RIETI
Research Institute of Economy, Trade & Industry, IAA

RIETI BBL Seminar Handout

"European Green Recovery Strategy and Industry Perspectives"

February 10, 2021

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https://www.rieti.go.jp/jp/index.html

European Green Recovery Strategy and Industry Perspectives

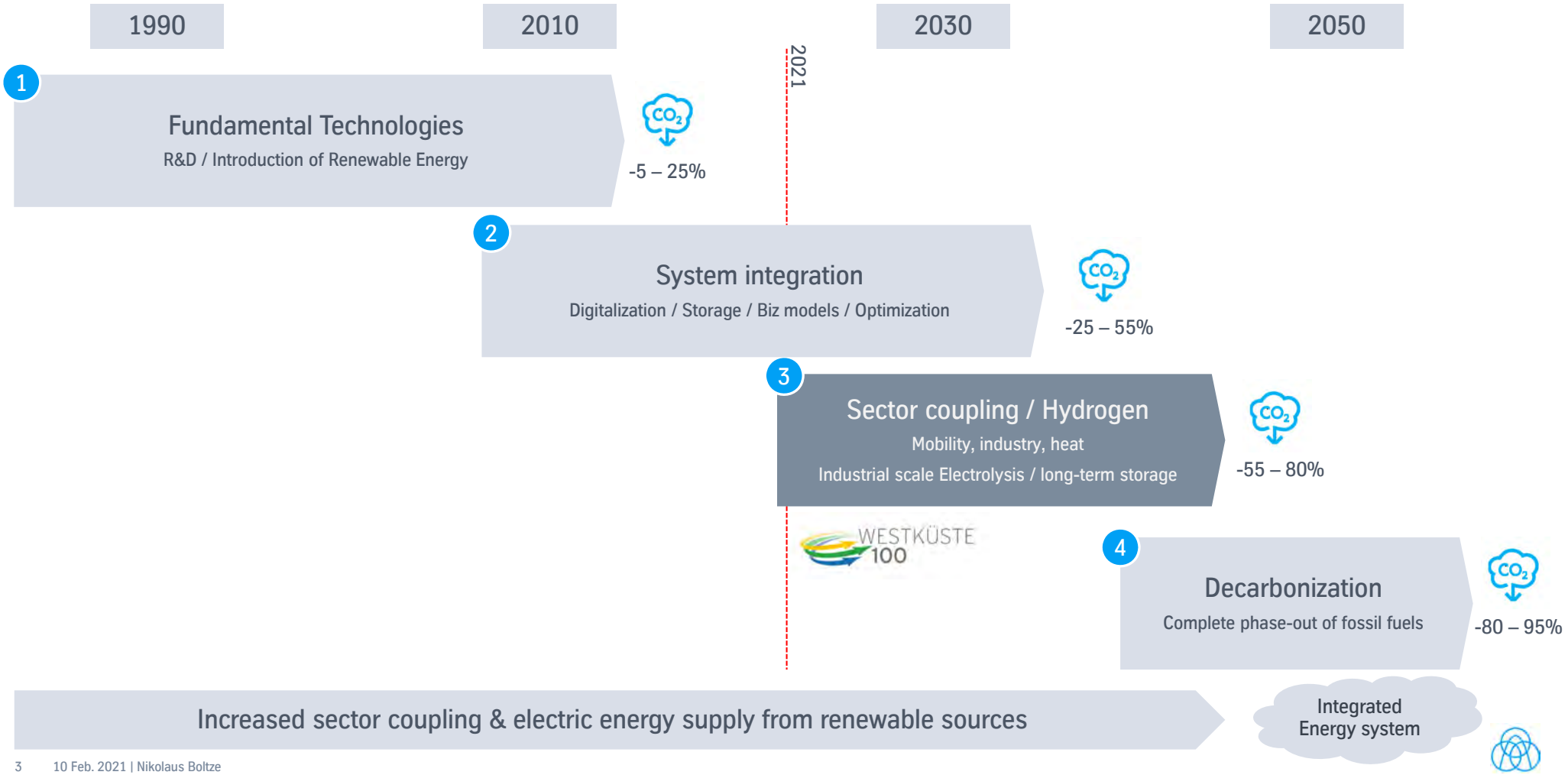
10.02.2021 | Nikolaus Boltze

thyssenkrupp Japan K.K.
ティッセンクルップグループ

Agenda

1. Status / Roadmap
2. Introduction: thyssenkrupp
3. thyssenkrupp samples: Cement / Steel
4. Project Study – “Westkueste 100”
5. Conclusion

Roadmap in Europe/Germany: Transformation of the Energy System



thyssenkrupp is an international group of companies made up of independent industrial and technology businesses

Fiscal year 2019/20(continuing operations[1])

104,000
Employees

€29.0 billion
Sales

60
Countries

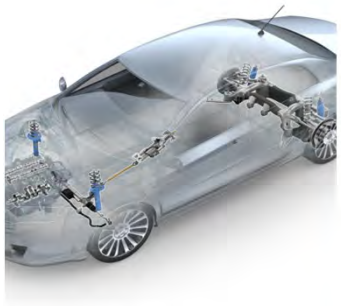
149
Nationalities

1. Unless otherwise stated, all key figures refer to the continuing operations, i.e. without the elevator business and individual units from Corporate Headquarters accounted for as discontinued operations.

