



# CO<sub>2</sub>-emission free ironmaking

Press conference

April 4, 2016

SSAB



The world  
needs sustainable  
solutions

Our world is built using steel and with increasing demand for steel, more sustainable solutions are needed. Our customers need solutions that deliver higher performance in terms of energy efficiency, resource efficiency and better process and product performance.

**SSAB**





Our vision:  
A stronger, lighter  
and more sustainable  
world



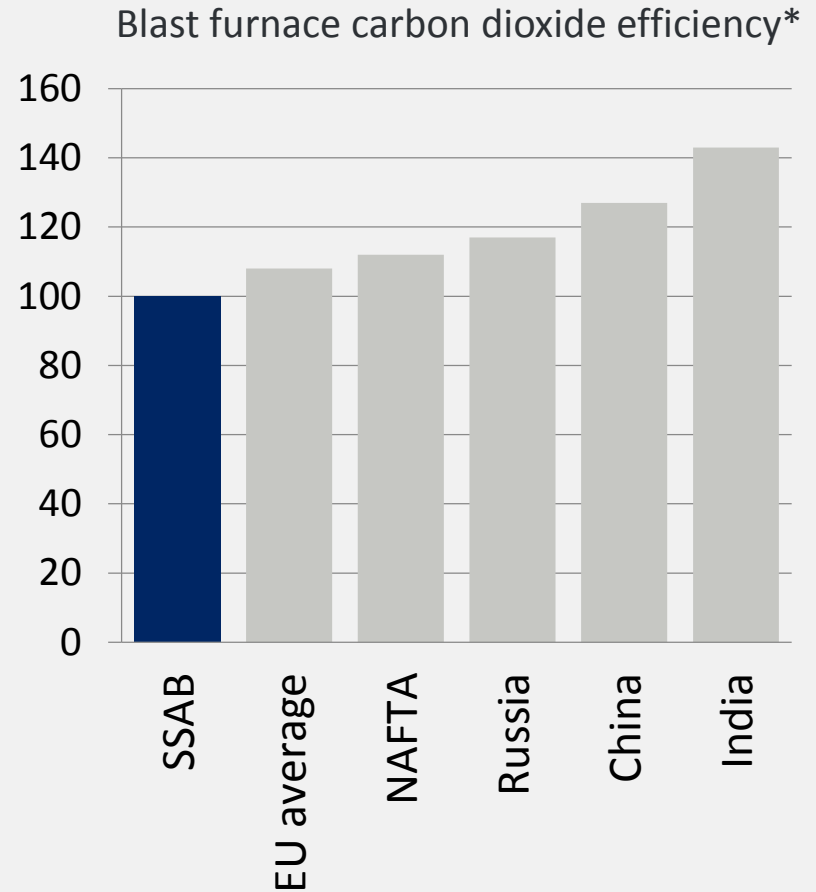
Together with our customers, we will go further than anyone else in realizing the full potential of lighter, stronger and more durable steel products.

**SSAB**

# CO<sub>2</sub>-efficient steel production

- ▶ We have one of the world's most CO<sub>2</sub>-efficient ironmaking processes
- ▶ We use nearly the minimum amount of carbon raw materials possible using current technology

Source: Stahl-Zentrum. \*The indexed carbon efficiency in ironmaking based on coal consumed 2012

