ESTEP SPRING DISSEMINATION EVENT

17-18 FEBRUARY 2026 - BRUSSELS (BELGIUM)

Closing the Loop: Hydrogen-Based Recovery of DRI and Zinc from EAF Dust via the Dust2Value Process

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InsPyro

ESTEP

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MISSION: INSPIRING METALLURGY

InsPyro improves existing metallurgical processes and develops new **sustainable processes** together with its customers

Dust2Value process

- InsPyro active in the Dust2Value consortium to assist in process modelling + digital twin development
- D2V is a novel process for the recovery of ZnO and DRI from EAFD using H_2 as a reducing agent

Funded by the European Union

Disclosure Statement:

This document has been produced by consortium partners of the Dust2Value Horizon Europe project, funded by the European Union's Horizon Europe research and innovation programme under grant agreement Grant agreement ID: 101138742.

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From Grant Agreement: S.34-35

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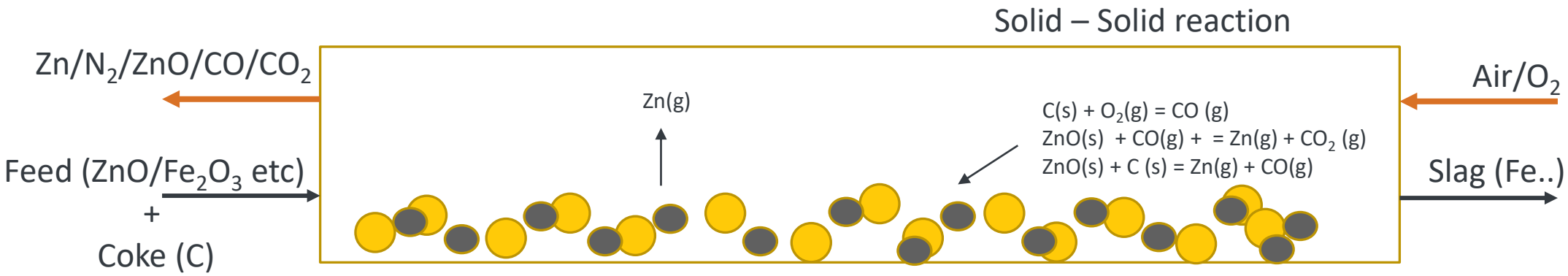
Zinc reduction: Waelz Kiln

- Typically occurs in waelz kiln using carbon



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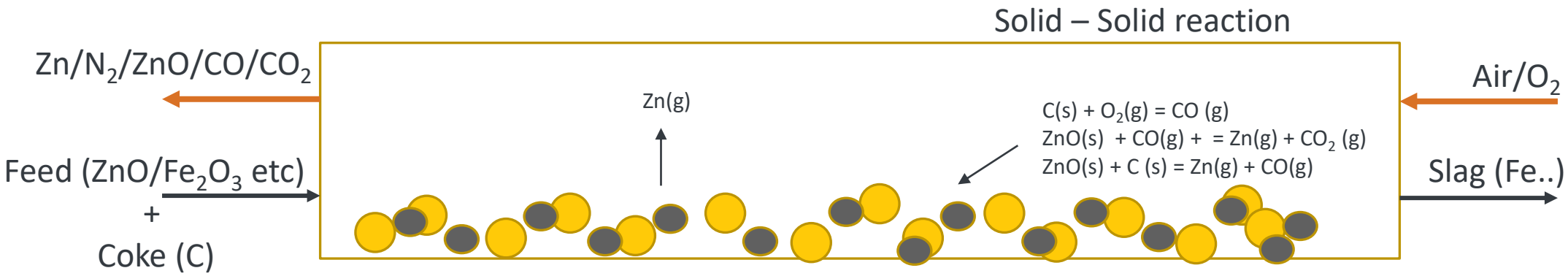

Efficiency
Counter current principle

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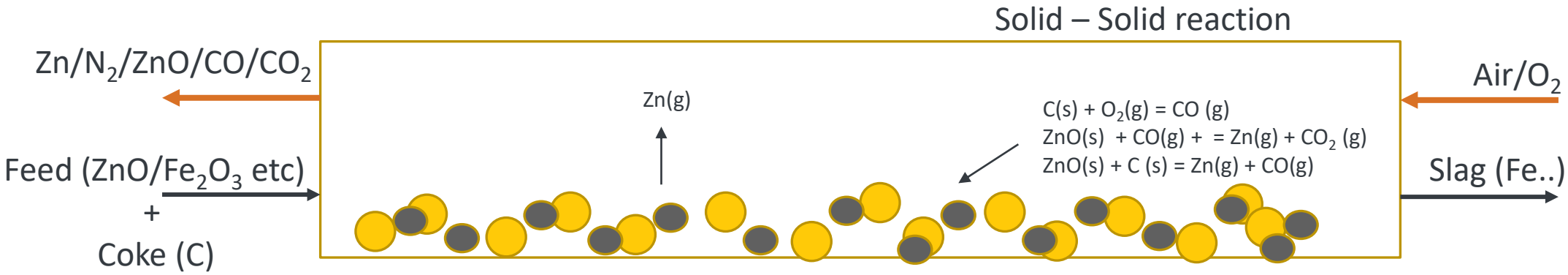

Efficiency
Counter current principle

Heat Recovery
ZnO reoxidation

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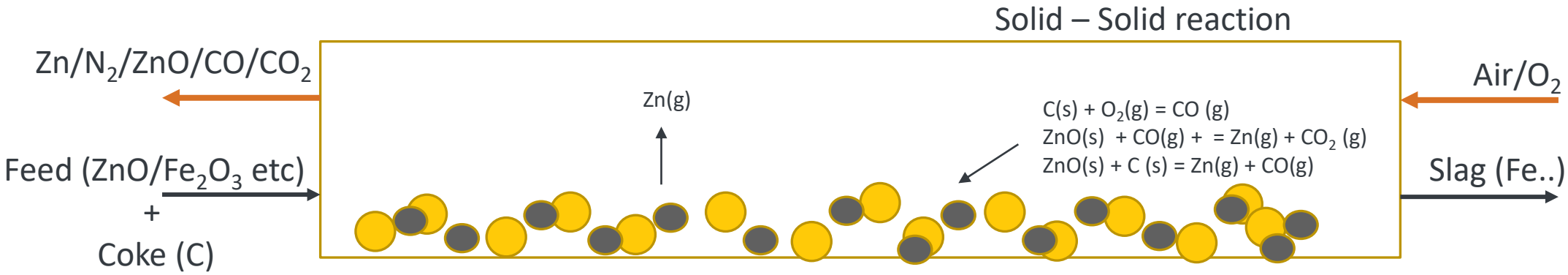

