



# SSAB presentation at Stålbyggnadsdag

Martin Pei, SSAB CTO

October 22, 2020

**SSAB**

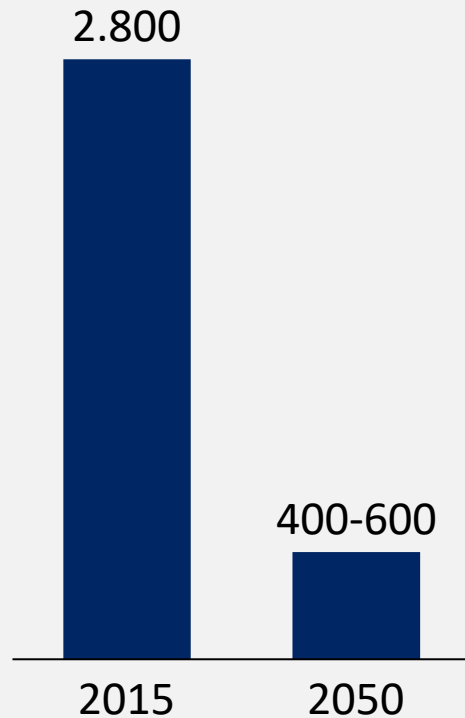
# Agenda

- ▶ **Introduction to HYBRIT and fossil free steel**
- ▶ Roadmap to commercialization
- ▶ Success factors enabling the transition

# A new steelmaking process is needed

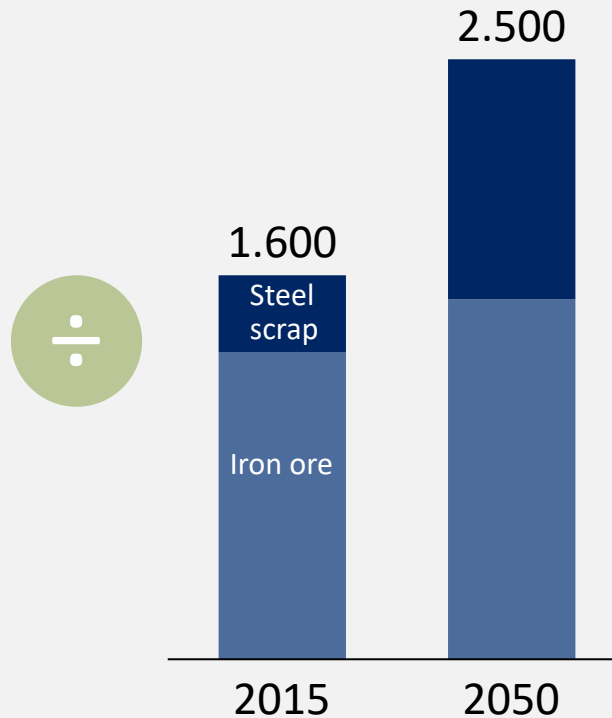
## CO<sub>2</sub> reductions required given Paris Agreement

