

**Innovative Revolutionary Ironmaking Technology
for a Low Carbon Economy**

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R&D

Picture: Hlsarna pilot plant, experimental campaign June 2013

“If it’s not made from steel it’s made with steel”



“If it’s not made from steel it’s made with steel”

- Steel is an essential material for our modern society
- Innovative steel qualities result in more sustainable end products
- The World steel production is growing and steel consumption will double in 2050



The importance of the steel sector for the EU

- The steel industry is an essential part of Europe's economy, accounting for 1.4 percent of the GDP of the EU28.
- Large parts of other industries depend on the availability of a reliable-quality steel supply.
- The EU28 steel industry directly employs around 335,000 people and several millions are to some extent dependent on it.
- The EU steel industry is among the most energy and resource efficient producers worldwide.

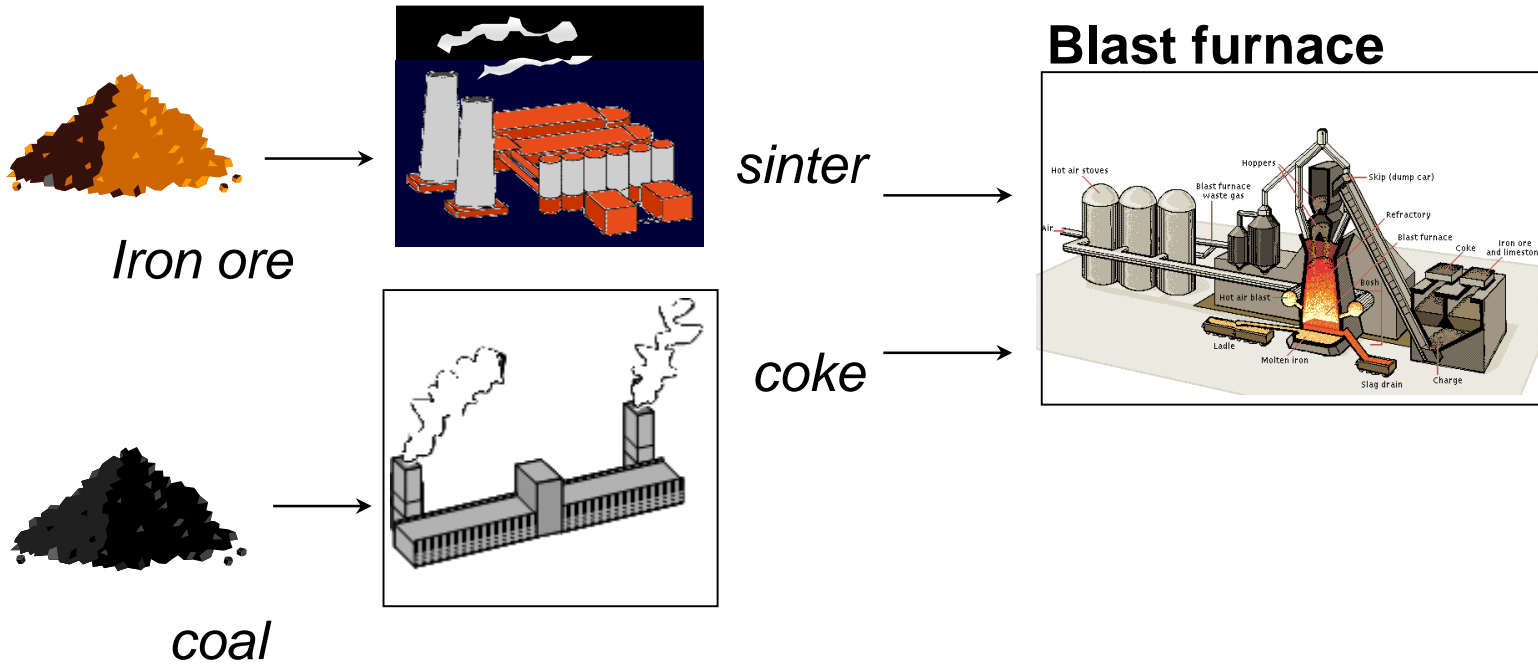
Sustainability Challenge

**Global competitiveness
of EU industries**

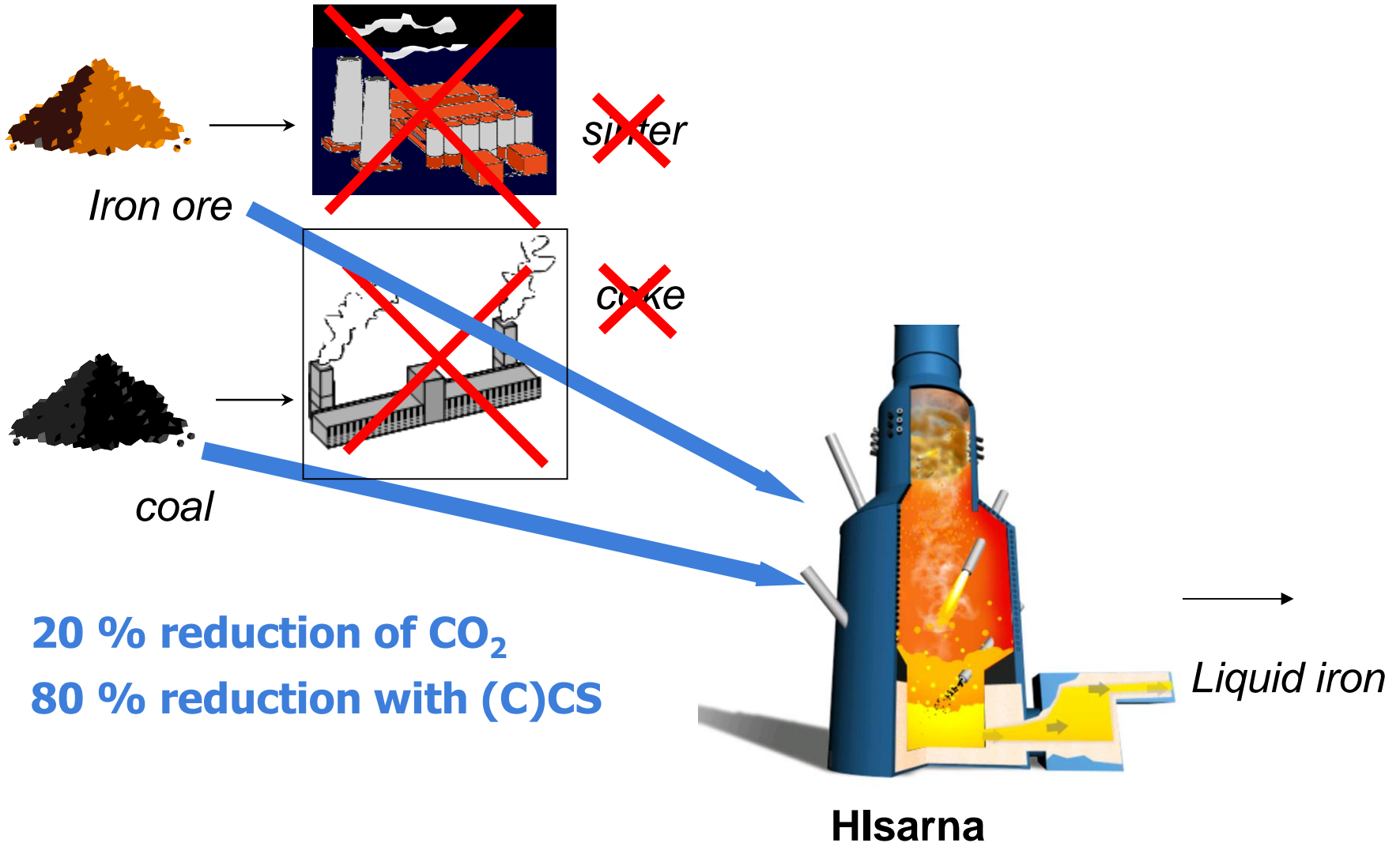
EU's climate objectives



Blast furnace route: 3 steps from raw materials to liquid metal



Hlsarna offers: single step from raw material to liquid metal



Achievements Hlsarna development



Ultra Low CO₂ Steelmaking



Negotiations with ULCOS



Engineering



Construction



Campaign A



Campaign D



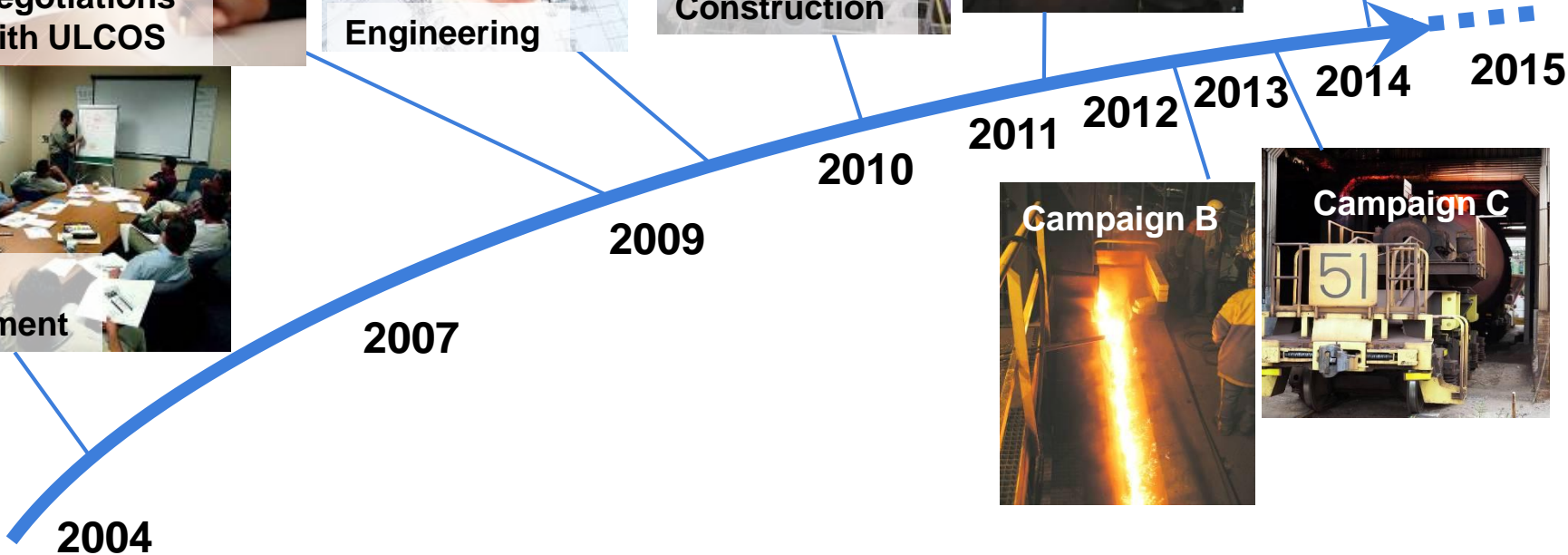
Campaign B



Campaign C



Concept development



Results from the development so far

- Experiments confirm the ability of the Hlsarna technology to reduce the CO₂ emissions of steel production with 20%
For EU this potentially amounts to 36 M ton-CO₂/year.
(100 M t-steel/year and specific emission of 1.8 t-CO₂/t-steel)
- This reduction results from improved energy efficiency and doesn't depend on the use of CCS