Efficiency
Counter current principle

Fossil Carbon
GHG – 550 kg/t EAFD

Heat Recovery
ZnO reoxidation

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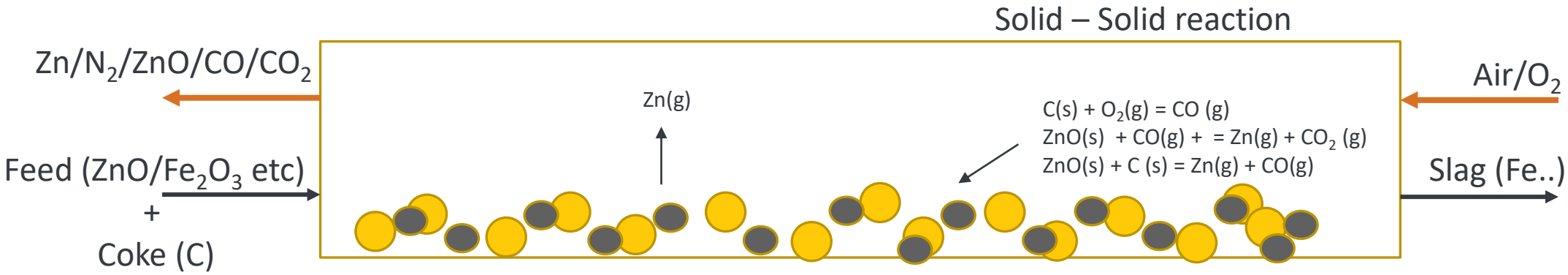

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Heat Recovery
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Waelz Slag
600-700 kg/t EAFD
No Fe recovery

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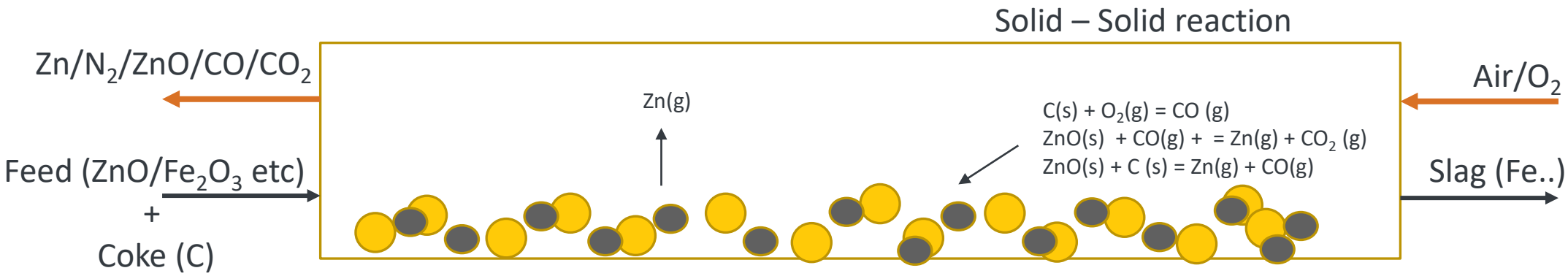

Efficiency
Counter current principle

Fossil Carbon
GHG – 550 kg/t EAFD

Zn Recovery
Some sintering and Zn and Fe dissolves in Ca Silicates

Heat Recovery
ZnO reoxidation

Waelz Slag
600-700 kg/t EAFD
No Fe recovery

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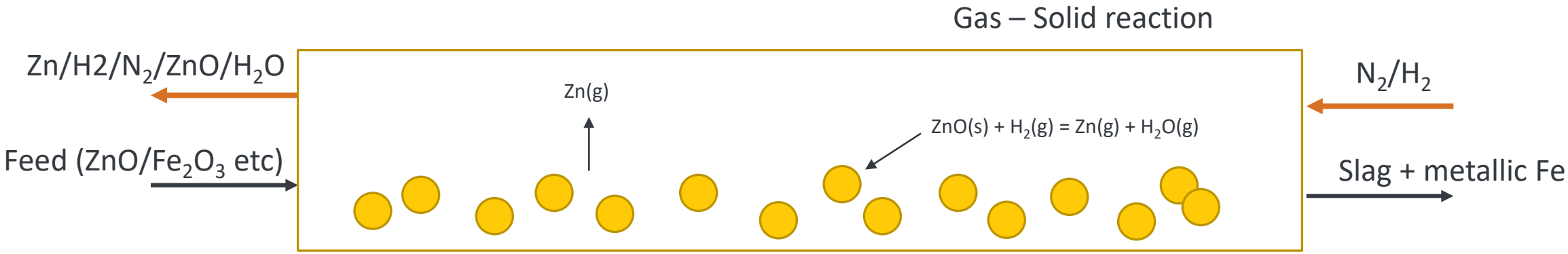
Zinc reduction: Dust2Value Process

- How ZnO reduction with carbon and hydrogen differ



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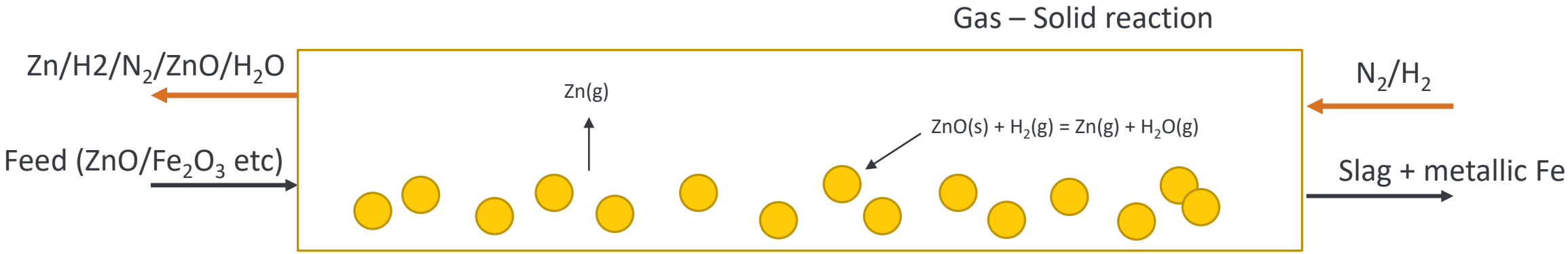

Efficiency
Counter current principle
Hydrogen recovery

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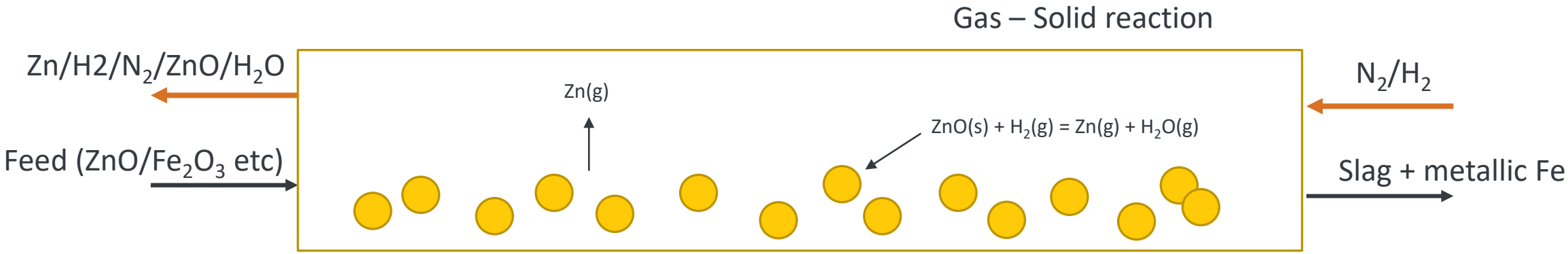

