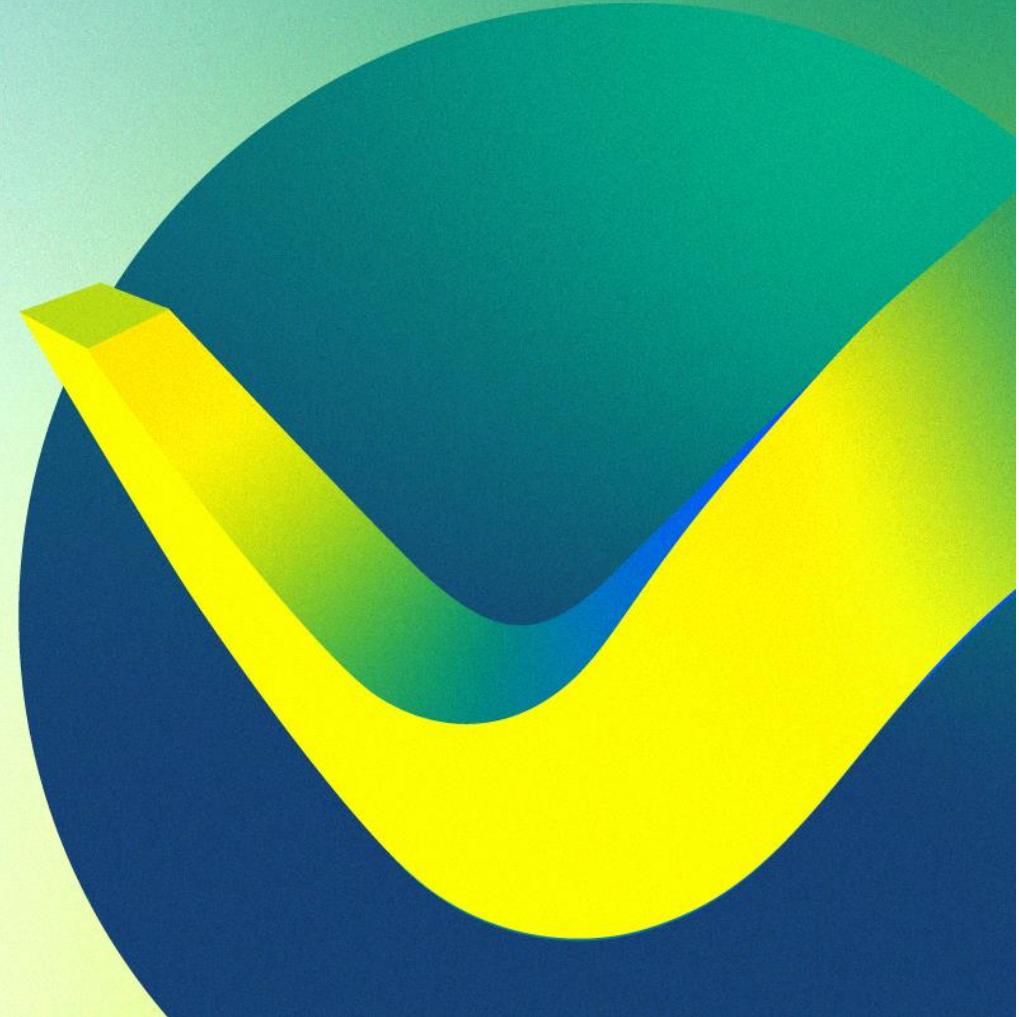
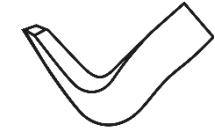


