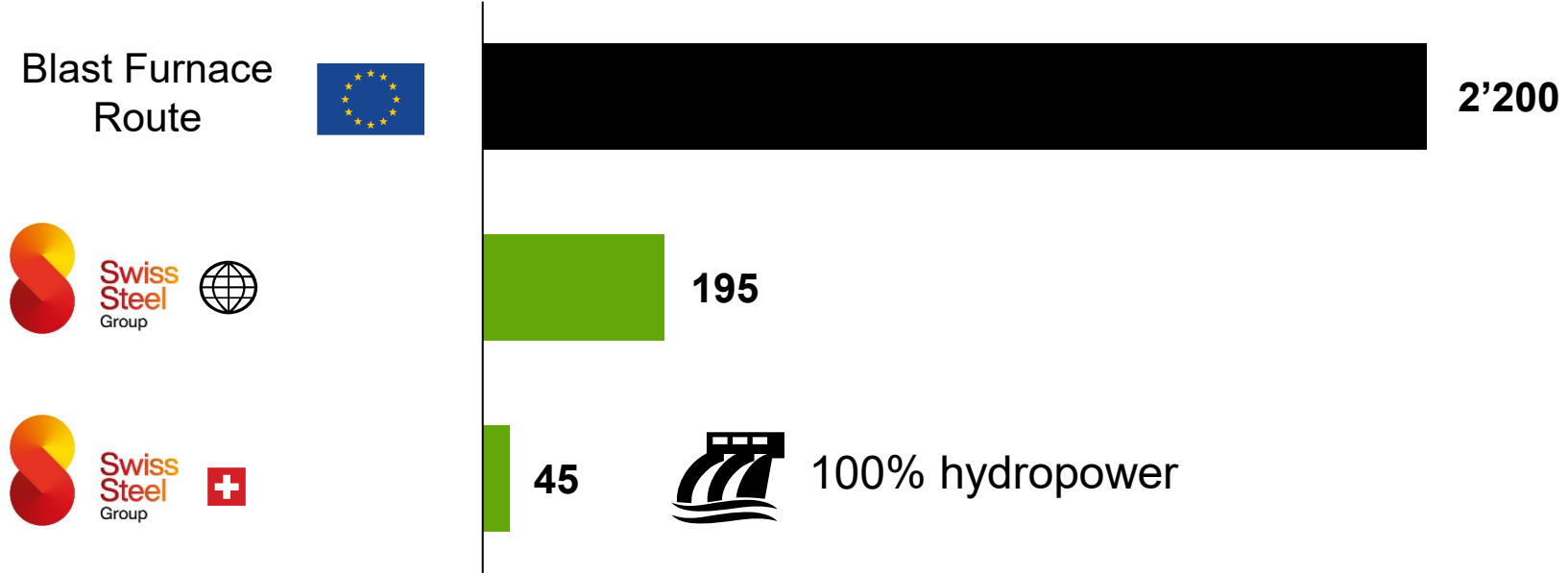
Electric Arc
Furnace



Blast Furnace Route vs Swiss Steel

Emissions (Scope 1+2)

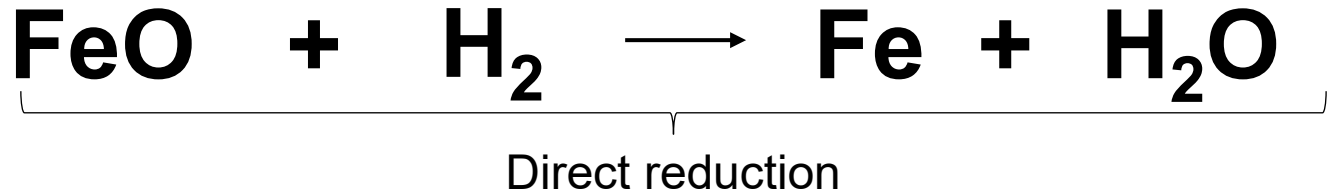
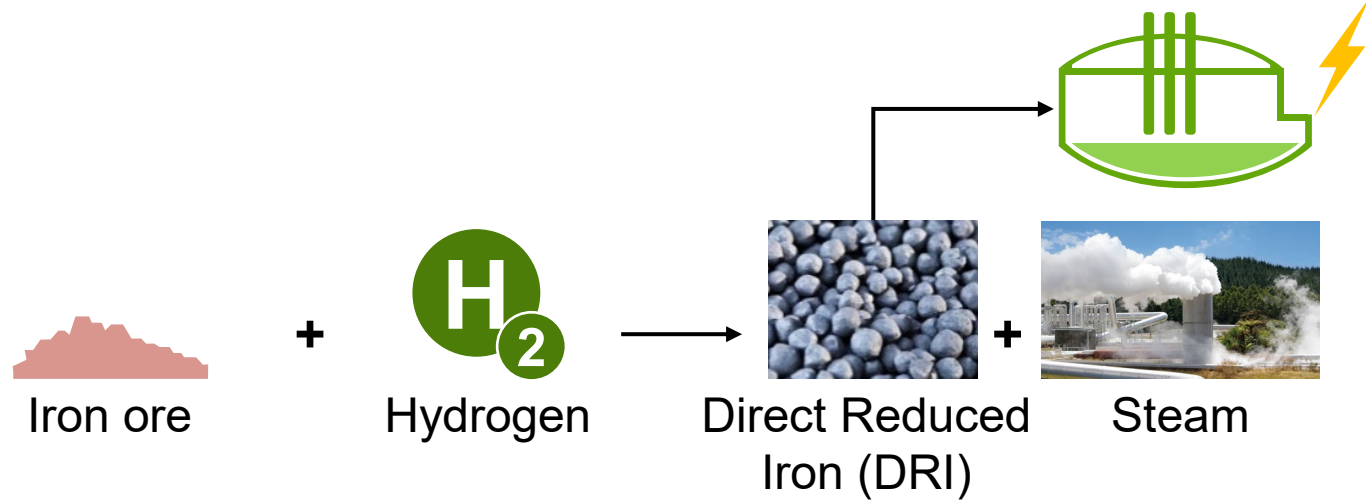
kg CO₂ per ton of crude steel