Efficiency
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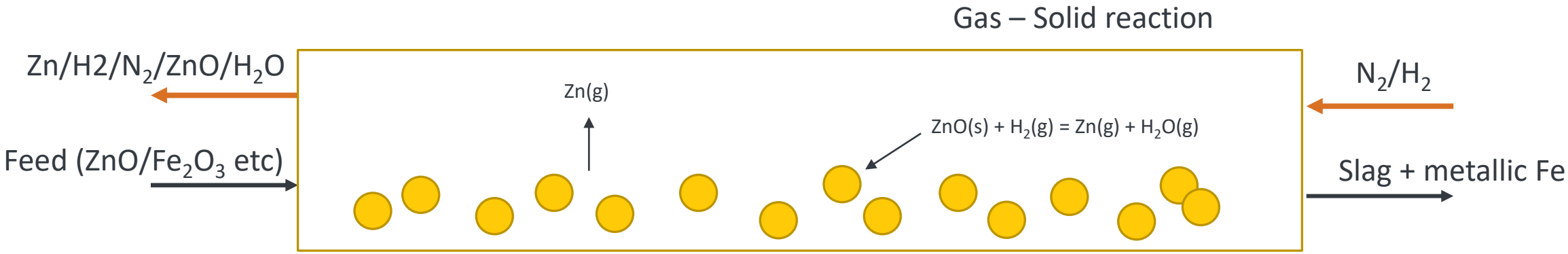

Efficiency
Counter current principle
Hydrogen recovery

Fossil Carbon
No direct emmisions

Heat Recovery
ZnO reoxidation

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Zinc reduction: Dust2Value Process

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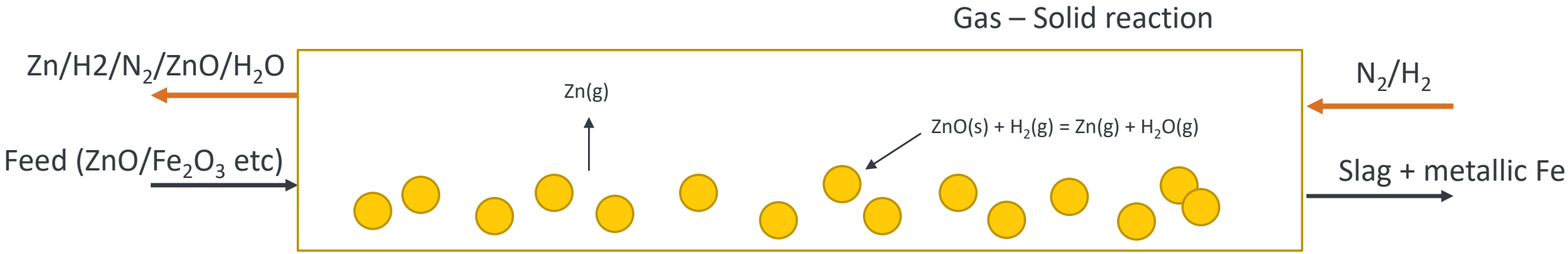

Efficiency
Counter current principle
Hydrogen recovery

Fossil Carbon
No direct emmisions

Heat Recovery
ZnO reoxidation

SDRI

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Zinc reduction: Dust2Value Process

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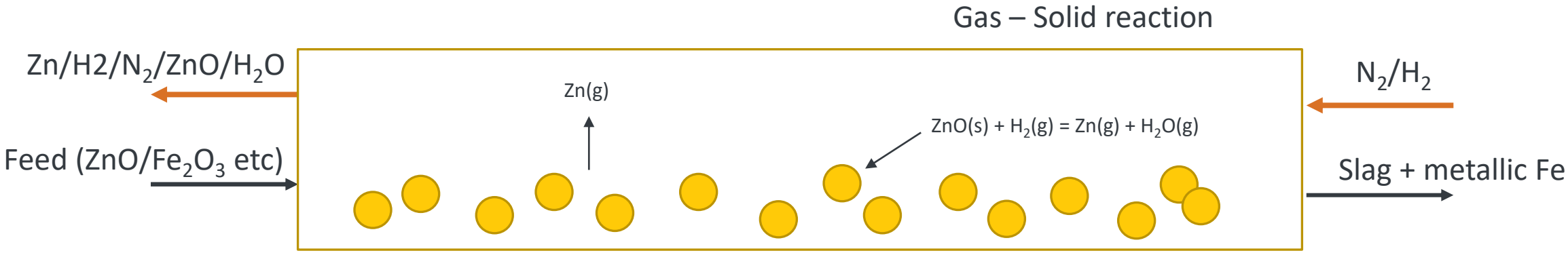

Efficiency
Counter current principle
Hydrogen recovery

Fossil Carbon
No direct emmisions

Zn Recovery
High Zn recovery, limited sintering (<1200 °C)

Heat Recovery
ZnO reoxidation

SDRI

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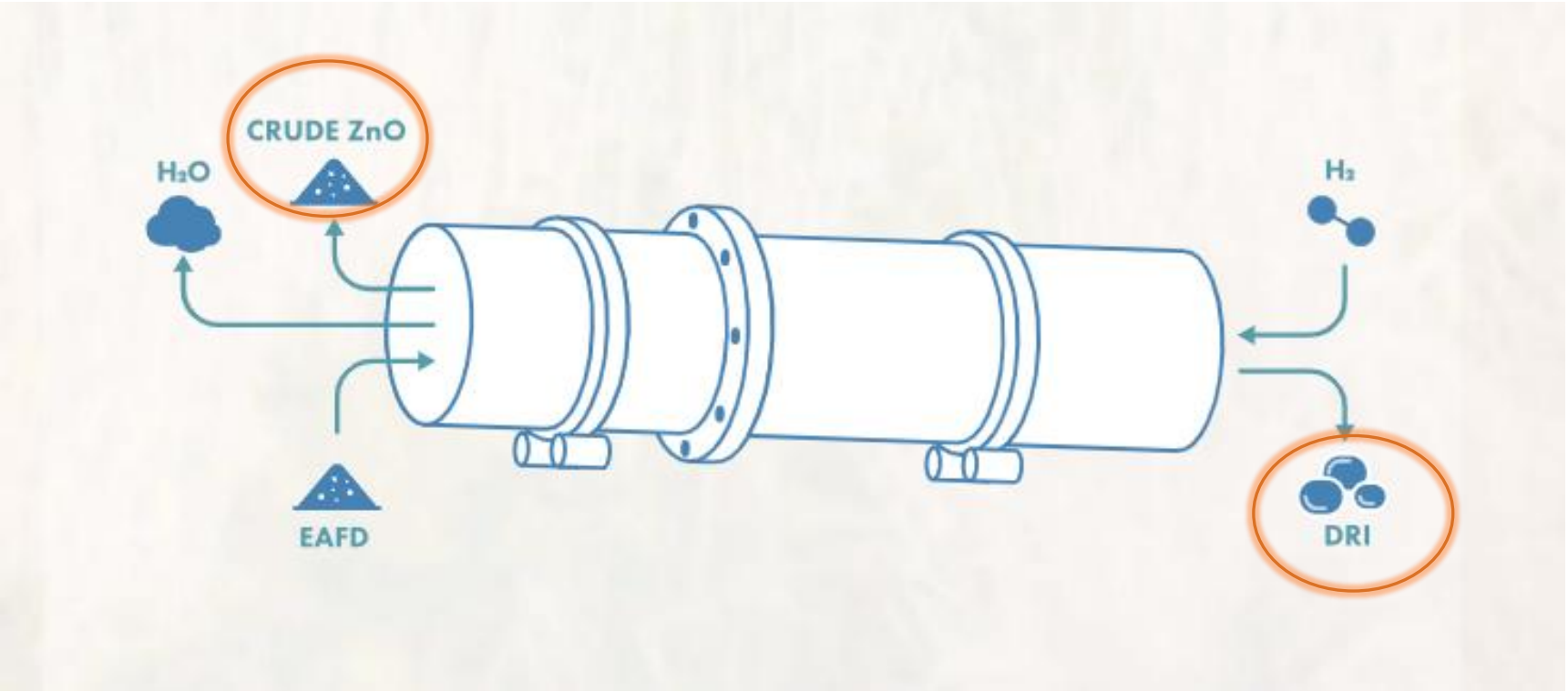
Overall process + Goals