# Future sustainable steel production

Jonas Larsson, Head of Environmental Affairs

Jonas Adolfsson, Business Development Mobility

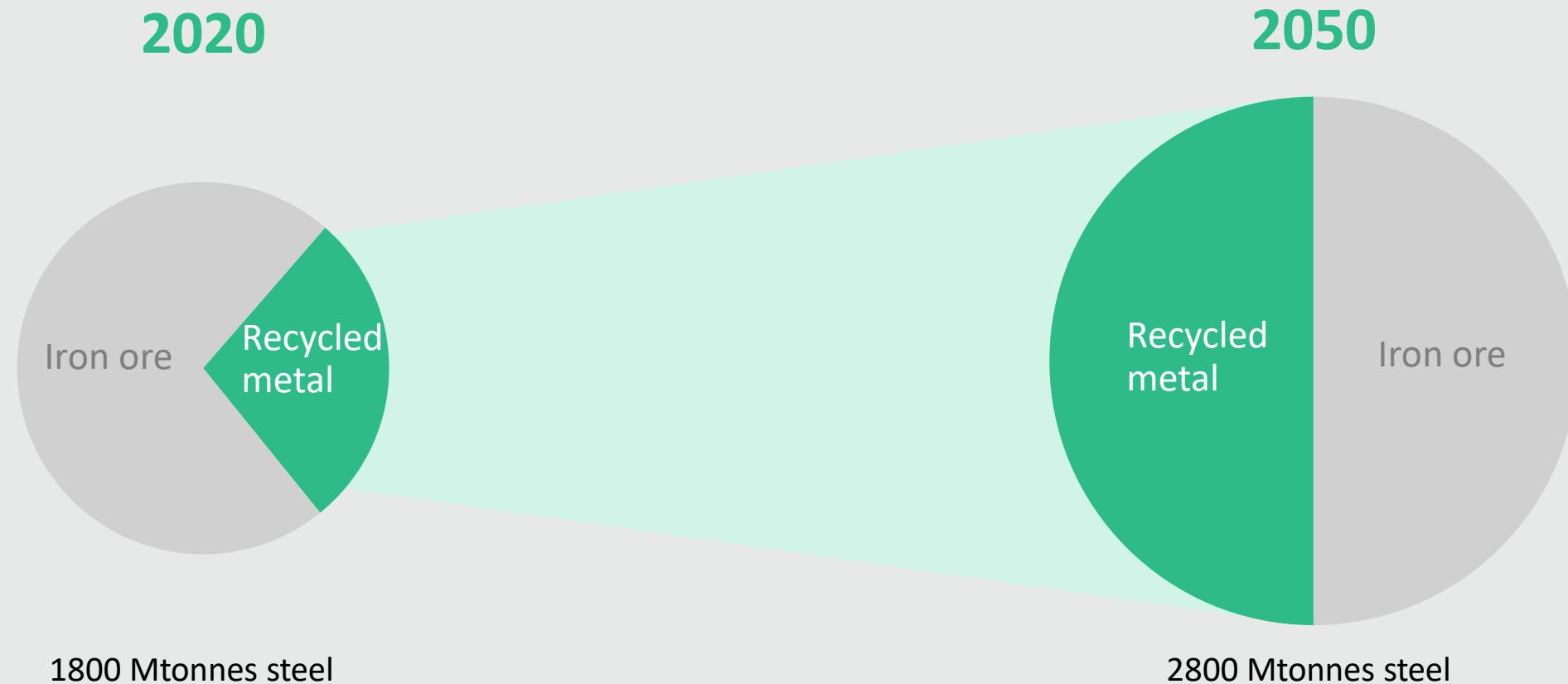




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# THE NEED FOR FOSSIL-FREE STEEL

# Both recycled and iron ore based steel are needed



Source: Swedish iron and steel producers' association, Jernkontoret

# SSAB has built a leading position

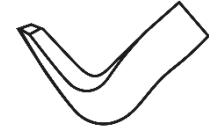


**HYBRIT**  
Joint Venture between  
SSAB, LKAB, Vattenfall  
formed in 2017

World-unique pilot  
plant started operation  
in 2020

World's first fossil-free  
steel rolled and  
delivered to Volvo  
Group in 2021