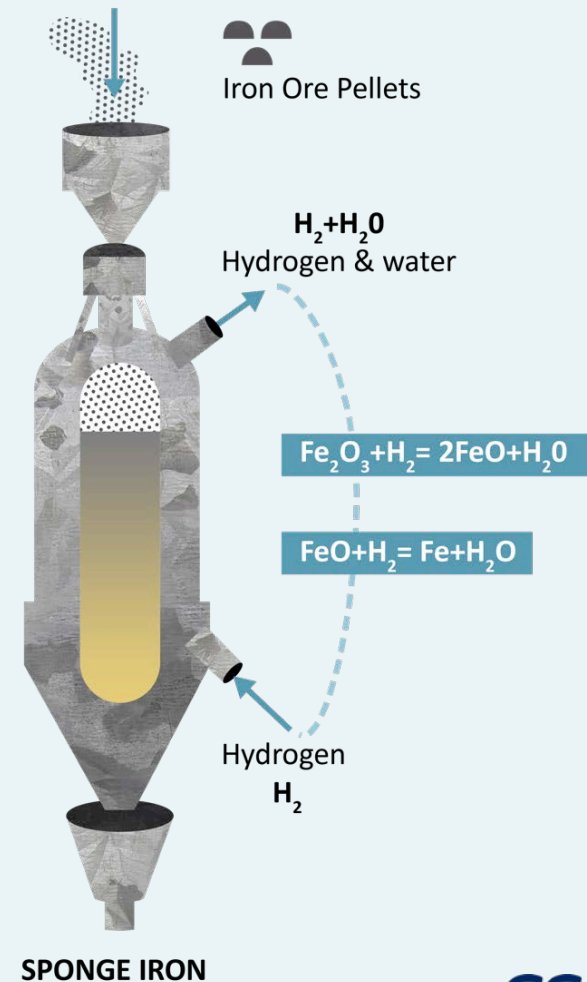


**WE WANT TO  
DO MORE**

**SSAB**

# CO<sub>2</sub>-emission free ironmaking

- ▶ SSAB, LKAB and Vattenfall today announce the launch of a project that can solve the steel industry's carbon dioxide challenge, HYBRIT (Hydrogen Breakthrough Ironmaking Technology).
- ▶ The aim is to reduce carbon dioxide emissions from ironmaking to zero by eliminating the need to use fossil fuel for iron ore reduction. The idea is to replace the blast furnaces with an alternative process, using hydrogen produced from "clean" electricity.
- ▶ This means that the by-product from ironmaking would be **water** not carbon dioxide.



# Why SSAB?

- ▶ We have one of the most CO<sub>2</sub>-efficient ironmaking processes in the world today, but are still the largest source of CO<sub>2</sub> emissions in Sweden
- ▶ Sustainability and performance are integrated into our business model
- ▶ Technical advances in production are part of our DNA and history
- ▶ We have actively been involved in European projects aimed at reducing CO<sub>2</sub> emissions.
- ▶ We are now launching a Swedish national project that aims to develop a CO<sub>2</sub>-emission free ironmaking process that can solve the root cause of CO<sub>2</sub> emissions in the steel industry.

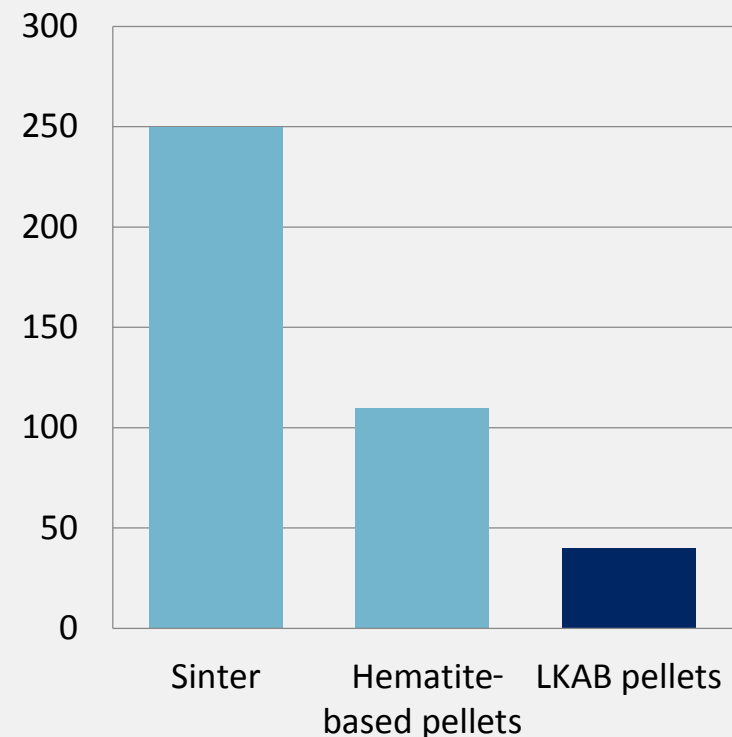


# Why LKAB?



- ▶ LKAB is already today a world-leading producer of world class direct reduction pellets
- ▶ Benefits of using LKAB iron ore pellets:
  - Direct reduction pellets are very low gangue and rich in iron, giving high energy efficiency in the direct reduction process as well as in the following electric arc furnace process. The pellets also create better conditions for production of cleaner steel
- ▶ More than half of the energy required by the pelletization process is supplied by the chemical oxidation of magnetite to hematite
- ▶ LKAB is dedicated to follow our clients in their efforts to reduce CO<sub>2</sub> emissions in their processes
- ▶ Developing methods to further reduce CO<sub>2</sub> emissions in our pelletizing processes