Sustainability
Low carbon footprint

Key Products:
Crude ZnO
DRI

Efficiency
Maximize H_2 efficiency

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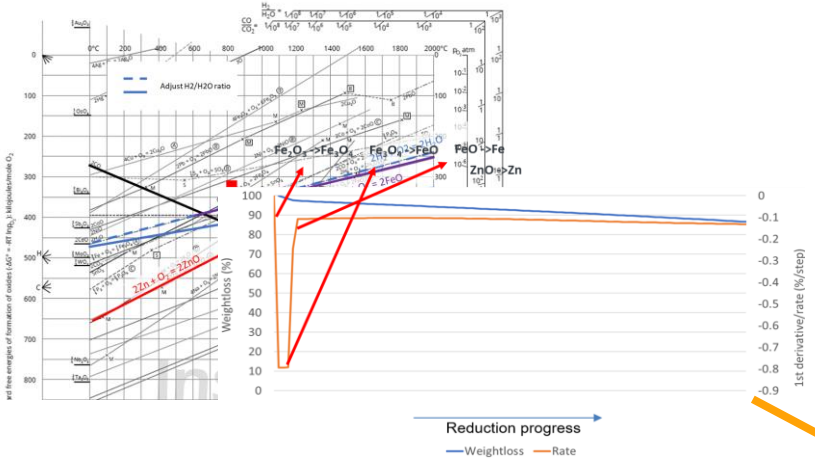
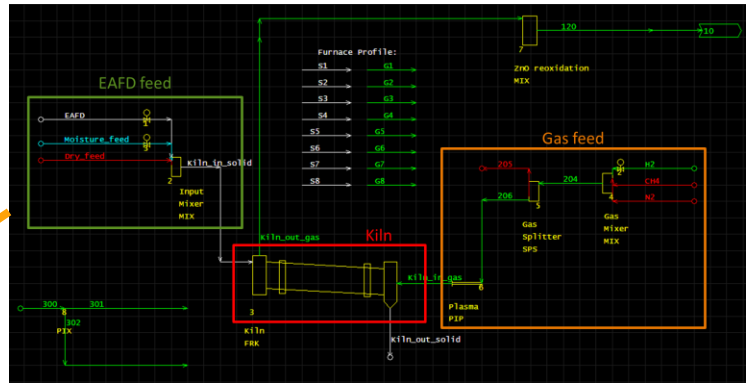
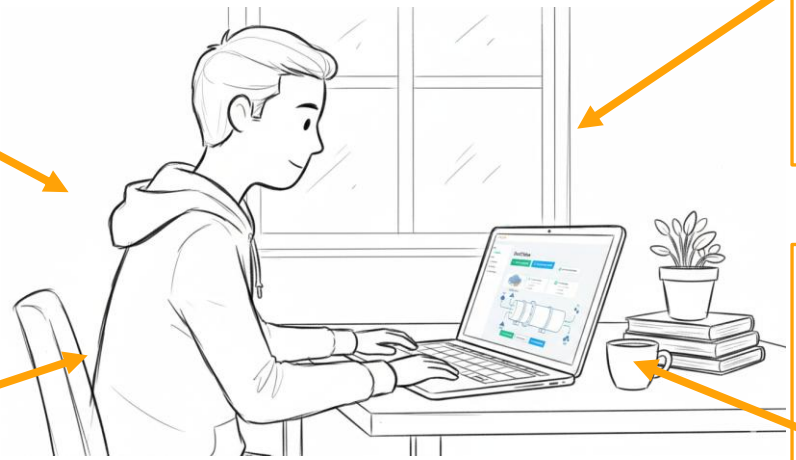
Digital Twin

Thermodynamics

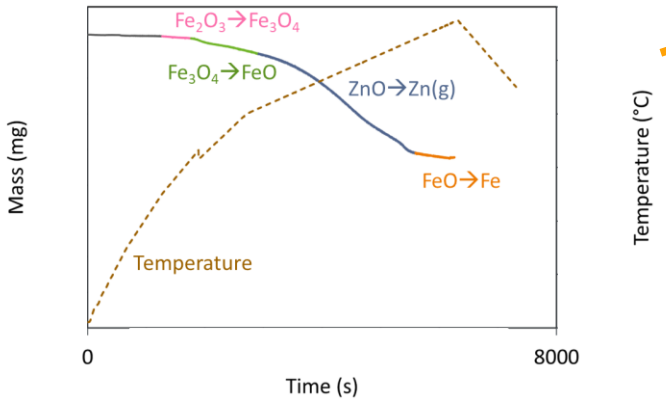


Mass and energy balance

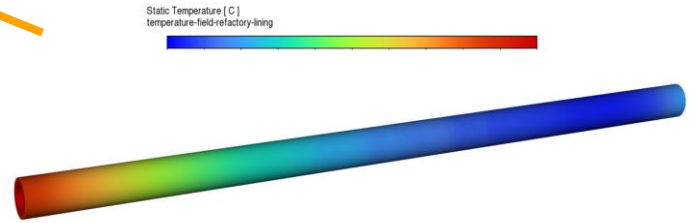




Experiments



CFD analysis



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Process Integration

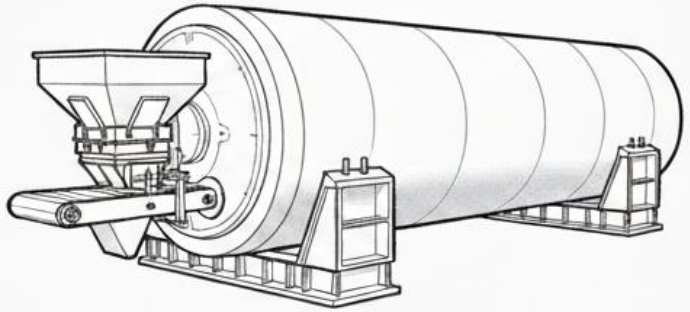
Data input of production data

Digital twin

Real time data analysis:

- Expected yields based on input data
- Expected H2 efficiency
- Temperature profile of kiln