Pilot shipments to  
strategic customers  
500 tonnes in 2022

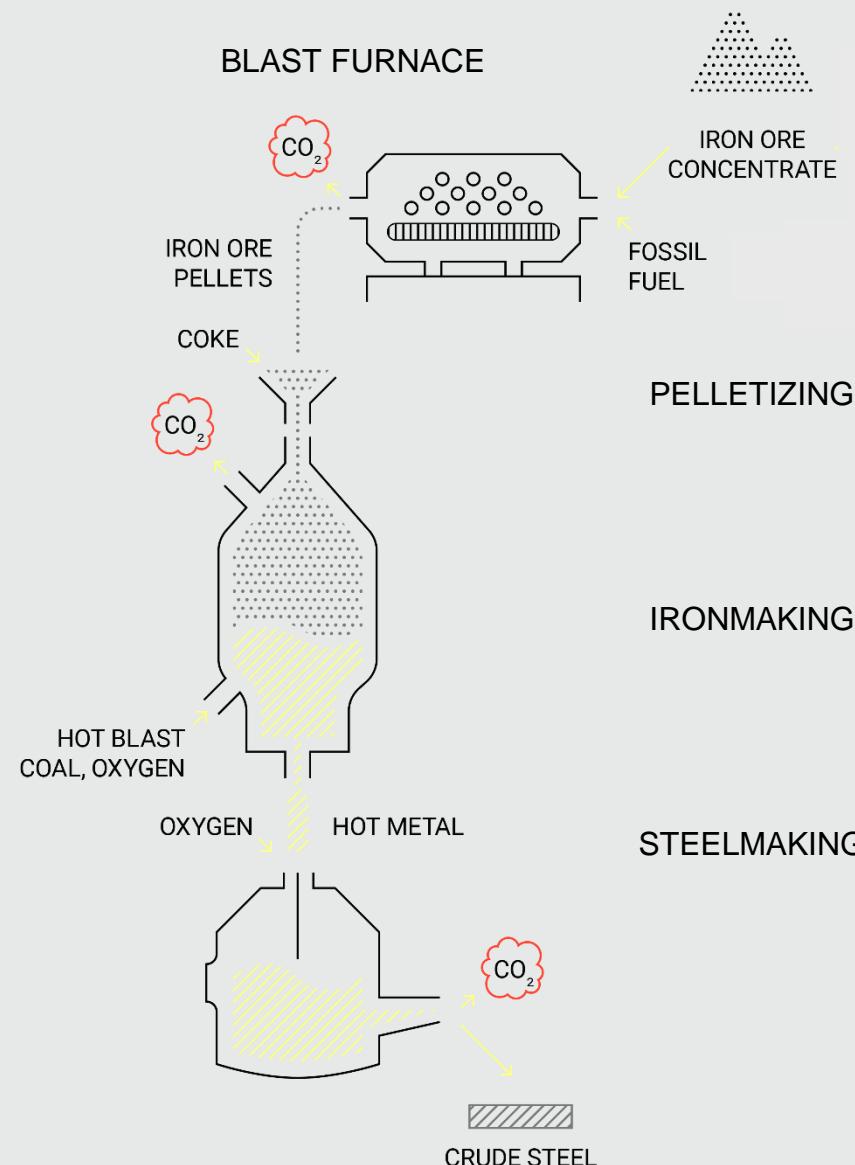


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# HOW TO MAKE FOSSIL-FREE STEEL