What to do?

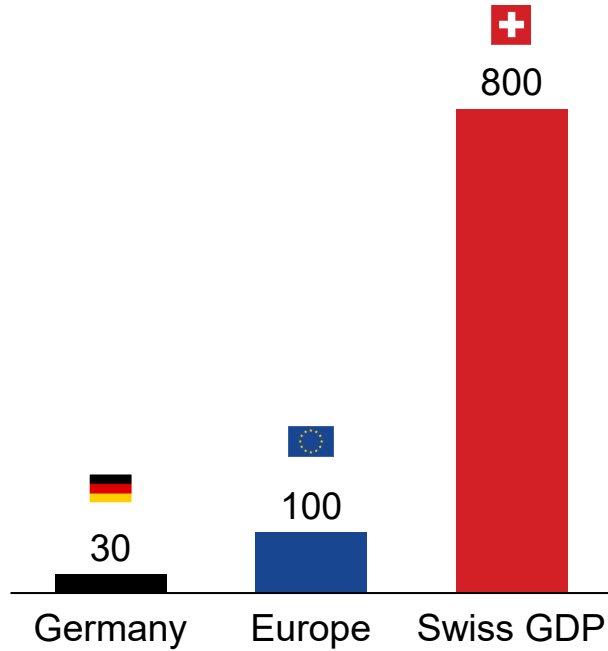


Shaft Furnace



Estimated costs for transformation of primary steel makers

EURbn

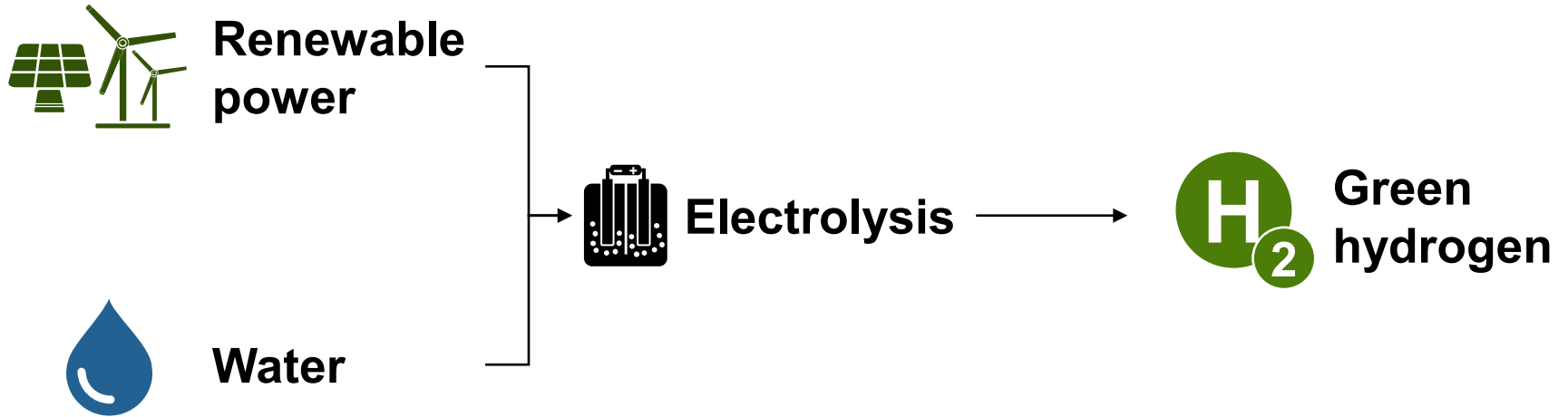


Exemplary large green steel projects



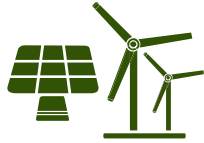
H₂green steel

Production process of green hydrogen



Power and infrastructure required to produce green hydrogen for German steel industry