Million tons CO<sub>2</sub>



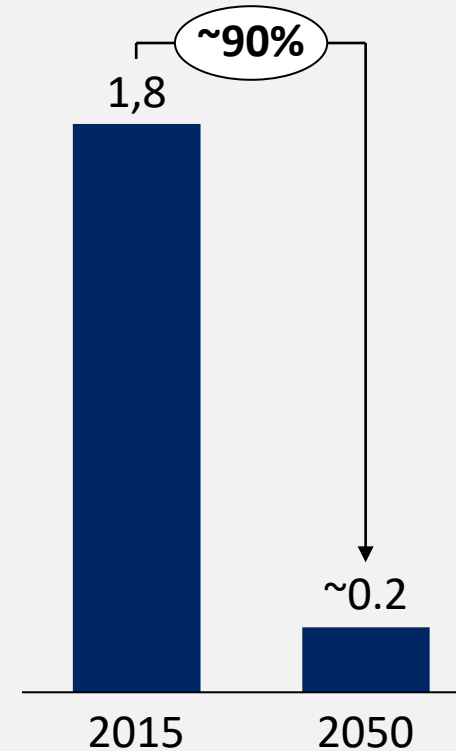
## Global steel demand

Million tons steel



## Required change in carbon intensity

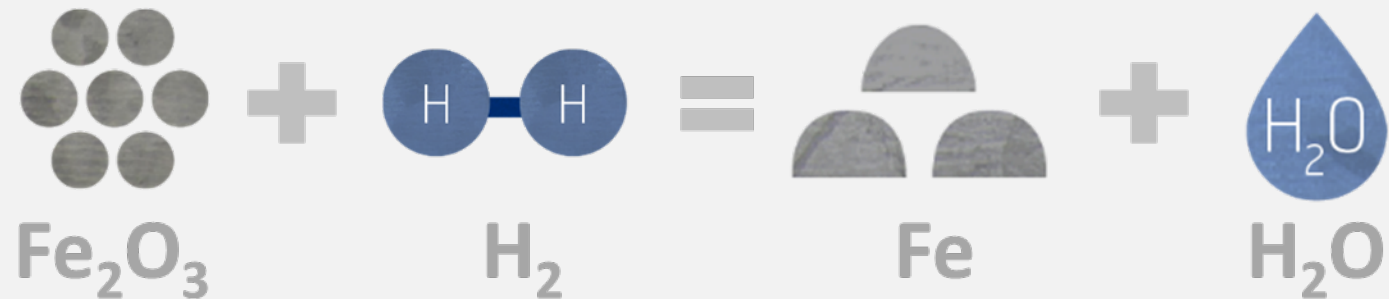
Ton CO<sub>2</sub>/ton steel



- ▶ ~90% lower carbon intensity in steel production required
- ▶ A new metallurgy is needed – impossible to meet with incremental improvements of current technologies

# The aim of the HYBRIT<sup>®</sup> Initiative

Eliminate CO<sub>2</sub> emissions in the value-chain for iron- and steelmaking by replacing coal with fossil-free electricity and hydrogen



# HYBRIT – a SSAB initiated JV with the target to develop the world's first fossil-free steel-making technology



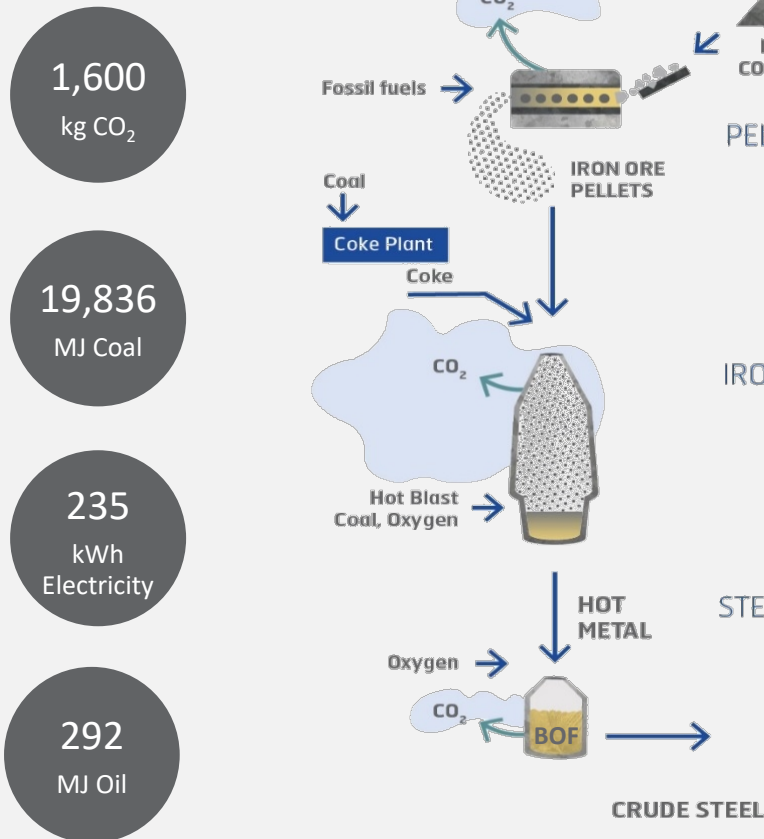
*Research  
funding from:*



- ▶ HYBRIT is a joint venture between SSAB, LKAB and Vattenfall, formed to develop hydrogen-based production of fossil-free sponge iron
  - Initiated by SSAB in 2016, joint company founded 2017
  - Equal ownership stakes of the founding partners
- ▶ HYBRIT R&D supported by government
  - Funding support so far from Swedish Energy Agency
  - Further support from national/EU-level expected
- ▶ Since its start HYBRIT has generated significant attention from customers, industry, academia, society, politicians and others stakeholders