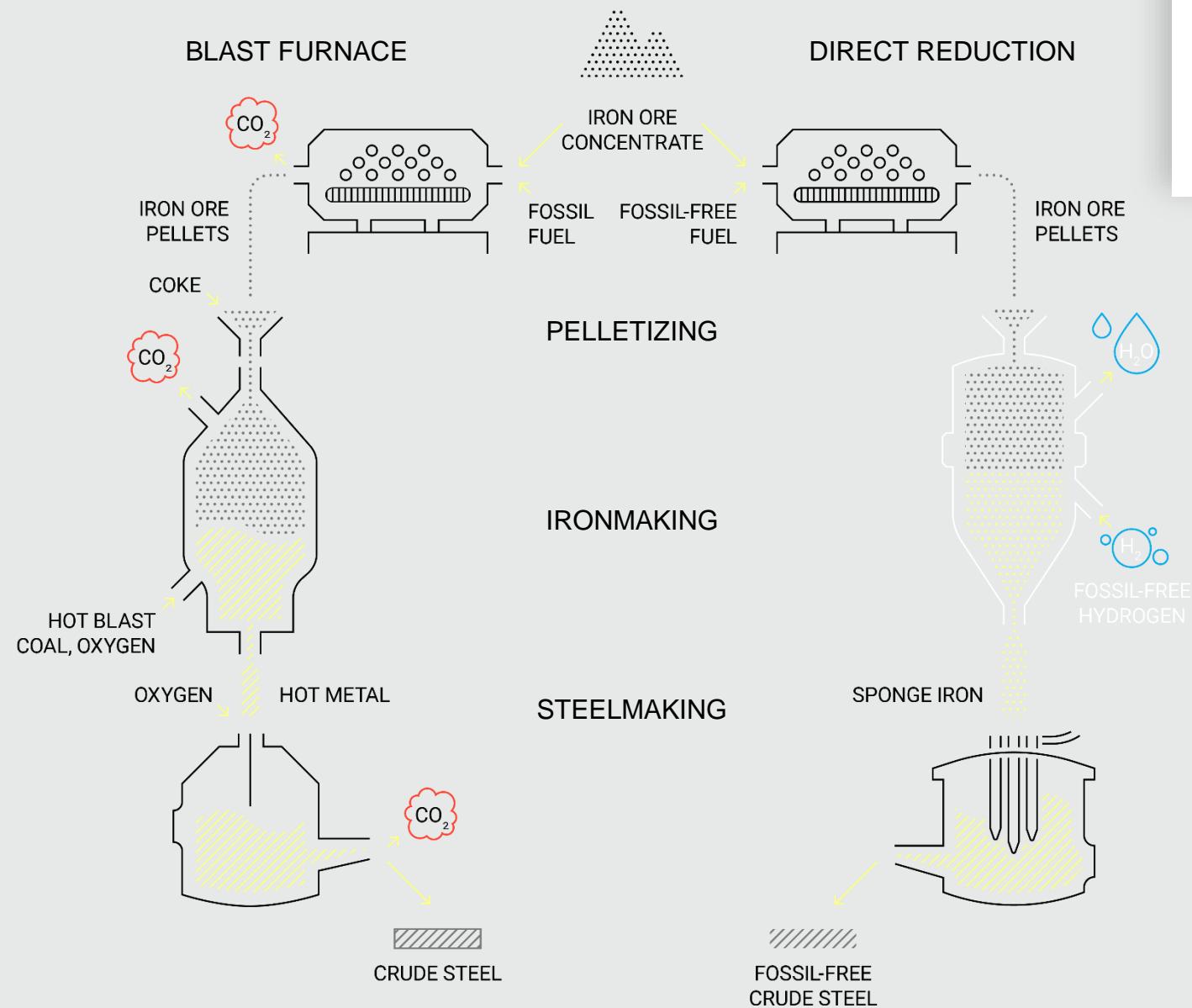
# The HYBRIT technology

Two ways to make steel from iron ore today



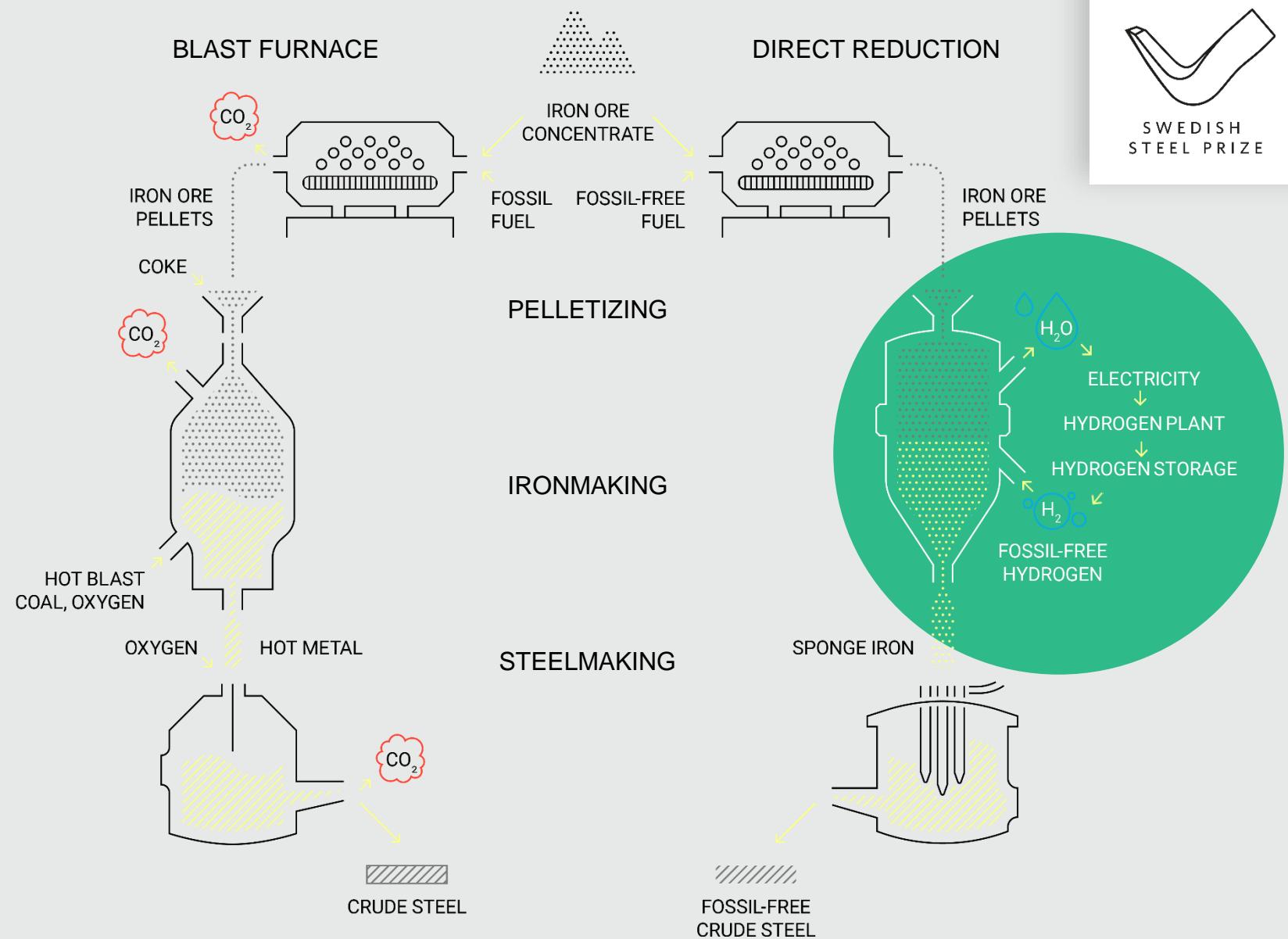
# The HYBRIT technology

Two ways to make steel from iron ore today



# The HYBRIT technology

## Fossil-free steel making



# The first fossil-free steel rolled in July 2021





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# CARBON EMISSIONS IN LCA FOR STEEL