~102 TWh



Renewable power



Water

~21 Mio. m³

9 liter water for 1kg H₂



Electrolysis

~9500 plants á 1MW

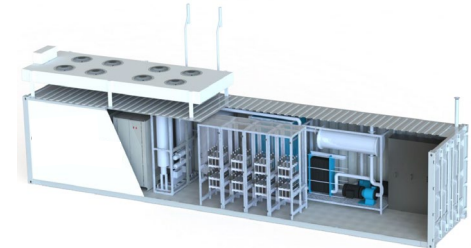
Average efficiency: 75%

Operational hours p.a. 8000h¹

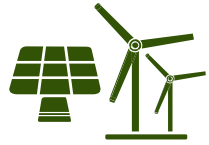


Green hydrogen

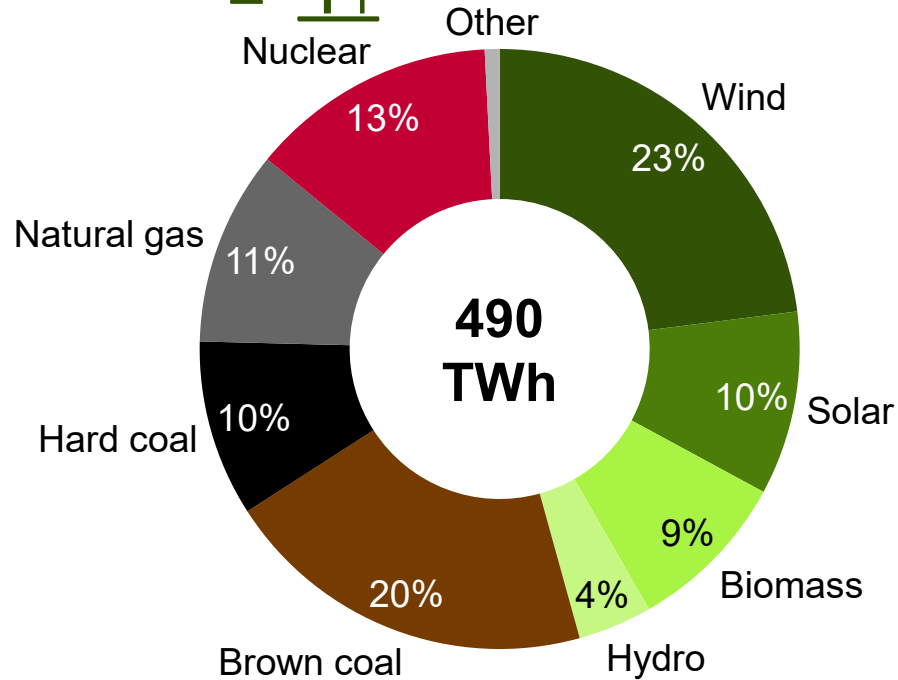
~77 TWh



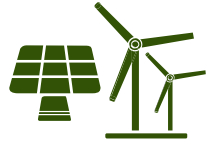
German power mix 2021



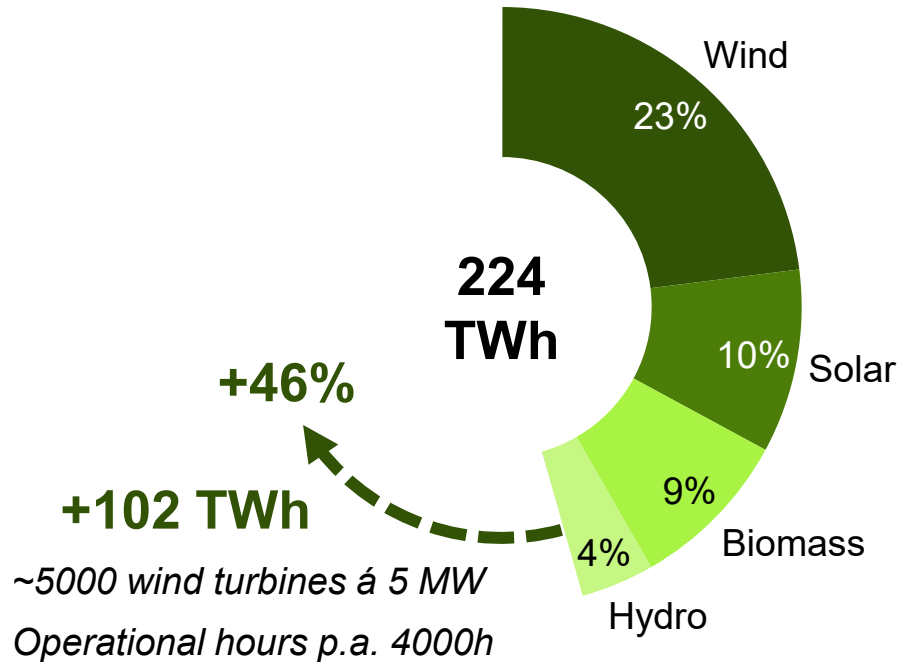
Power Mix 2021



German power mix 2021

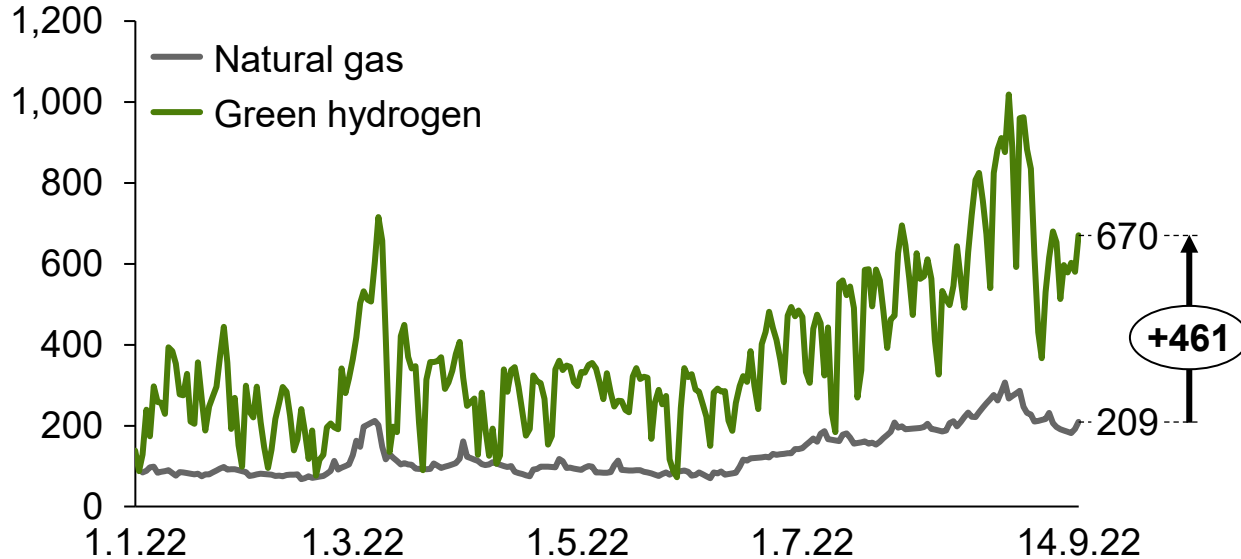


Renewable power



Price comparison natural gas and green hydrogen

Price per MWh
EUR

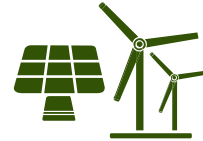


What to do?



Green hydrogen

- ▶ Imports (ship + pipeline)
- ▶ Use hydrogen only where conversion from natural gas to power is less efficient



Renewable power

- ▶ Offshore wind++
- ▶ Increase share of other decarbonized energies?



Electrolysis

- ▶ Significant ramp-up in capacities
- ▶ Continued research into scale and efficiency