- Hlsarna can improve the sustainability and the competitiveness of the EU steel industry

Development stages and their obstacles

1. Research phase

- Costs to date of 50 M € were funded by Project partners (Industry), EU FP6, RFCS and Dutch Government

Total duration of this period was 8 years.

Dedicating scarce knowledge and skills to the development requires continuity of the development work, while funded projects are typically 2 to 3 years.

2. Transition to Pilot/Demo phase

- Subsidy request to RFCS for endurance campaign (20 M €) in 2013 was declined

Project enters critical phase, so called “Valley of Death” between research and implementation.

Project at risk of stalling due to lack of public co-funding.

Continuity of the team at risk, recent work fully funded by industry

Development stages and their obstacles

3. Demo phase

- Expected ~2018 (strong dependency on availability of funding)
- Costs estimate 250 – 300 M € for an industrial size demo plant (0.5 - 1 mln t/y)
 - *Financing will be a major issue. Required money exceeds by far the available research budgets in steel companies, that need to cover all areas from process improvements to new product developments.*
 - *For several years the EU steel industry lacks the financial strength to invest in projects with an uncertain and/or delayed return (such as a Demo project)*
 - *Lack of free allocations will further undermine possibility to finance low carbon technologies*
 - *Public co-funding and practical support is crucial for Demo projects for break-through innovations in large scale industries like the steel industry*

Sustainability Challenge

Global competitiveness of EU industries



EU's climate objectives

- The transition towards a sustainable low carbon Europe requires the spread of **new technologies and large investments** in new infrastructure.