# What is Life Cycle Assessment (LCA)?



Scope 3 Upstream

=

Raw materials &  
other supplies

Scope 2

=

Energy

Scope 1

=

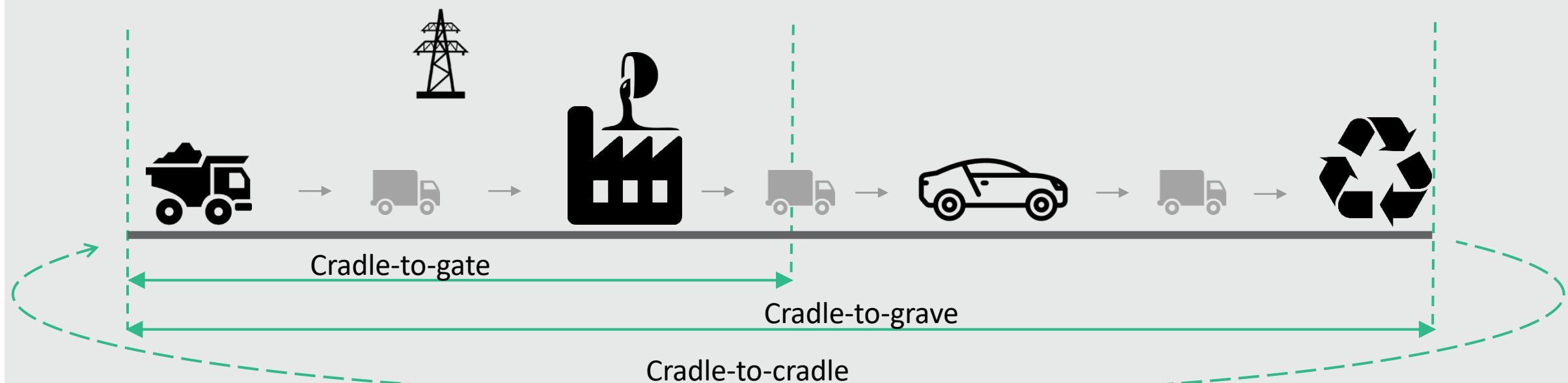
Production

Scope 3 Downstream

=

Use of product

End of life



**Iron ore based steel is the origin of scrap**

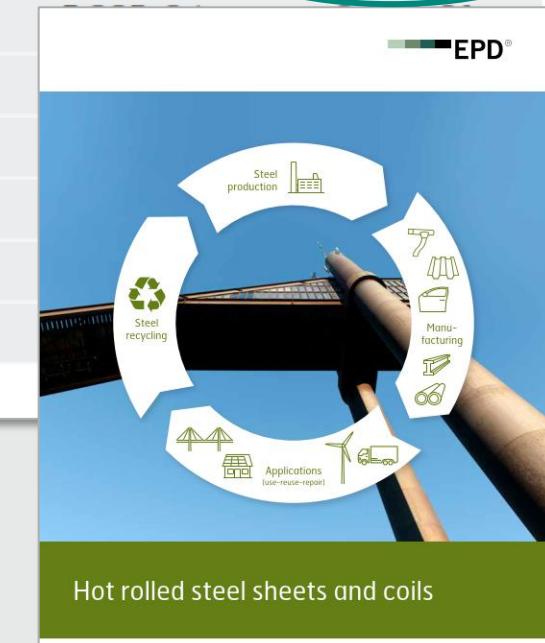
Since this is a valuable raw material it gives a credit in Environmental Product Declarations, EPDs

# The SSAB EPD shows world leading LCA values



TABLE 2A. POTENTIAL ENVIRONMENTAL IMPACT PER 1,000 KG OF HOT ROLLED STEEL SHEETS AND COILS

Parameter	Unit	A1-A3	C3	C4	D
Global warming potential (GWP)	kg CO <sub>2</sub> equiv.	2.16E+03	2.49E+00	7.44E-01	-1.48E+03
Eutrophication potential (EP)	kg (PO <sub>4</sub> ) <sup>3-</sup> equiv.	4.16E-01	4.22E-03		
Acidification potential (AP)	kg SO <sub>2</sub> equiv.	3.90E+00	1.76E-02		
Photo-oxidant formation potential (POCP)	kg ethene equiv.	4.38E-01	1.95E-03		
Ozone Layer Depletion Potential (ODP)	kg CFC11 equiv.	9.67E-11	8.13E-15		
Abiotic depletion potential: fossil (ADP-fossil)	MJ, net calorific value	2.36E+04	4.83E+01		
Abiotic depletion potential: elements(ADP-elements)	kg Sb equiv.	1.27E-03	2.80E-06		



## ► The SSAB LCA CO<sub>2</sub> emission:

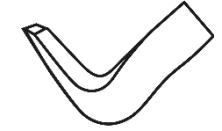
- Calc: 2.16 – 1.48 = 0.68 ton CO<sub>2</sub>e/ton steel

## ► Comparable to scrap based production

- With fossil-free steel, SSAB will be significantly lower

Environmental Product Declaration (EPD)  
In accordance with ISO 14025 and EN 15804+A1  
S-P-01919, version 1.0  
UN CPC 412

SSAB



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# TARGETING A FULLY SUSTAINABLE STEEL PORTFOLIO



- Fossil-free electricity
- Fossil-free fuels
- Fossil-free internal transports
- Fossil-free sponge iron based on the HYBRIT® Technology
- Based on high-quality recycled steel

The logo for SSAB FOSSIL FREE STEEL is displayed within a white, right-pointing chevron shape. The word 'SSAB' is in a small sans-serif font at the top, 'FOSSIL' is in a large, bold, sans-serif font in the center, 'FREE' is in a large, bold, sans-serif font below it, and 'STEEL™' is in a smaller sans-serif font at the bottom. The background is a blurred image of Earth from space.