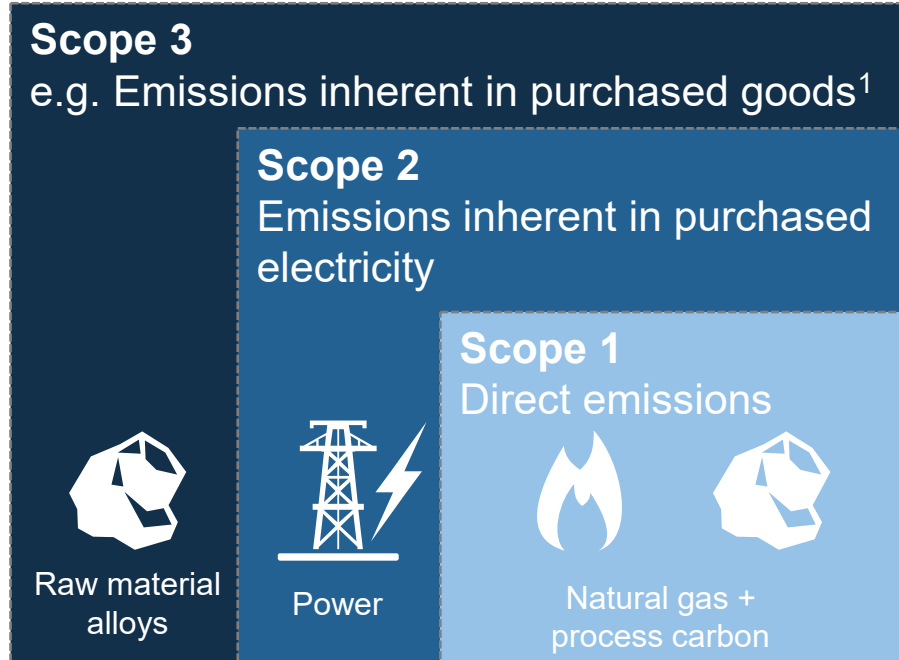


Water

- ▶ Increase concessions for water withdrawal
- ▶ Tap into groundwater

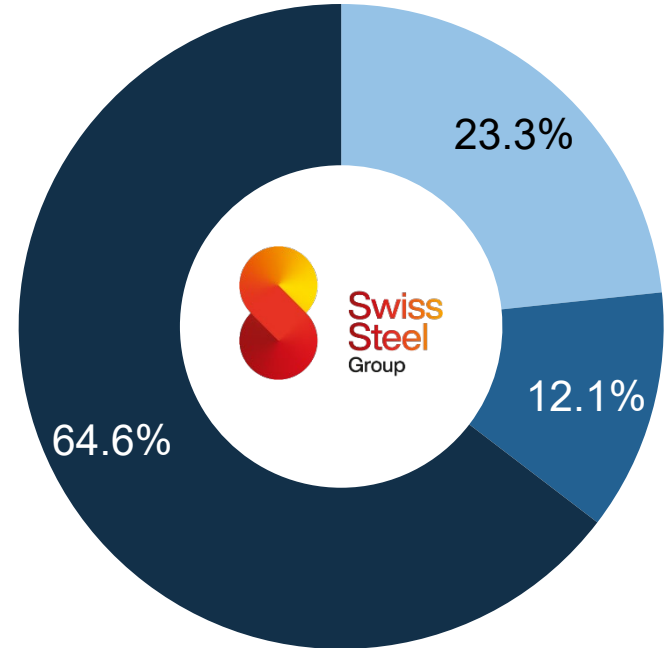
Swiss Steel Group Emissions Break-Down

Our main emission sources



