

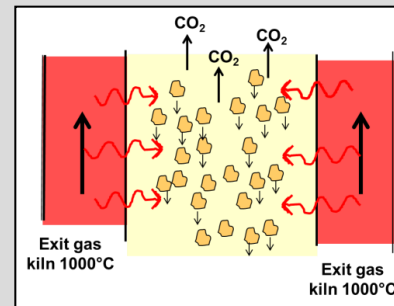
# LEILAC: a third generation technology for CC

海德堡水泥集团 为巴黎气候大会提出的气温水平升高控制在2°C以内的目标做出贡献

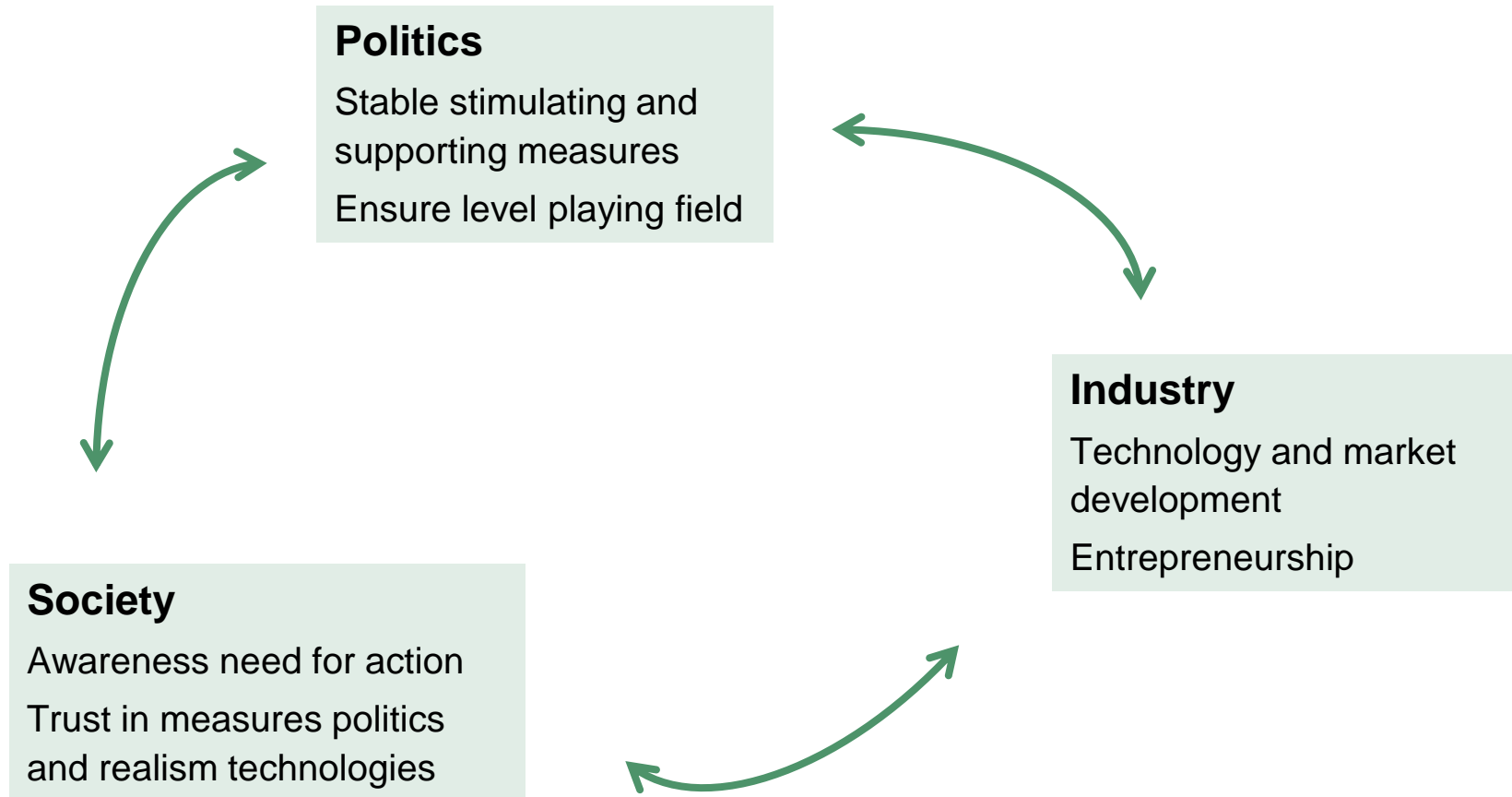
Jan Theulen

Director Alternative Resources GES

Brussels, 17<sup>th</sup> October 2018



# Abating climate change requires close collaboration



# Politics: Paris COP21 has put climate change back on the international agenda...



## What does the society say?



## How do we react ?

This is Norcem

It produces cement for building energy efficient cities in Norway. It also produces CO<sub>2</sub>, warming our world