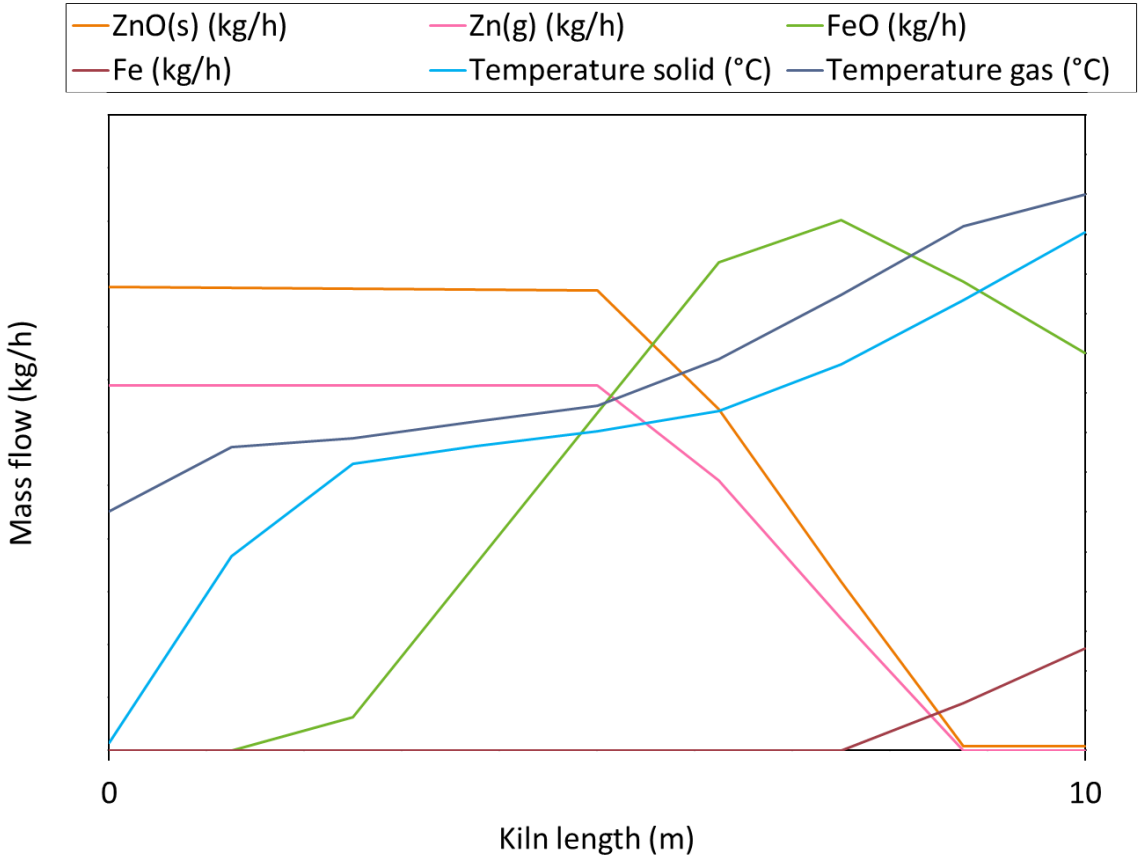
Pilot plant



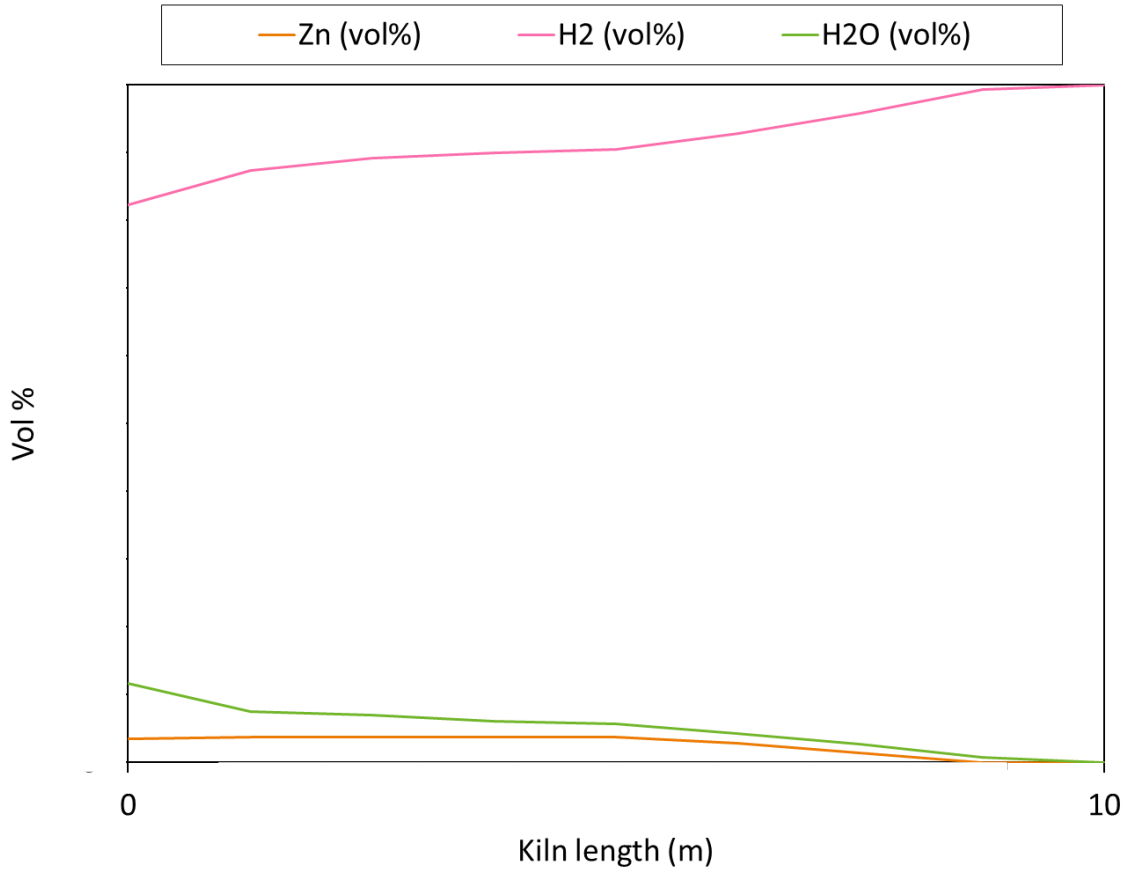
Feedback used to improve production

Preliminary Results

Mass and temperature profile



Gas profile



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Preliminary Results