- **Public funds and practical support** needed in all stages from research to deployment.

Sustainability Challenge

Global competitiveness of EU industries

Free allocation or/and full offset of indirect CO₂ costs for best performers in sectors at least until international distortions to competition are removed.

EU's climate objectives



Sustainability Challenge

Global competitiveness
of EU industries

EU's climate objectives



The steel industry believes that a **genuine reform of the EU ETS** with an improved carbon leakage support must take place, ensuring the achievement of both the EU's climate objectives for 2020 and 2030 **while safeguarding the global competitiveness** of industries at risk of carbon leakage.

Conclusions

- The World Steel Consumption will double in 2050.
- Globally, steel is a growing market and the EU steel sector should be able to seize the opportunities fast-growing economies are offering.
- Best performers in sectors at risk of carbon leakage should incur no direct or indirect burdens resulting from climate policies; free allocation for direct CO₂ and full offset of indirect CO₂ costs should be granted at least until international distortions to competition are removed.
- The steel industry is committed to unlocking the energy and CO₂ saving potential as reported in its low-carbon steel roadmap.
- Part of the solution is the Hlsarna process, which has a unique combination of **environmental** and **economical** benefits as confirmed by pilot plant trials.
- Hlsarna can reduce the CO₂ emissions of the steel production by 20 % without CCS and by 80% with CCS, provided economic viability of these technologies.
- Further up-scaling requires significant funding, up to 300 M €.
- Public funds and practical support should be provided consistent with the level of support needed.