Overview of our businesses

Automotive Technology

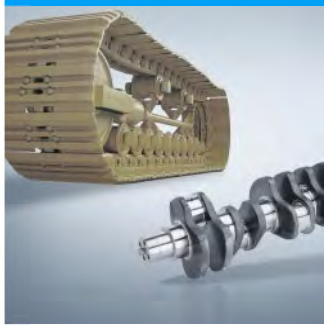
Automotive Components



System Engineering

Industrial Components

Forged Technologies



Bearings

→ Windenergy

Plant Technology

Chemical & Process Technologies

Mining Technologies

Cement Technologies

Marine Systems

Submarines

Surface Vessels

Naval Electronic Systems

Materials Services

Raw Materials & Trading

Production

Distribution

Supply Chain Services

Steel Europe

Production & Service

#grey2green

www.greencementplant.com

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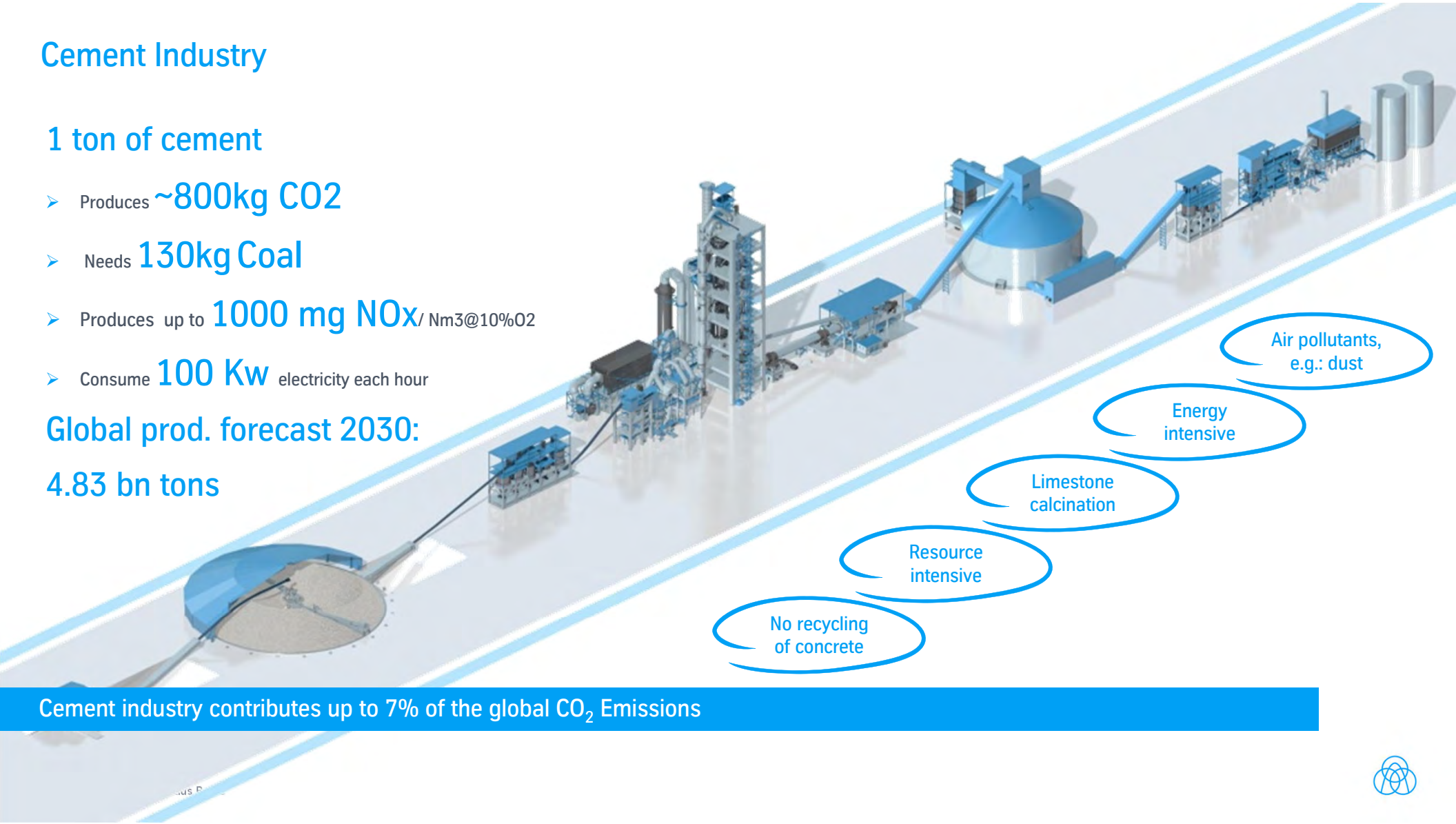
Cement Industry

1 ton of cement

- Produces ~800kg CO2