1. Scope 3 with overall 15 sub-categories (3.1 – 3.15); category 3.1 (Purchased goods and services) most significant for steel

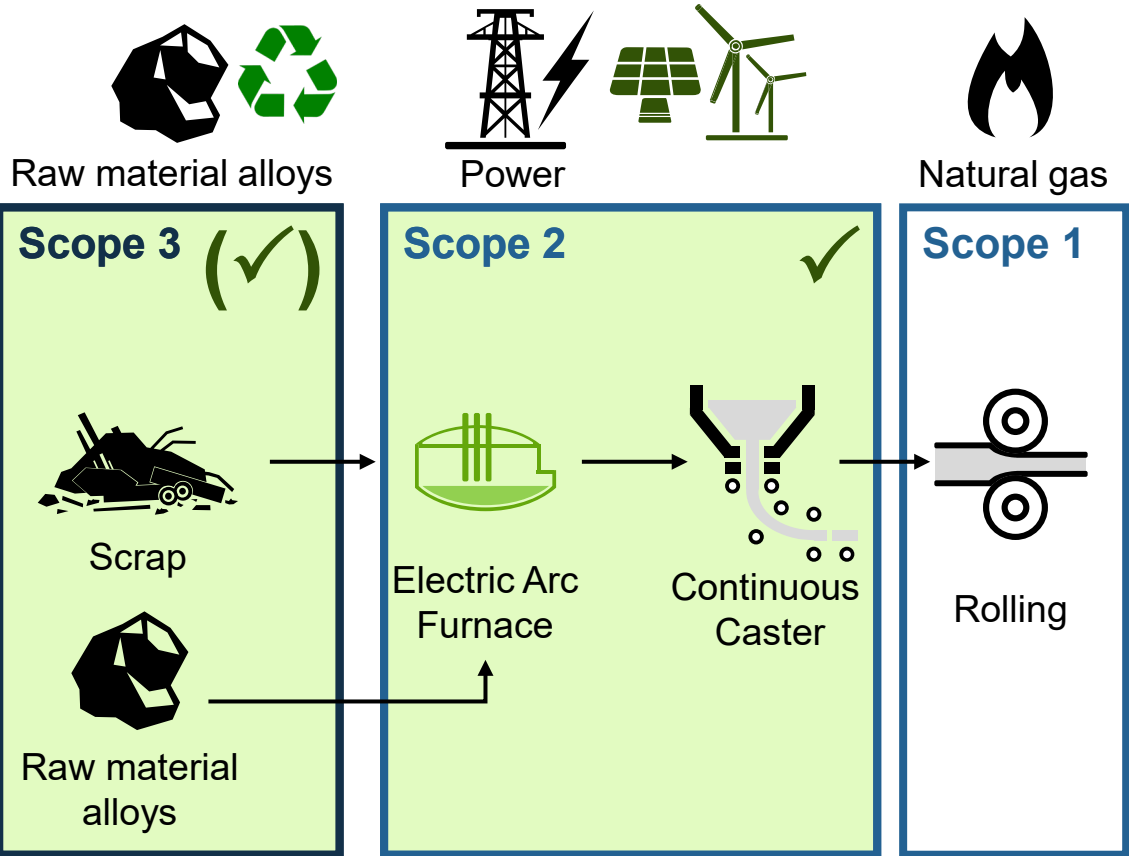
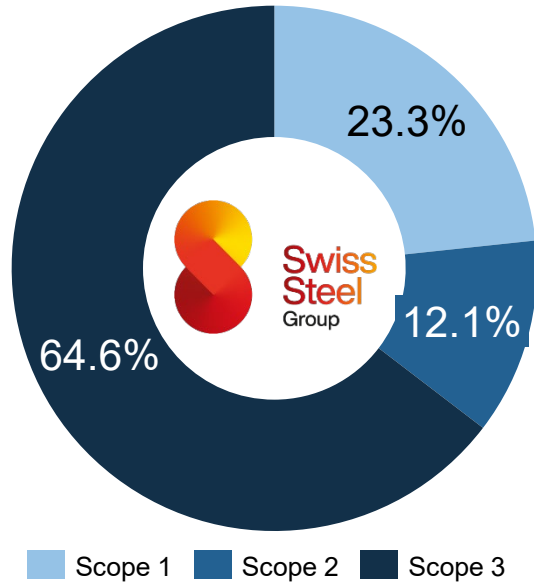
Corporate Carbon Footprint by Scope