- Fossil-free electricity
- Fossil-free fuels
- Fossil-free internal transports
- Fossil-free sponge iron based on the HYBRIT® Technology
- Based on high-quality recycled steel





Carbon emission in operations  
including purchased energy (scope 1-2):

**0.0**

kg CO<sub>2</sub>e emissions per kg steel (target).



Carbon emission in operations  
including purchased energy and iron ore  
(scope 1-2 and iron ore of scope 3 upstream):

**0.0**

kg CO<sub>2</sub>e emissions per kg steel (target).



The emissions are not completely zero, but so small that we guarantee that it is less than 0.05 kg CO<sub>2</sub>e emissions per kg steel, and thus rounded to 0.0.

# Carbon emissions of SSAB Zero™



Carbon emission in operations,  
including purchased energy (Scope 1-2):  
**0.0 kg CO<sub>2</sub>e** emissions per kg steel (target)

The emissions are not completely zero, but so small that we  
guarantee that it is less than 0.05 kg CO<sub>2</sub>e emissions per kg steel,  
and thus rounded to 0.0.

Carbon emission in operations including purchased energy and raw material  
(Scope 1-3 Upstream): 0.3 kg CO<sub>2</sub>e emissions per kg steel (target).

# Carbon emissions of SSAB Fossil-Free™ steel



Carbon emission in operations,  
including purchased energy and iron ore mining  
(Scope 1-2 and part of scope 3 upstream):  
**0.0 kg CO<sub>2</sub>e** emissions per kg steel (target).

The emissions are not completely zero, but so small that we  
guarantee that it is less than 0.05 kg CO<sub>2</sub>e emissions per kg steel,  
and thus rounded to 0.0.

Carbon emission in operations including purchased energy and raw material  
(Scope 1-3 Upstream): 0.3 kg CO<sub>2</sub>e emissions per kg steel (target).

# Unbeatable results – using SSAB Fossil-Free™



In addition to the carbon emissions in operations, there is a potential **credit up to 1.5 kg CO<sub>2</sub>e** per kg steel to be deducted, when customers include the end-of-life in an LCA calculation.

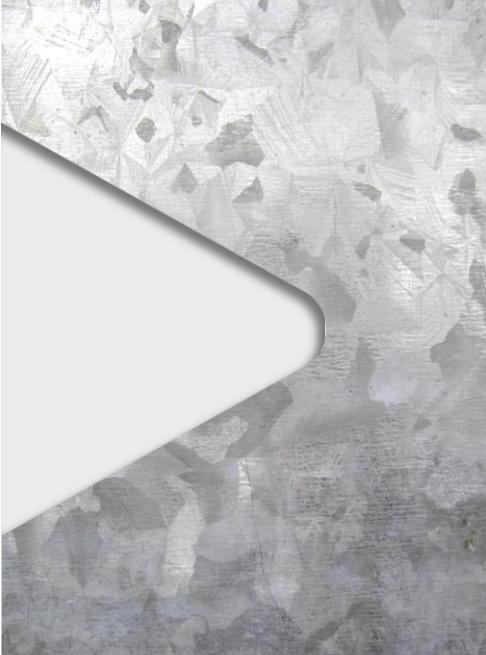
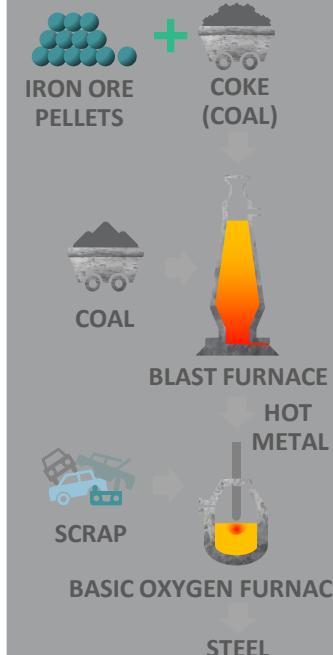
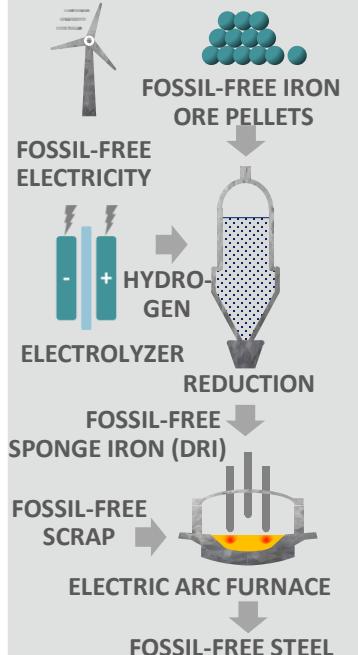
In contrast to scrap-based steel production, steel production from primary fossil-free sponge iron generates additional steel scrap for recycling at the end of its life cycle.