# The HYBRIT technology

## CURRENT PROCESS - BLAST FURNACE + BOF



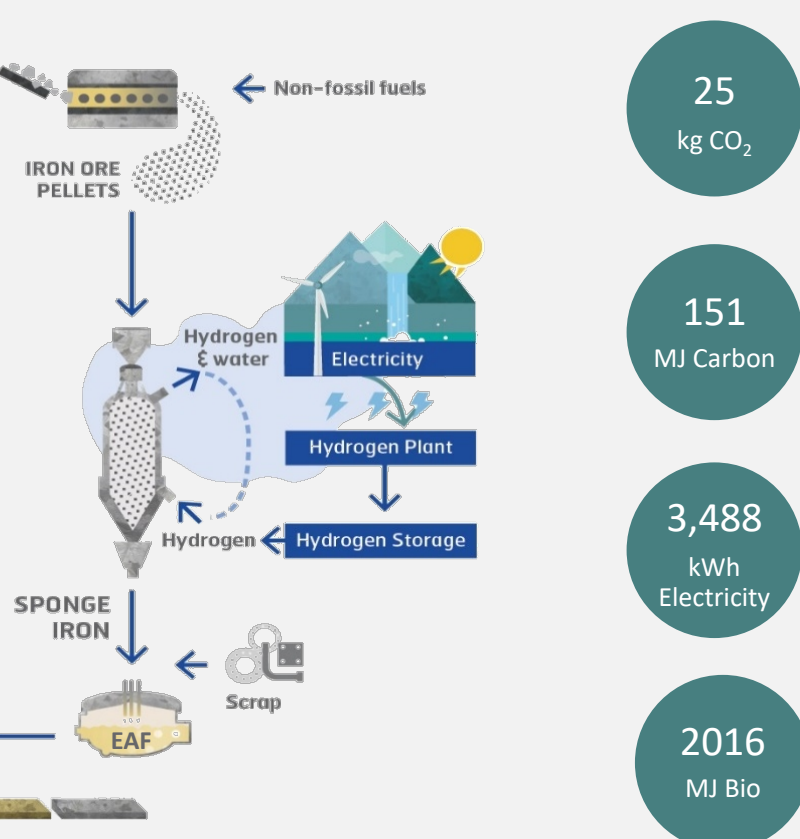
1,600  
kg CO<sub>2</sub>

19,836  
MJ Coal

235  
kWh  
Electricity

292  
MJ Oil

## NEW PROCESS – HYBRIT + EAF



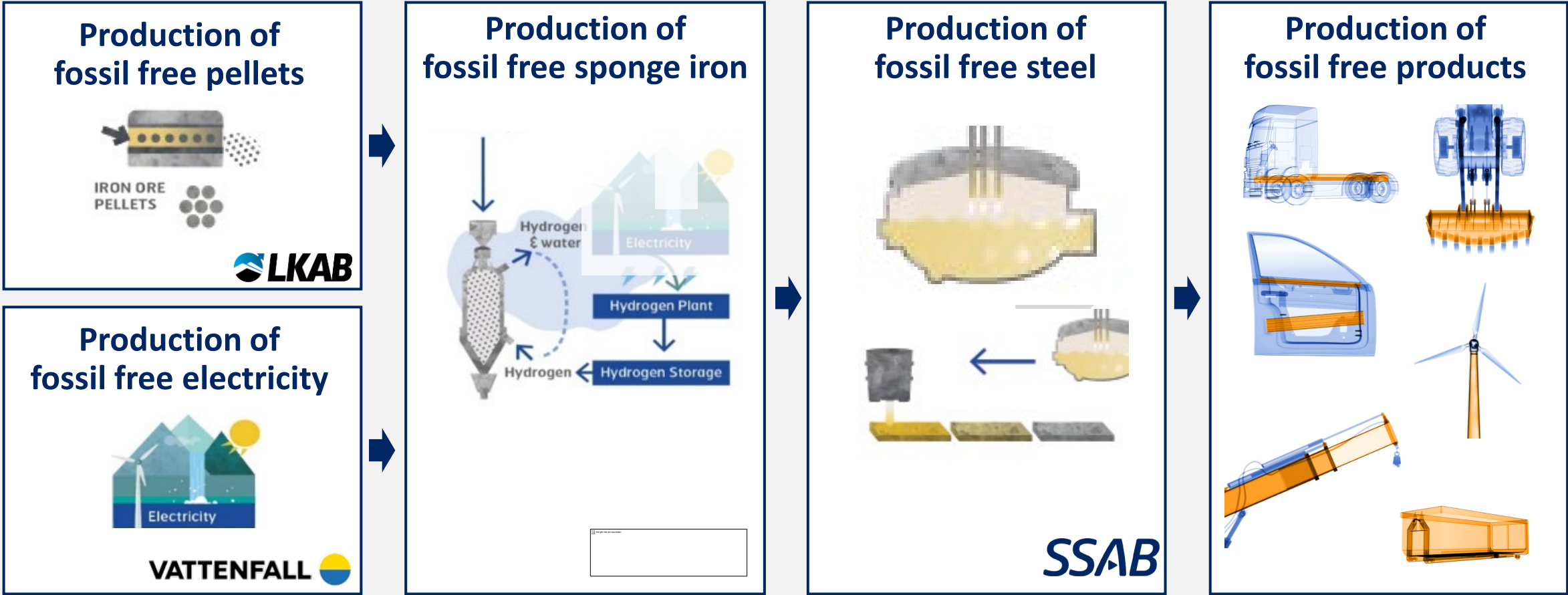
25  
kg CO<sub>2</sub>

151  
MJ Carbon