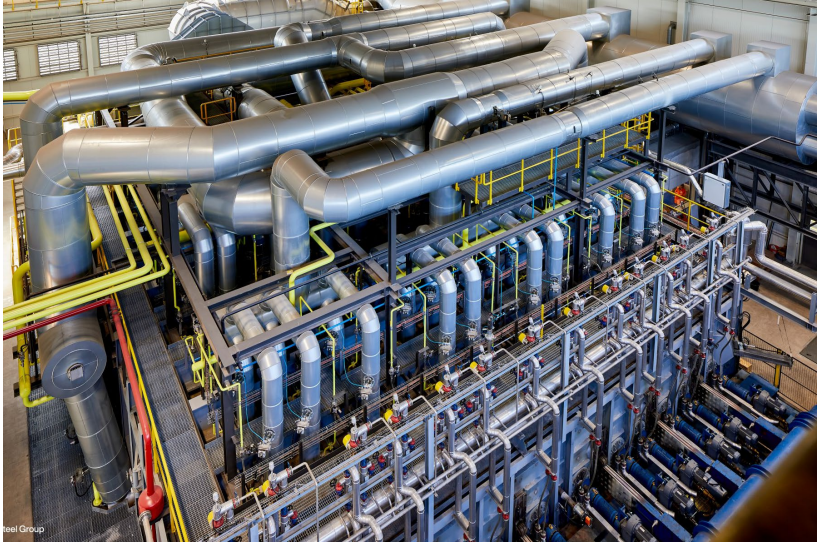
Scope 1 Scope 2 Scope 3

We mainly burn natural gas in our rolling mills

Corporate Carbon Footprint by Emission Scopes



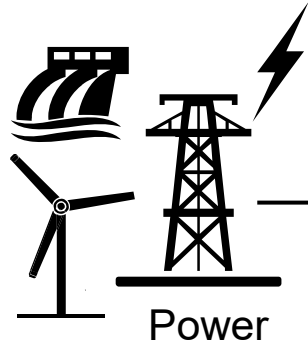
Re-heating steel before rolling



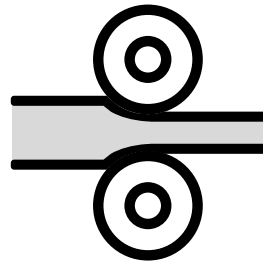
Re-heating steel before rolling



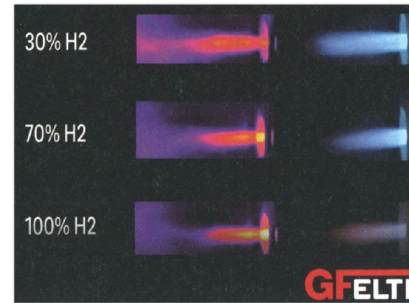
Swiss Steel Group



Natural gas



Rolling



Combustion temperature with