- Needs 130kg Coal
- Produces up to 1000 mg NOx/ Nm3@10%O2
- Consume 100 Kw electricity each hour

Global prod. forecast 2030:

4.83 bn tons



Cement industry contributes up to 7% of the global CO_2 Emissions

Solutions to reduce carbon footprint and greenhouse gases

Solution to capture and neutralize CO2

$H_2O \rightarrow H_2 + O_2$

polysius® pure oxyfuel

prepol® Step Combuster

Solution use wastes as fuels in stead of coal

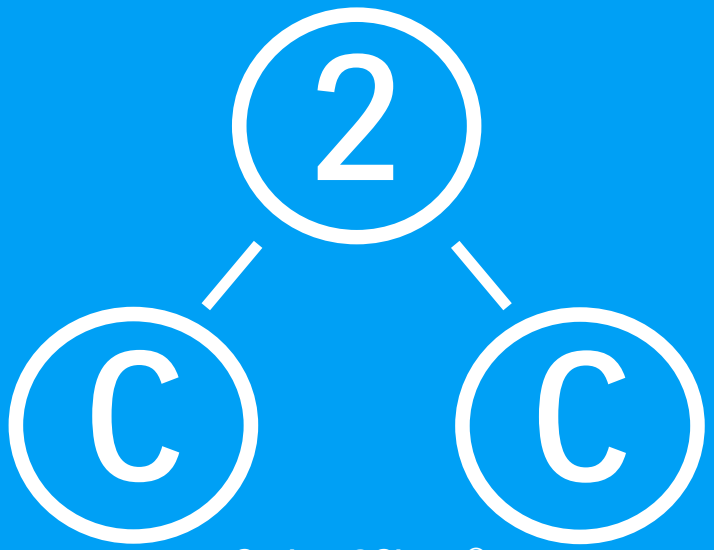
polysius® activated clay

Reduce CO2 emission up to 40% by reduce clinker factor

Proven technology by projects implemented worldwide

Steel Production

tkH2Steel



Carbon2Chem®

engineering.tomorrow.together.