3,488  
kWh  
Electricity

2016  
MJ Bio

# Our vision - Demonstration of a complete industrial value chain from the Nordics



**SSAB**



# HYBRIT® Initiative – on-going pilot activity



**SSAB**

**LKAB**

**VATTENFALL**



**Swedish  
Energy Agency**

Ground-breaking ceremony June 2018







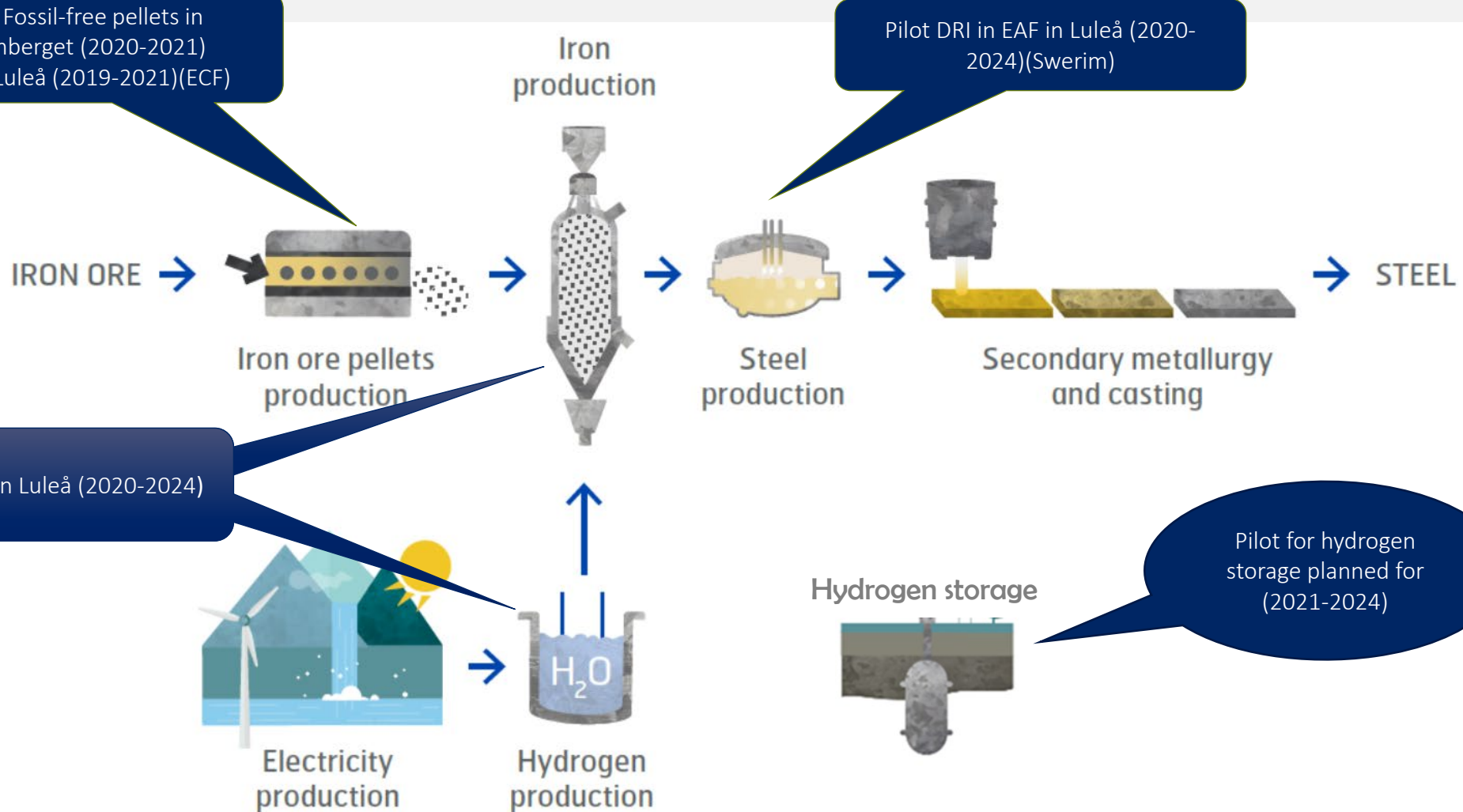
HYBRIT

世界初の  
水素鋼



FOSSIL-FREE STEEL

# HYBRIT's pilot projects in Norrbotten, Sweden



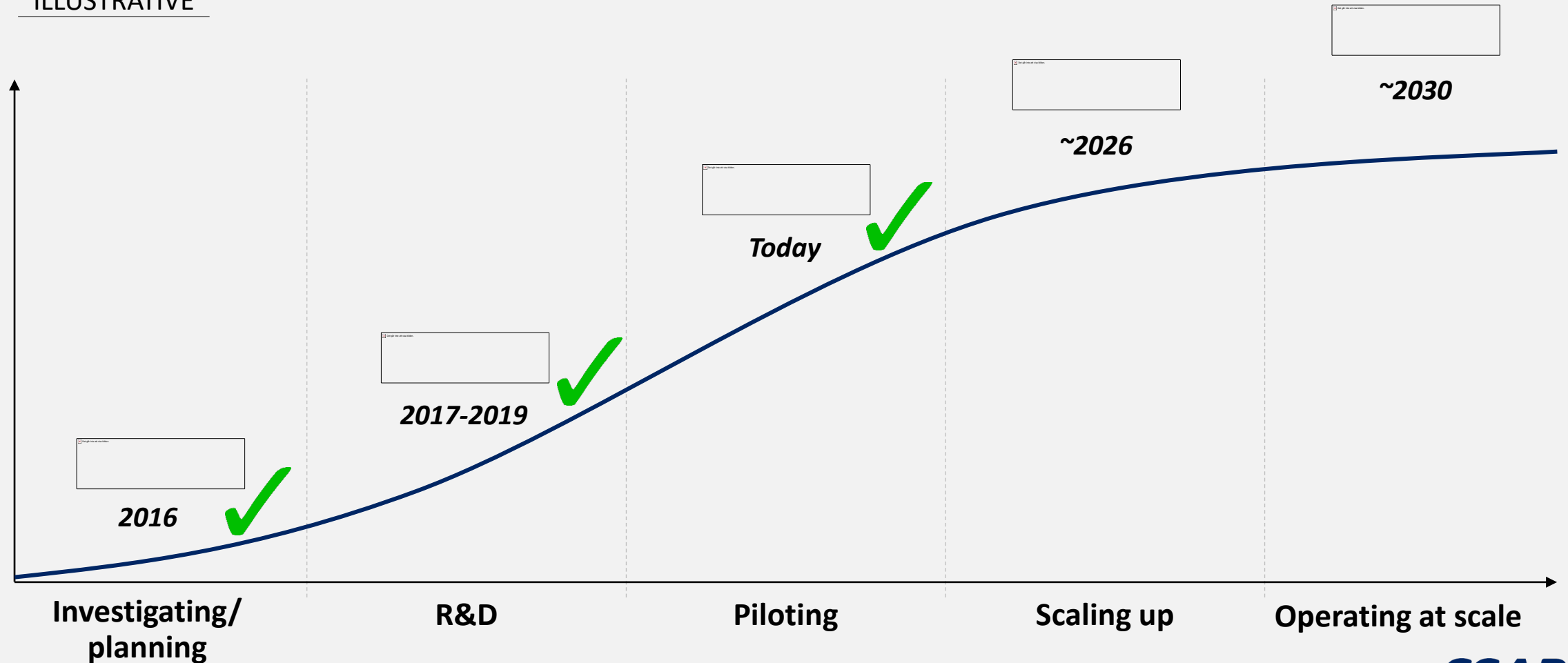
# Agenda

- ▶ Introduction to HYBRIT and fossil free steel
- ▶ **Roadmap to commercialization**
- ▶ Success factors enabling the transition