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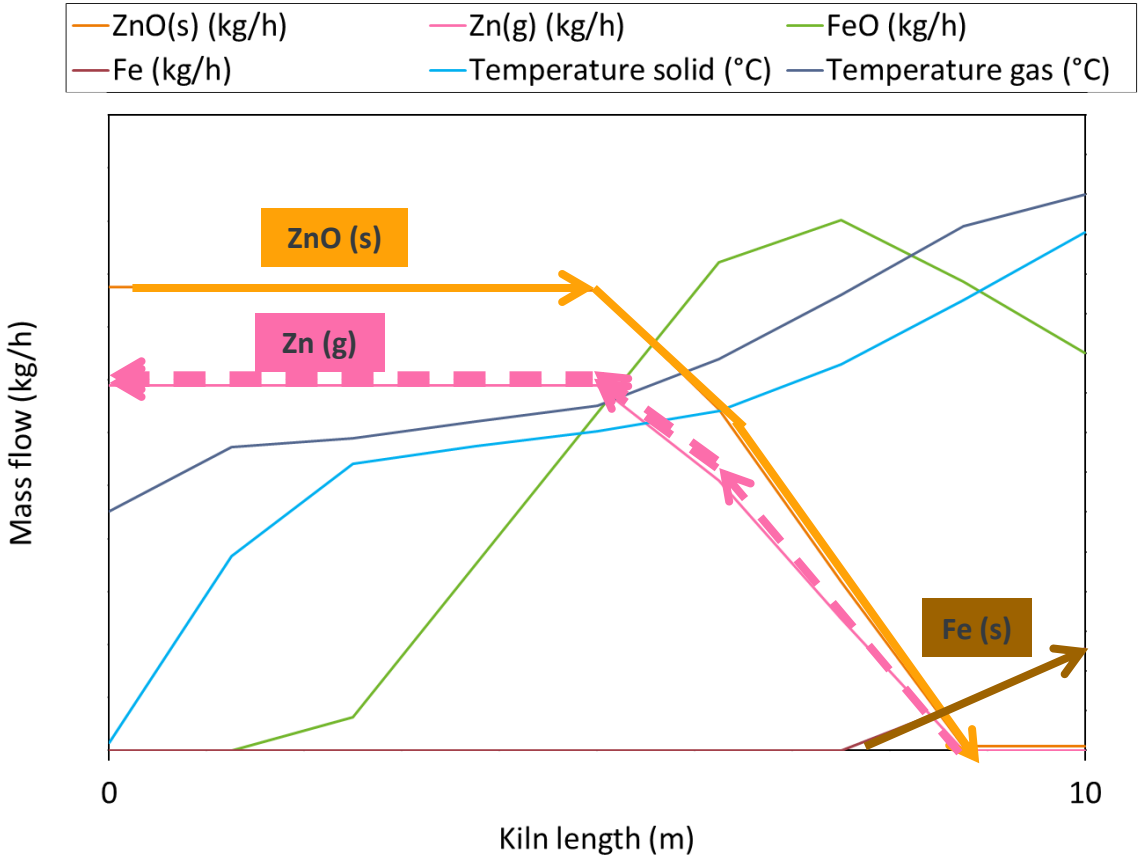

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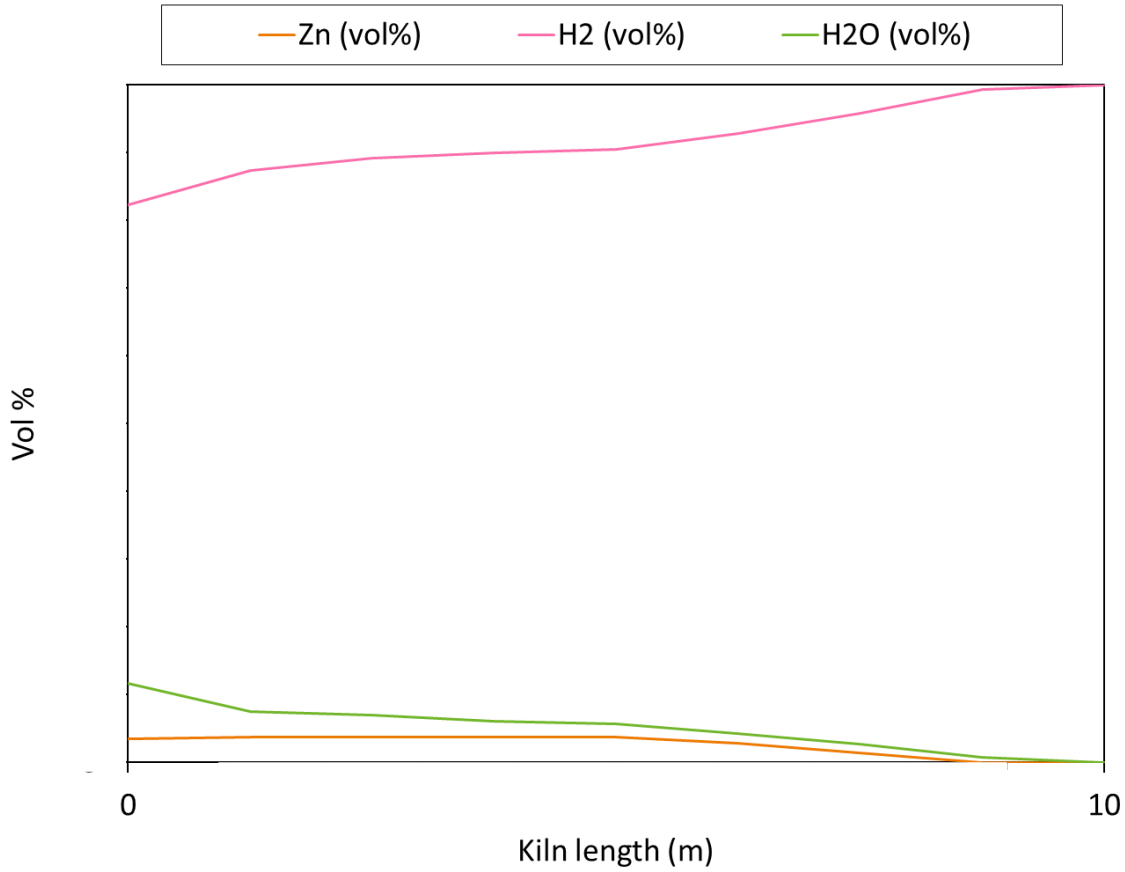

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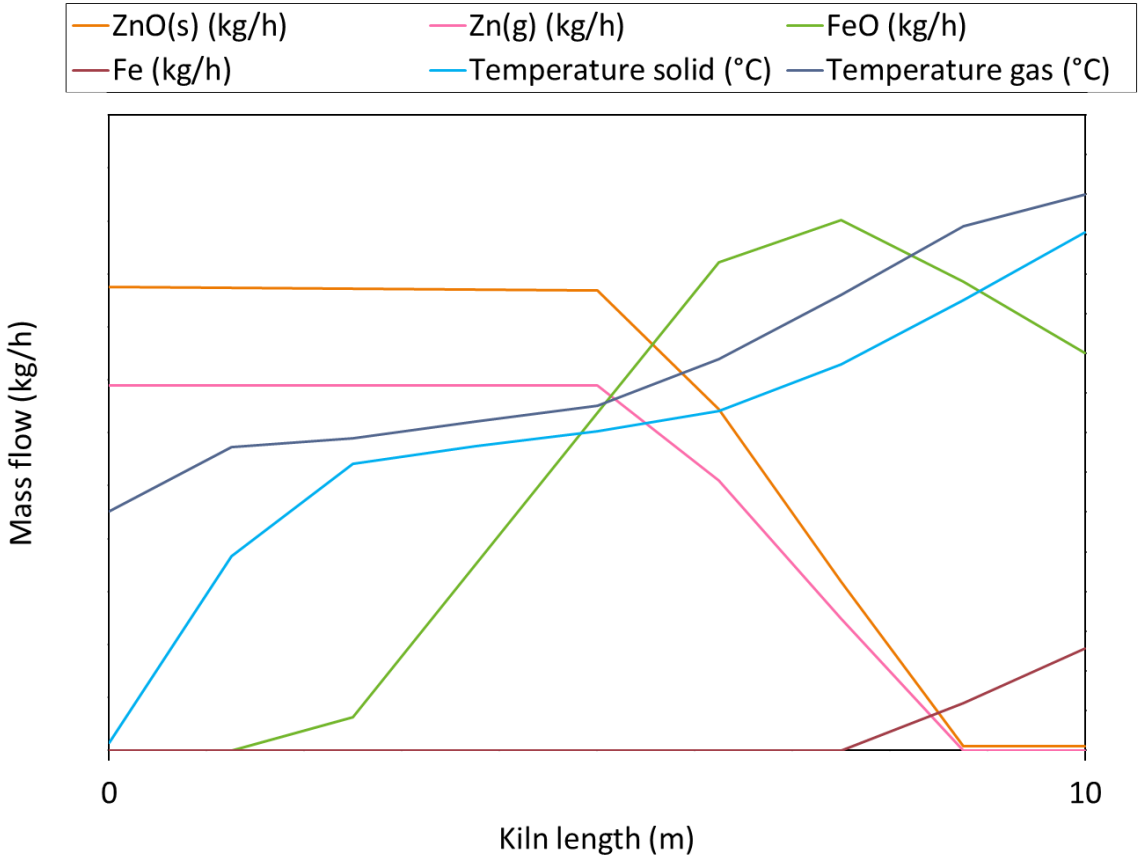