thyssenkrupp

Clear strategy: hydrogen for climate-neutral steel

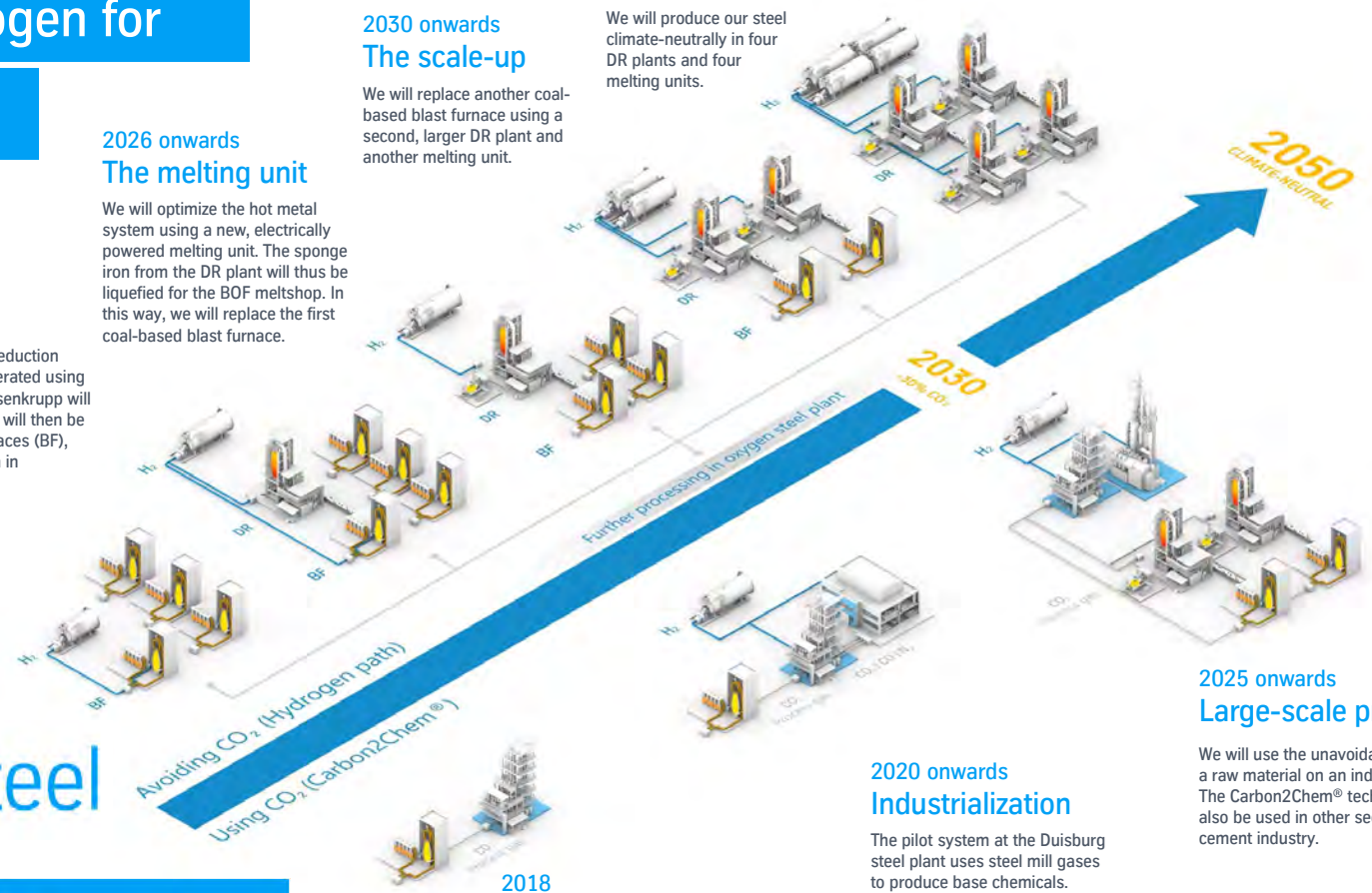
2019 – 2022
H2 in the blast furnace
We have been testing the use of hydrogen in a working blast furnace since 2019. The goal: The equipping of blast furnace 9.