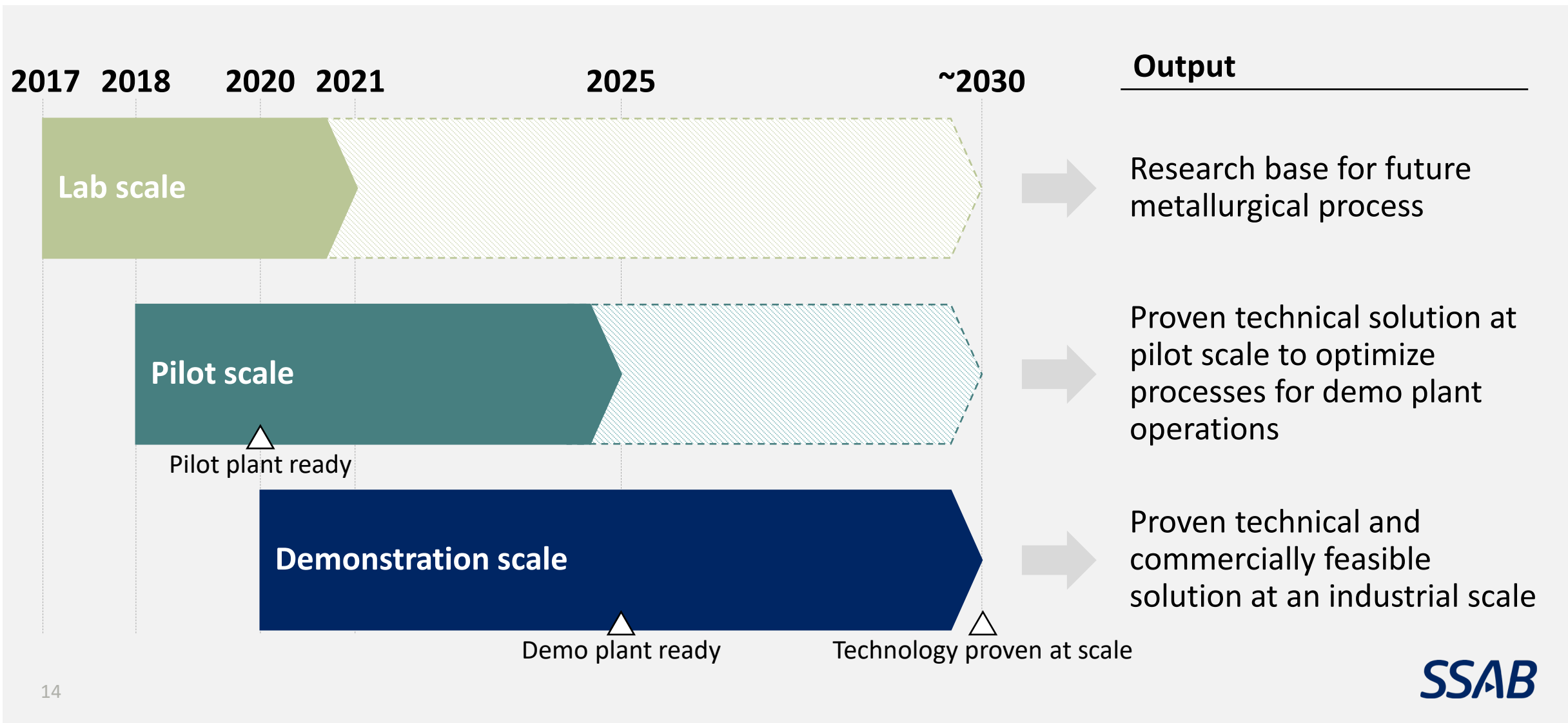


# Now in the process of planning how we scale up to launch fossil free steel commercially by ~2026

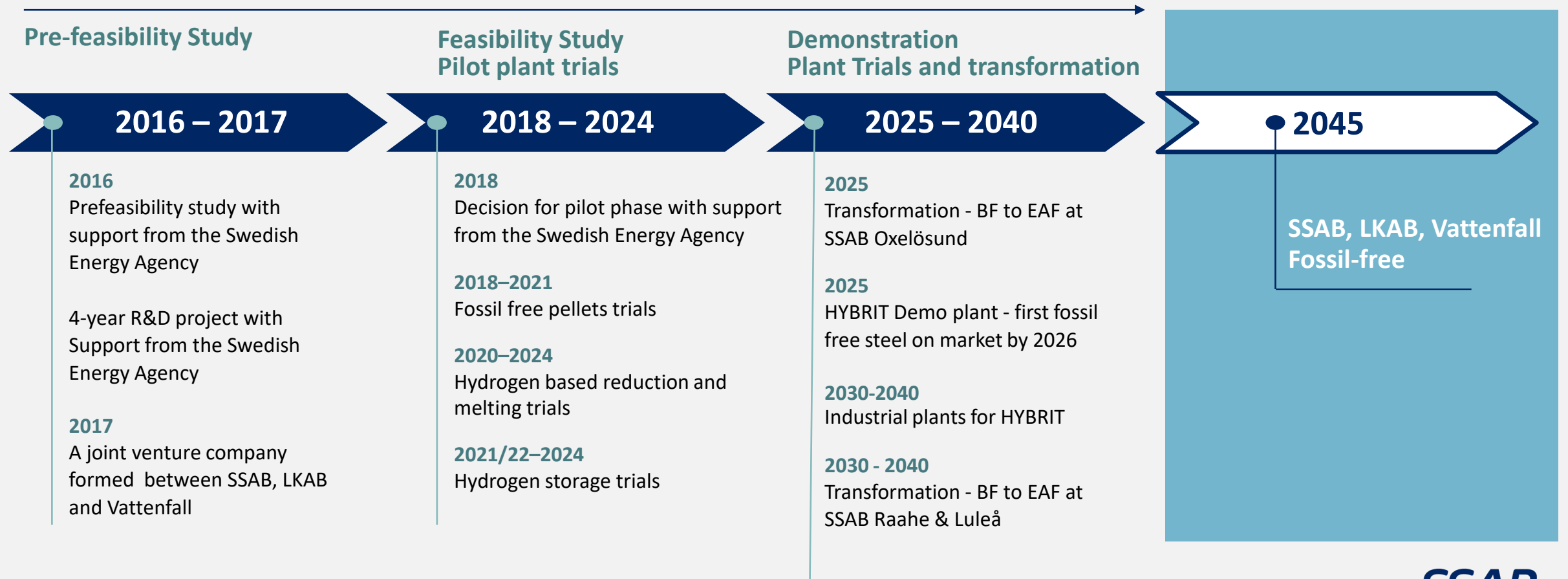
ILLUSTRATIVE



# The next steps is to build a demonstration plant at an industrial scale



# Roadmap



# Agenda

- ▶ Introduction to HYBRIT and fossil free steel
- ▶ Roadmap to commercialization
- ▶ **Success factors enabling the transition**





**"There is no future for grey steel in Europe. But an incredible future for green steel and hydrogen."**

EVP Frans Timmermans, (press conference, September 17, 2020)

***"Secondly, NextGenerationEU should invest in lighthouse European projects with the biggest impact: hydrogen, renovation and 1 million electric charging points. Allow me to explain how this could work: Two weeks ago in Sweden, a unique fossil-free steel pilot began test operations. It will replace coal with hydrogen to produce clean steel. This shows the potential of hydrogen to support our industry with a new, clean, licence to operate."***

*Ursula von der Leyen, State-of-the-Union address 2020 (speech, September 16, 2020)*

# Success factors enabling the transition

## Fossil-free electricity

- ▶ Sufficient availability at competitive cost
- ▶ Infrastructure & grid capacity

## Market for fossil free-steel

- ▶ Green public procurement
- ▶ LCA emissions-based product regulations, with value-chain transparency (PEFs)
- ▶ Carbon Border Adjustment Mechanism

## Financial support & de-risking

- ▶ Investment support (CAPEX and OPEX) for break-through technologies
- ▶ IPCEI, EU Innovation Fund, Just Transition Fund, Next Generation EU (green recovery), Carbon Contract for Difference (CCfD) – important elements

***SSAB***



*A stronger,  
lighter and more  
sustainable world*