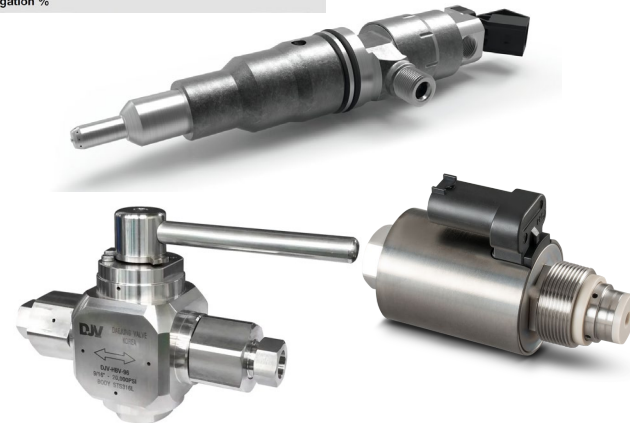
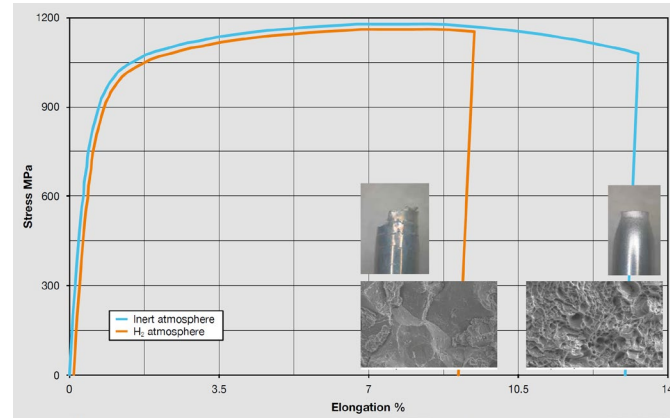
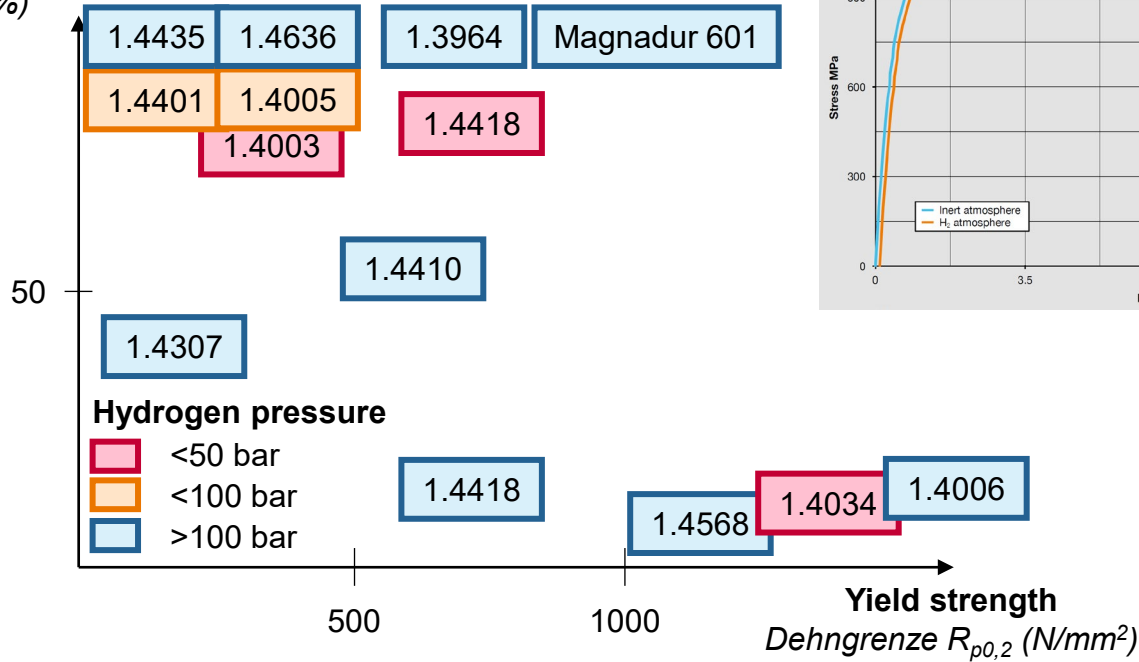
	Air	Pure O ₂
Natural gas	1970°C	2860°C
Hydrogen	2130°C	3080°C

Swiss Steel offers strong and highly hydrogen resistant steels

Hydrogen Resistance

Relative Reduction Area RRA^1

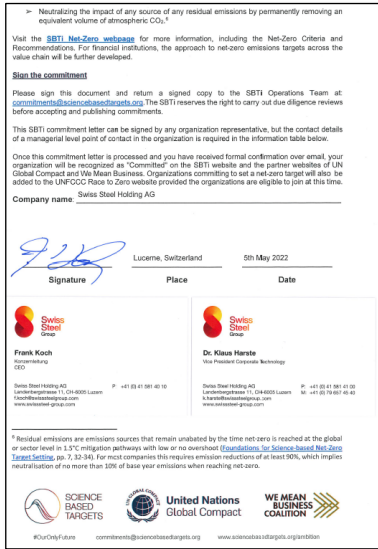
(%)



We are aiming to have our Science Based Targets initiative validation completed in Q1 2024