2024 onwards
The milestone
Using a large-scale direct reduction plant (DR) which will be operated using green H_2 in the future, thyssenkrupp will produce sponge iron which will then be processed in the blast furnaces (BF), allowing a further reduction in emissions.

2026 onwards
The melting unit
We will optimize the hot metal system using a new, electrically powered melting unit. The sponge iron from the DR plant will thus be liquefied for the BOF meltshop. In this way, we will replace the first coal-based blast furnace.

2030 onwards
The scale-up
We will replace another coal-based blast furnace using a second, larger DR plant and another melting unit.

2050 onwards
Climate-neutrality
We will produce our steel climate-neutrally in four DR plants and four melting units.



1 tkH2Steel

2 Carbon2Chem®

2018
The world first
The concept: CO_2 becomes a raw material. In September 2018, thyssenkrupp produced methanol from steel mill gases for the first time at its Carbon2Chem® technical center in Duisburg.

2020 onwards
Industrialization
The pilot system at the Duisburg steel plant uses steel mill gases to produce base chemicals.

2025 onwards
Large-scale production
We will use the unavoidable CO_2 as a raw material on an industrial scale. The Carbon2Chem® technology can also be used in other sectors, like the cement industry.

Westkueste 100

Real-world laboratory with 10 partners

WESTKÜSTE 100

https://www.westkueste100.de/en/

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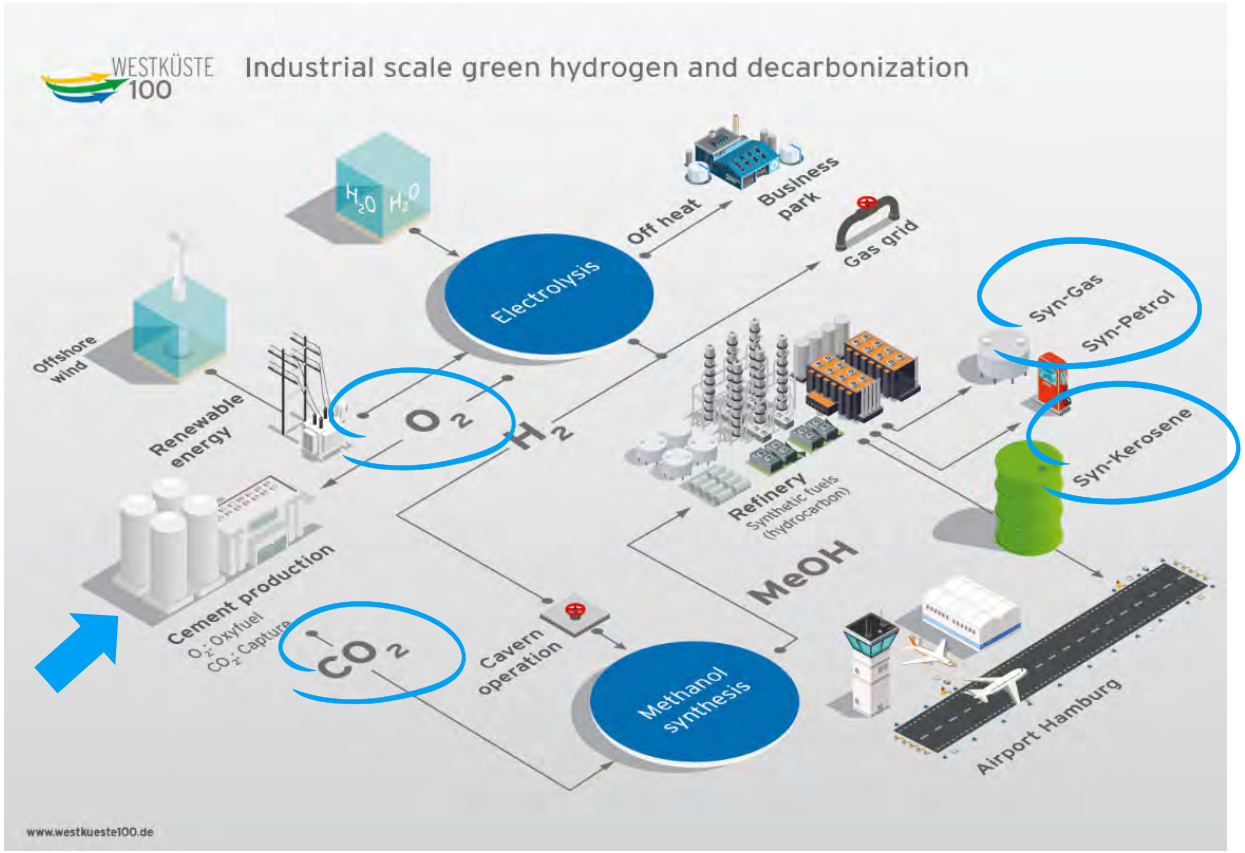
Complete sector coupling: Green hydrogen and de-carbonisation on an industrial scale