**CO<sub>2</sub> emissions from sintering and pelletizing**  
(kg CO<sub>2</sub>/tonne)



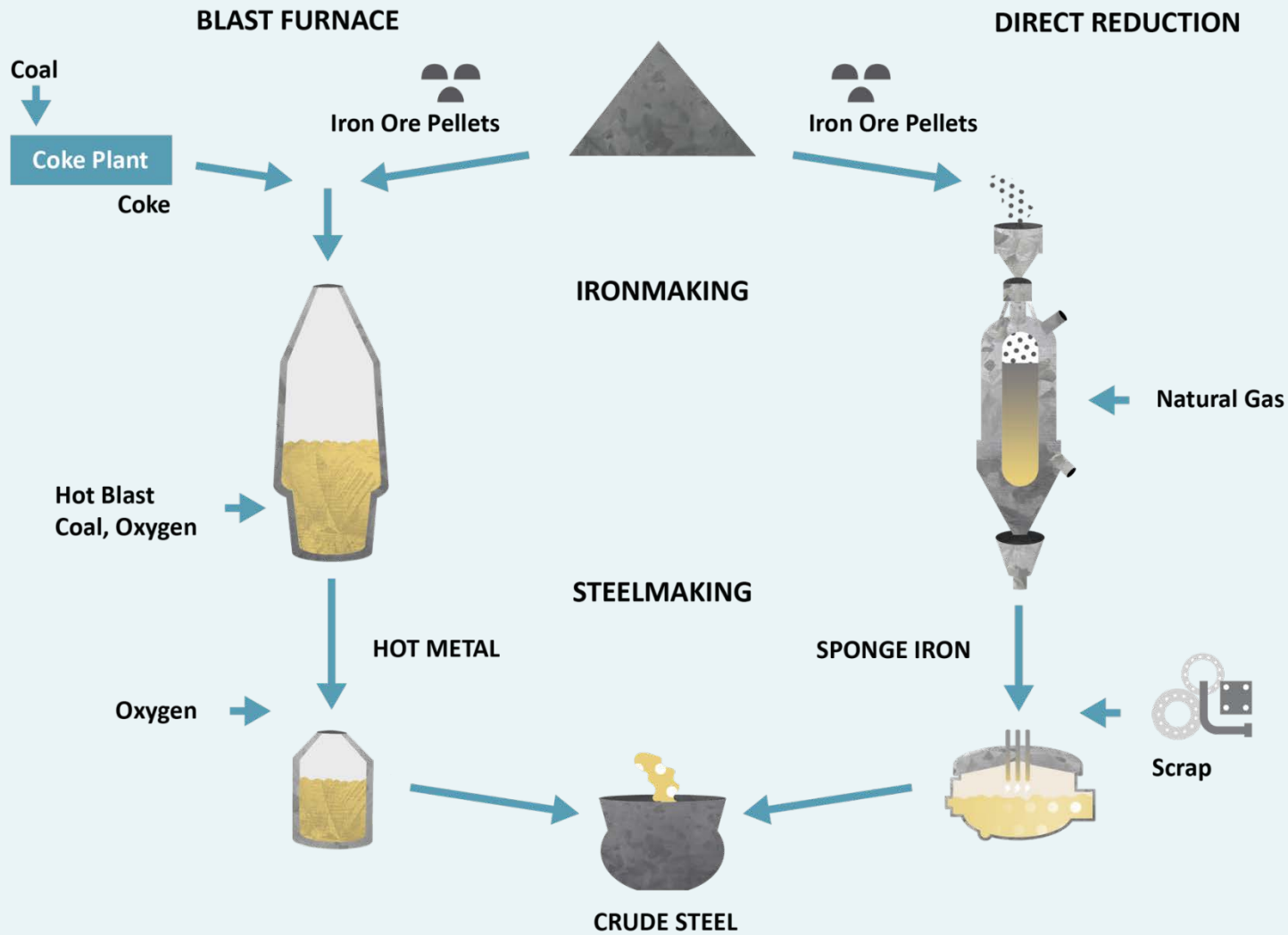


# Why Vattenfall?

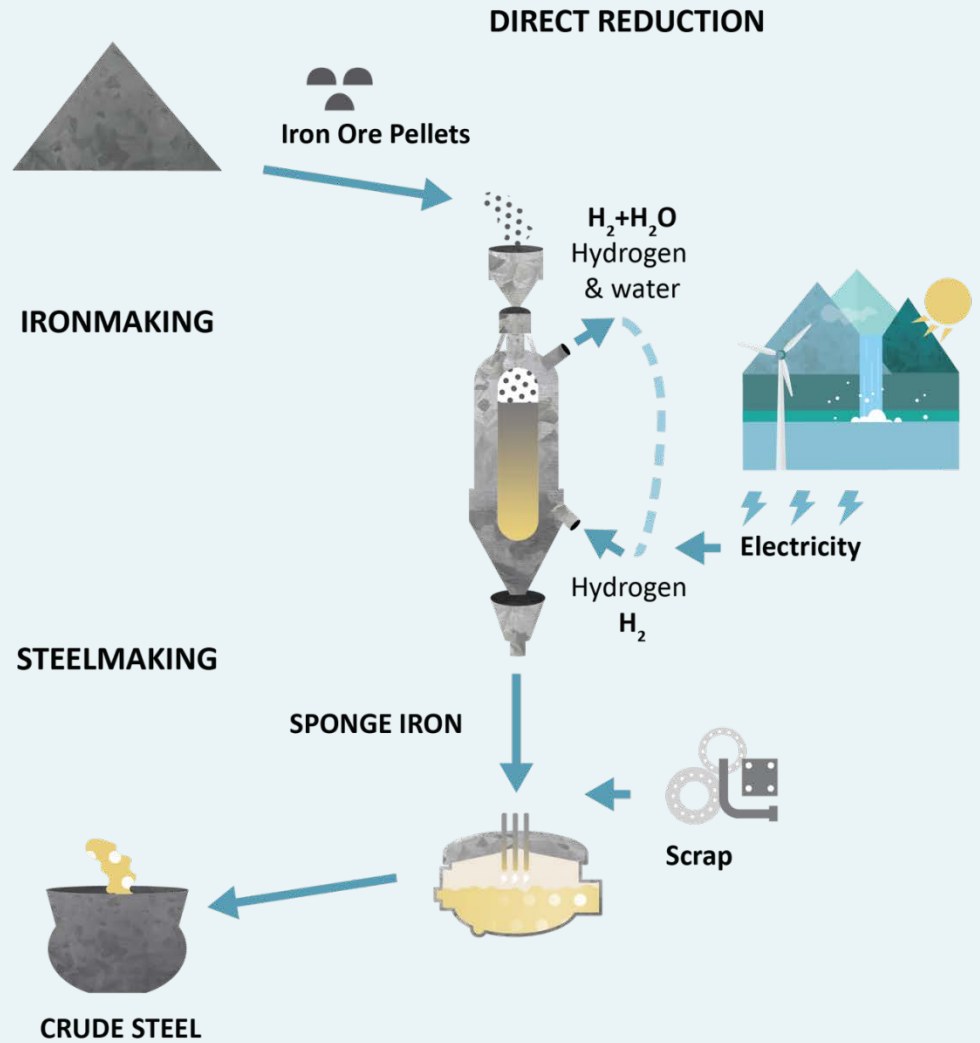
- ▶ Sweden has the ambition to become fossil free – one of the biggest challenges is industry and this is how we can help achieving it.
- ▶ Sweden's electricity generation has among the lowest CO2 emissions in the world.
- ▶ There are excellent opportunities to increase supply of carbon free electricity, given untapped resource potential, particularly in wind but also in biomass.
- ▶ Vattenfall has extensive knowledge about the Swedish, Nordic and European energy systems and markets and is well prepared to investigate the impact of a carbon free iron making process in Sweden.
- ▶ Vattenfall wants to lead the transition to a sustainable energy system. Cooperating with Swedish industry in order to switch from fossil fuels to carbon free electricity is a key element of the transition in Sweden.



# Two main ways to make steel today



# CO<sub>2</sub>-emission free ironmaking



# The project

- ▶ Pre-feasibility study 2016-2017
- ▶ Feasibility study-pilot plant trials 2018-2024
- ▶ Demonstration plant trials 2025-2035



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# Political involvement is needed to succeed

- ▶ Long term engagement from the state is needed in development work, both in the pre-feasibility study phase starting now and in a subsequent pilot plant trial, as well as in any long-term demonstration plant trial