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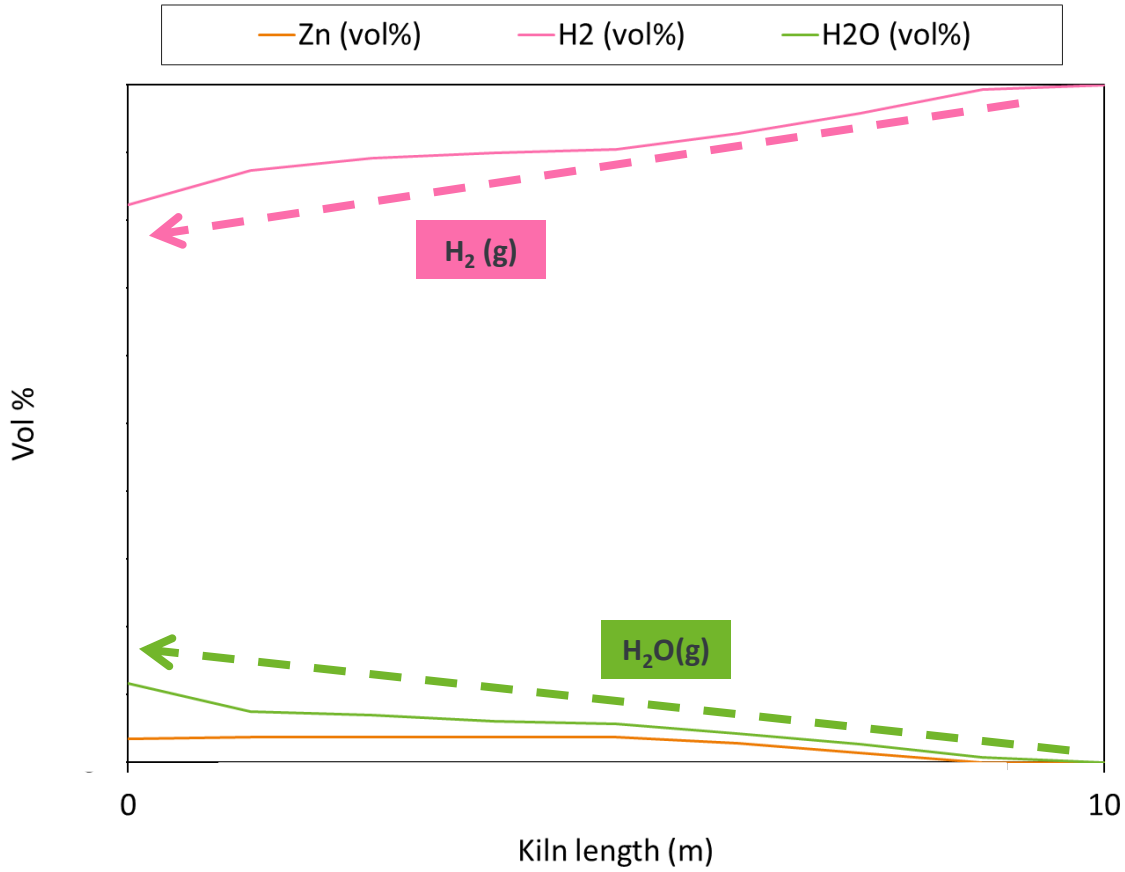

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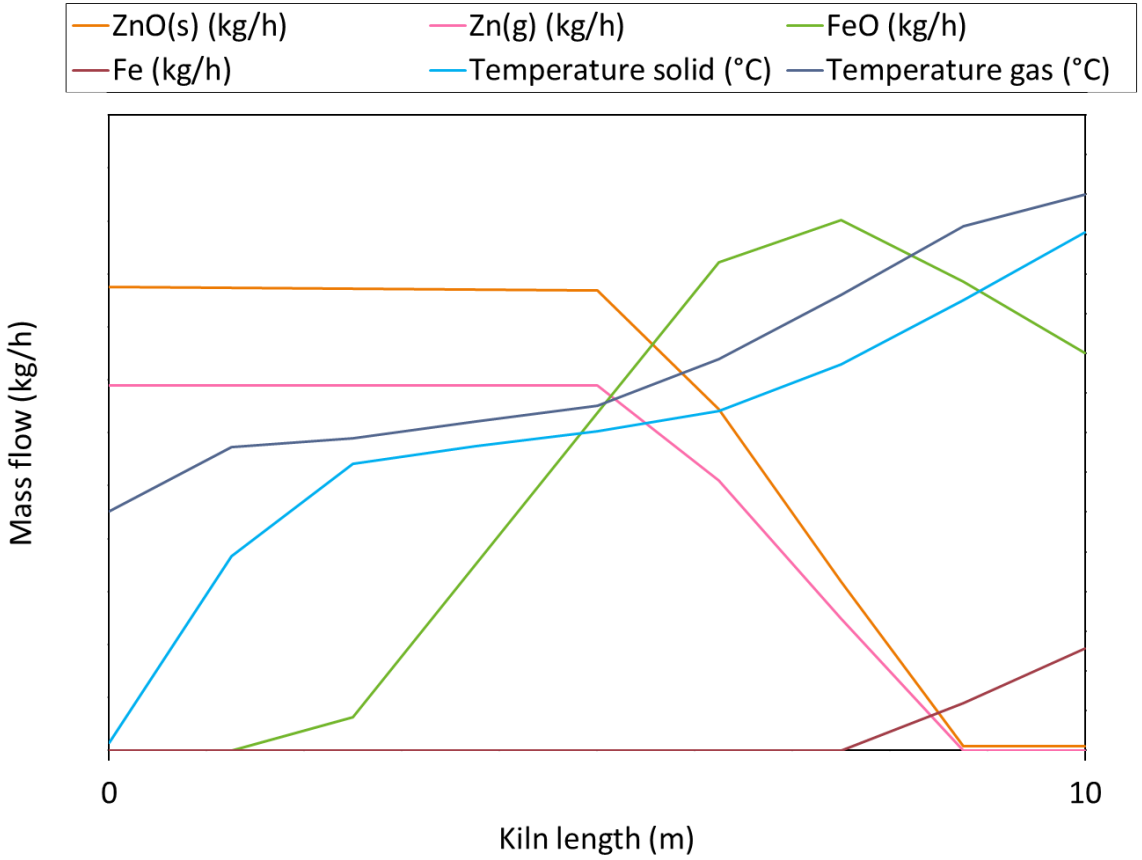