Future sustainable industrial park in Germany with the focus on:

- Green Hydrogen
- Green Cement
- Synthetic gas & petrol
- Synthetic Kerosene

CO_2 from Cement production is being used for the Methanol Synthesis

The Oxygen for Oxyfuel is being derived from an electrolysis plant

Location: Heide, Germany

Funding: Federal Ministry for Economic Affairs and Energy

Synthetic Kerosene & petrol are a breakthrough for the de-carbonization of the transport industry (aviation and cars)

Conclusion

Funding and framework are decisive for the transformation's success

- In general, we (industry) appreciate the stimulus program, hydrogen strategy, steel action plan and the EU's Green Deal
- The transformation needs adequate support and competitiveness has to be preserved
- Decisive: investments, operating costs, regulation and establishing green markets
- Production conditions must not deteriorate
- To be solved short-term:
  - EEG (Renewable Energy Act in Germany) exemption for electrolysers
  - Inclusion of hydrogen as an energy carrier in Energy Industry Act (EnWG)
  - Contracts for differences; funding (e.g. IPCEI Important Project of Common European Interest)

Production conditions in Germany and Europe must not deteriorate

- The conditions for **full compensation of the electricity price increases caused by emissions trading** must be created as quickly as possible.
- **Exemptions (EEG/KWKG) for electricity** from steel plants must be maintained. The increased external electricity purchased as a result of the climate strategy must be treated like in-house electricity.
- A **“Carbon Border Adjustment” (CBA)** should be considered as part of a broad package of measures; however, electricity price compensation and free allocation of allowances should not be dropped.
- The **funds generated from a CBA should be used to support the transformation** and in particular to develop the urgently needed gas and electricity infrastructure.

Markets must be created for the sale of climate-neutral steel

- There are **not yet any incentives for customers to pay a higher price for climate-neutral steel**.
  Consequently the transformation is not yet economically viable for steel producers.
- Therefore in the short term the possibility of **crediting climate-neutral steel against the emission targets of customer industries** (e.g. the automotive industry) and in the medium to long term **standards and quotas** for “green steel” should be considered.
- Moreover we support the introduction of **“Contracts for Difference”**.
- In **public-sector procurement,** requirements for the use of climate-neutral steel could be introduced.

Thank You

For Your Attention

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