This is referred to as Module D in Environmental Product Declarations (EPD). In the Product Environmental Footprint (PEF) methodology and the Circular Footprint Formula (CFF) this is also taken into account.

# LCA values for different steel production routes



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Steelmaking processes	Global average Blast Furnace	SSAB Zero™	SSAB Fossil-free™ steel
	 <p>IRON ORE PELLETS + COKE (COAL) → BLAST FURNACE → HOT METAL → BASIC OXYGEN FURNACE → STEEL</p>	 <p>SCRAP → ELECTRIC ARC FURNACE → STEEL</p>	 <p>FOSSIL-FREE IRON ORE PELLETS + FOSSIL-FREE ELECTRICITY → HYDRO-GEN → ELECTROLYZER → REDUCTION → FOSSIL-FREE SPONGE IRON (DRI) → FOSSIL-FREE SCRAP → ELECTRIC ARC FURNACE → FOSSIL-FREE STEEL</p>
Report	Global average ton CO <sub>2</sub> e/ton steel	Targets ton CO <sub>2</sub> e/ton steel	Targets ton CO <sub>2</sub> e/ton steel
Operations. Scope 1 and 2.	<b>2.0</b>	<b>0.0</b>	<b>0.0</b>
Cradle-to-Gate	<b>2.4</b>	<b>0.3</b>	<b>0.3</b>
Cradle-to-Gate + End-of-Life	<b>1.2</b>	<b>0.4</b>	<b>-1.2</b>
PEF Methodology*	<b>1.4</b>	<b>0.4</b>	<b>-0.9</b>

Sources: World Steel Association, SSAB.

Note: \*Product Environmental Footprint (PEF) with Circular Footprint Formula (CFF). 95% recycling rate at EoL.

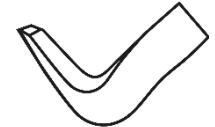
# True numbers



SSAB is **not** engaging in mass balancing **allocation of emission reduction**, where general carbon emission savings are allocated to achieve net zero or carbon neutral steel.

SSAB is **not** engaging in carbon **emission offsetting** activities, where investments in forest preservation are used to sell net zero or carbon neutral steel.

# SSAB Zero™ Certificate of carbon emissions



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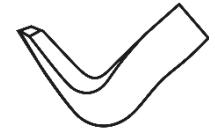
## SSAB Zero™ Plan



## Product Verification Statement



# Environmental product declarations (EPD)



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SSAB Zero™: around 2024



SSAB Fossil-free™ steel: around 2027

# Resources



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Phone: +46 709 833 060

The screenshot shows the SSAB website's navigation bar with 'Fossil-free steel' selected. The main content features a close-up of a person's eye with the text 'The future is fossil-free! Are you in?'. Below it, a subtext reads: 'If you think sustainable steel production sounds like a contradiction in terms, you're not alone. It's a common misconception. But now, it's time for a change.' A button says 'Explore what a fossil-free future means for you'. At the bottom, there are two images: a close-up of steel pellets and a group of people in an office setting. Text below the images says 'Not all green steel is fossil-free steel' and 'Get to know our partners'.



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