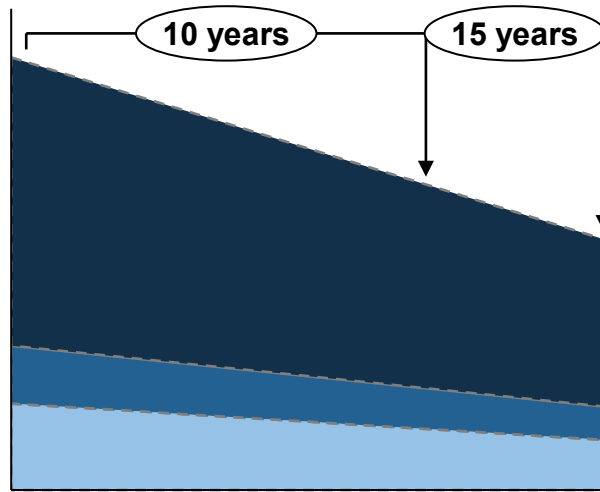


Commitment Letter May 2022



SSG decarbonization roadmap In development

ILLUSTRATIVE



Scope 1 Scope 2 Scope 3

SBTi Steel Sectoral Decarbonization Approach



Source: Swiss Steel Group; SBTi

Types of SSG Green Steel product categories

Current offer

Product-categories






Description

Electricity from
renewables
only

Scrap content
of at least
95%

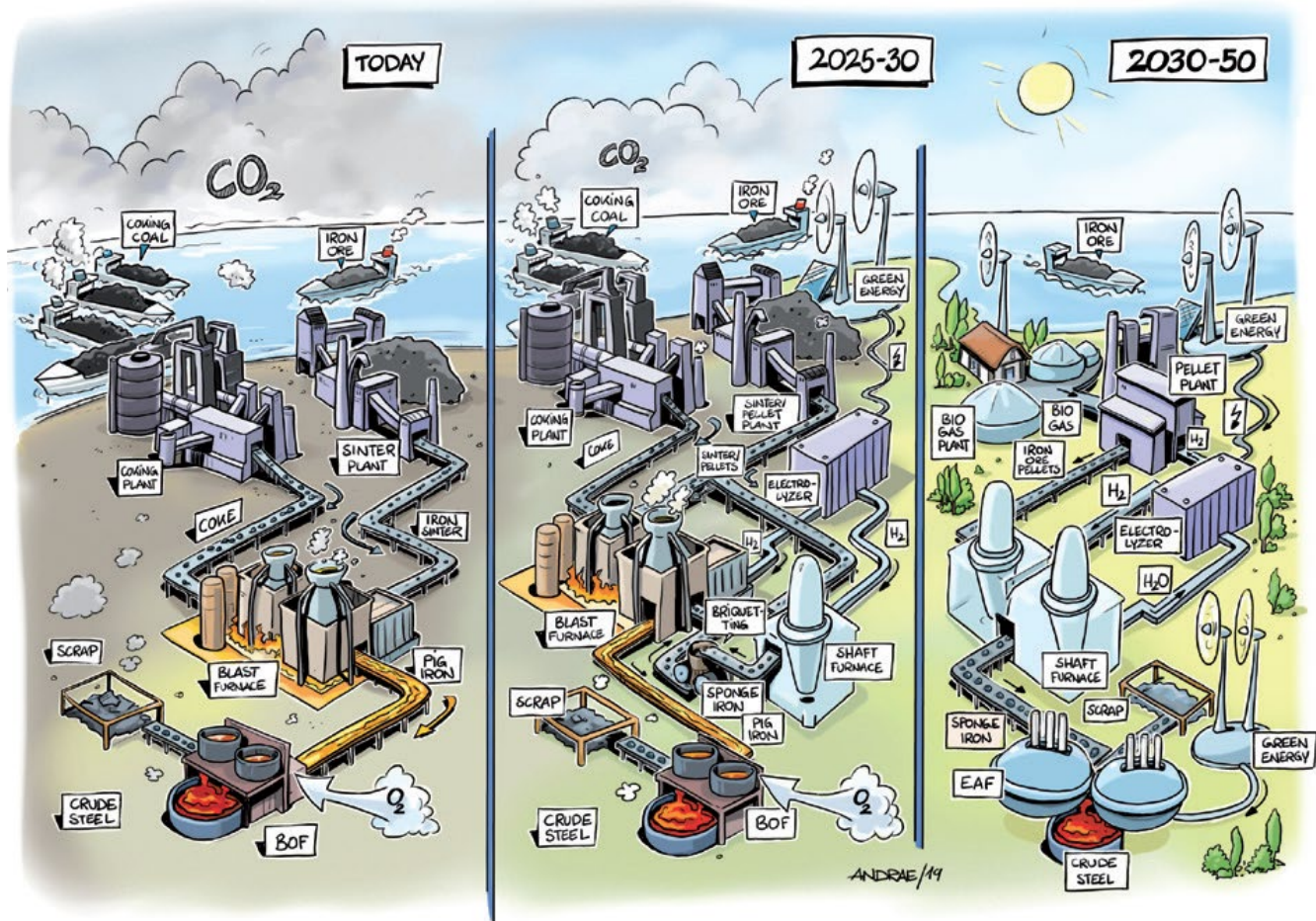
We can provide you with the product carbon footprint of your individual product so you can control your upstream emissions

Product Carbon Footprint of exemplary grades kg CO2 per ton finished product

INDICATIVE			
Forged bar 1.6587	~1400	~900	-
Rolled bar 1.6582	~700	~400	-
Bright bar 4441	~7700	~7500	<1000

Certification bodies we work with





ANDRAE/19



Thank you!