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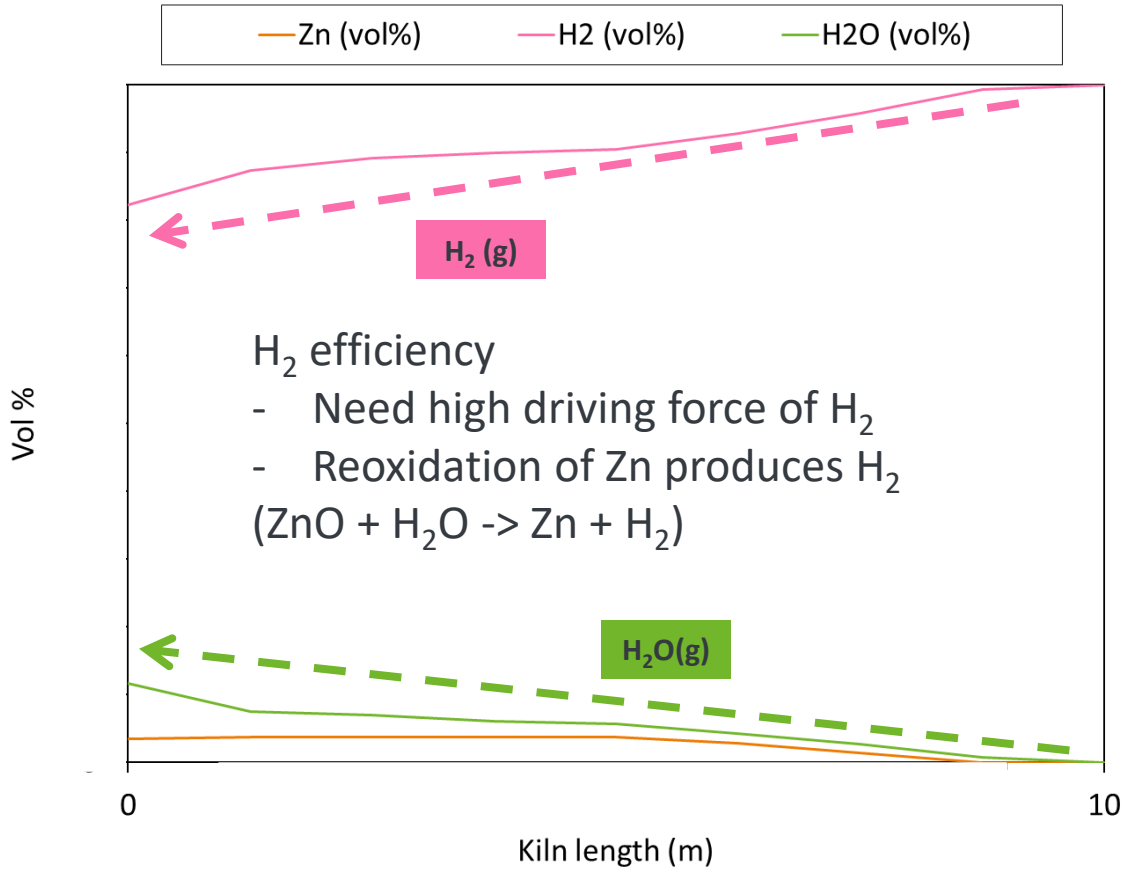

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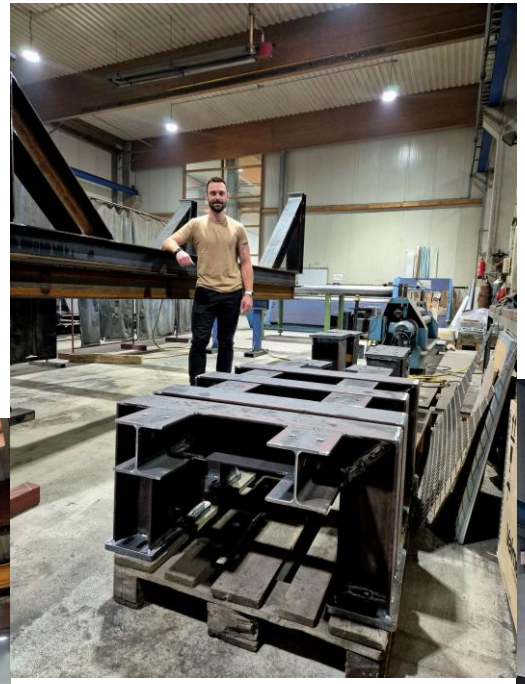
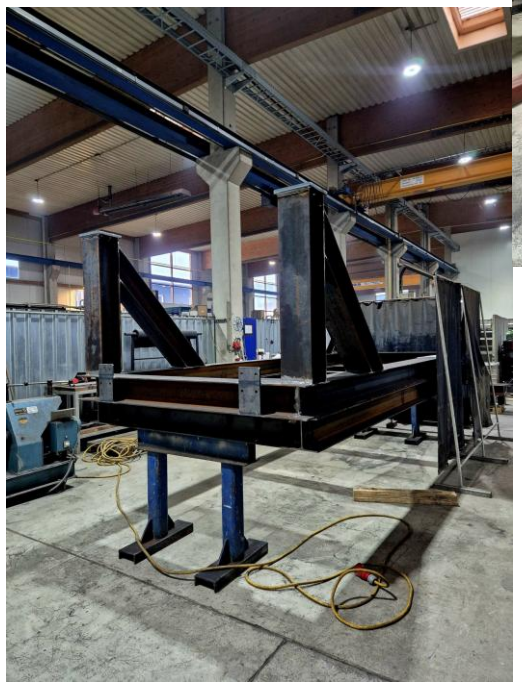
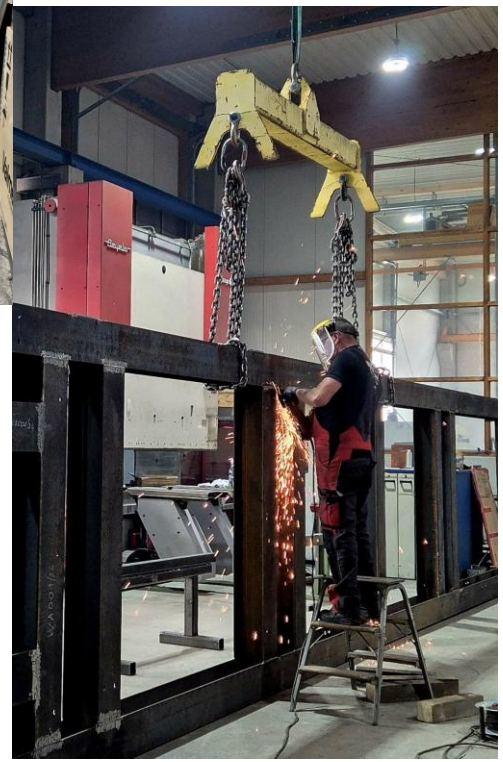
Project Current Status

- Pilot plant is under construction
- Digital twin under development







Thank you for your attention

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