- ▶ The following are required from a political perspective:
  - Conditions for a green industrial research program to enable test facilities for hydrogen gas-based ironmaking
  - Integration of work on zero emissions 2045 with labor policy
  - Link energy policy with industrial and environmental issues. More green electricity can replace fossil fuel in base industry.

# Our commitment

From our side **we are committed** to:

- ▶ Contributing time and resources to find solutions for CO<sub>2</sub>-emission free ironmaking on an industrial scale.
- ▶ Taking leadership in an industry project in line with the vision of a new industrialization of Sweden.
- ▶ Making a great contribution to enable Sweden's CO<sub>2</sub>-emission targets for 2045.
- ▶ Meanwhile we continue to decrease CO<sub>2</sub>-emissions by optimizing our existing production processes.

# Sweden has a unique opportunity

- ▶ We have already received very positive feedback for this initiative from the relevant politicians and authorities.
- ▶ Sweden has a unique opportunity:
  - Modern mining and steel industry
  - Good availability of CO<sub>2</sub> emission free electricity
  - Outstanding research and development capabilities
- ▶ This project will help us to take important steps to reduce Sweden's CO<sub>2</sub> emissions and make the necessary changes to become a more sustainable society.

# QUESTIONS?



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*A stronger,  
lighter and more  
sustainable world*