Norcem will capture and store 800 thousand tonnes of CO<sub>2</sub> every year

Deeply Decarbonise Society to reach 1.5°C



# How does Society react ?

## The Role of Gas in the Energy Transition

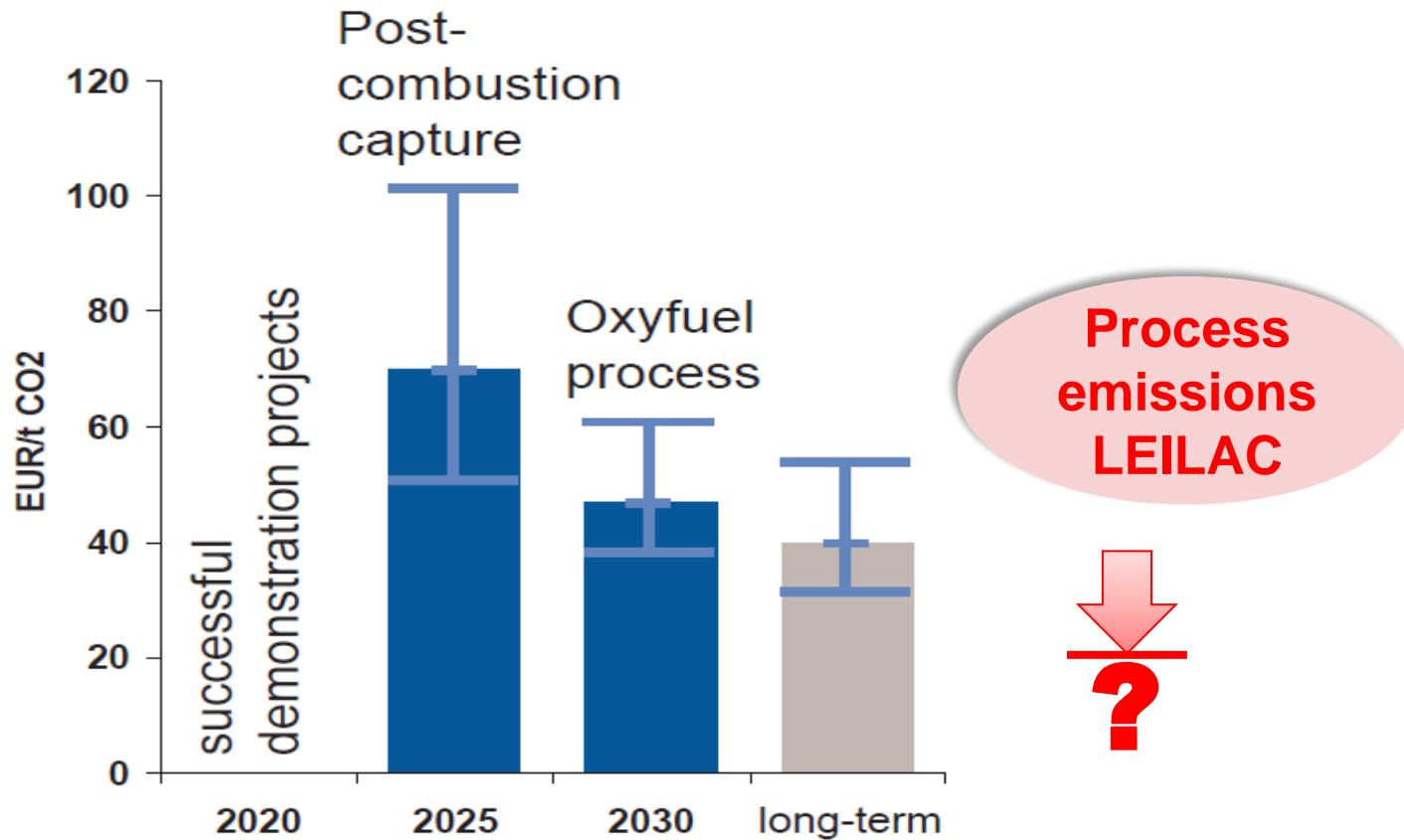
First thoughts on „acceptable CO<sub>2</sub> sources“



- Separation from industrial processes (cement, steel production etc.)
  - – if CO<sub>2</sub> avoidance technologies have been maxed out
  - – if industrial process okay with other Greenpeace targets

This will not cover the industrial process emissions, like for the cement and steel industry, and while **Germanwatch** favours research and development of new processes, they understand that there is a need to use CCS to achieve emission reductions compatible with a below-2° path.

# Carbon Capture: playing chess on multiple tables



# LEILAC: CO<sub>2</sub> separation@calcining (12 m€ EU-Horizon 2020)

## ■ Consortium



## ■ Indirect heating raw meal:

- Separate process CO<sub>2</sub>
- Calix MgO proven process

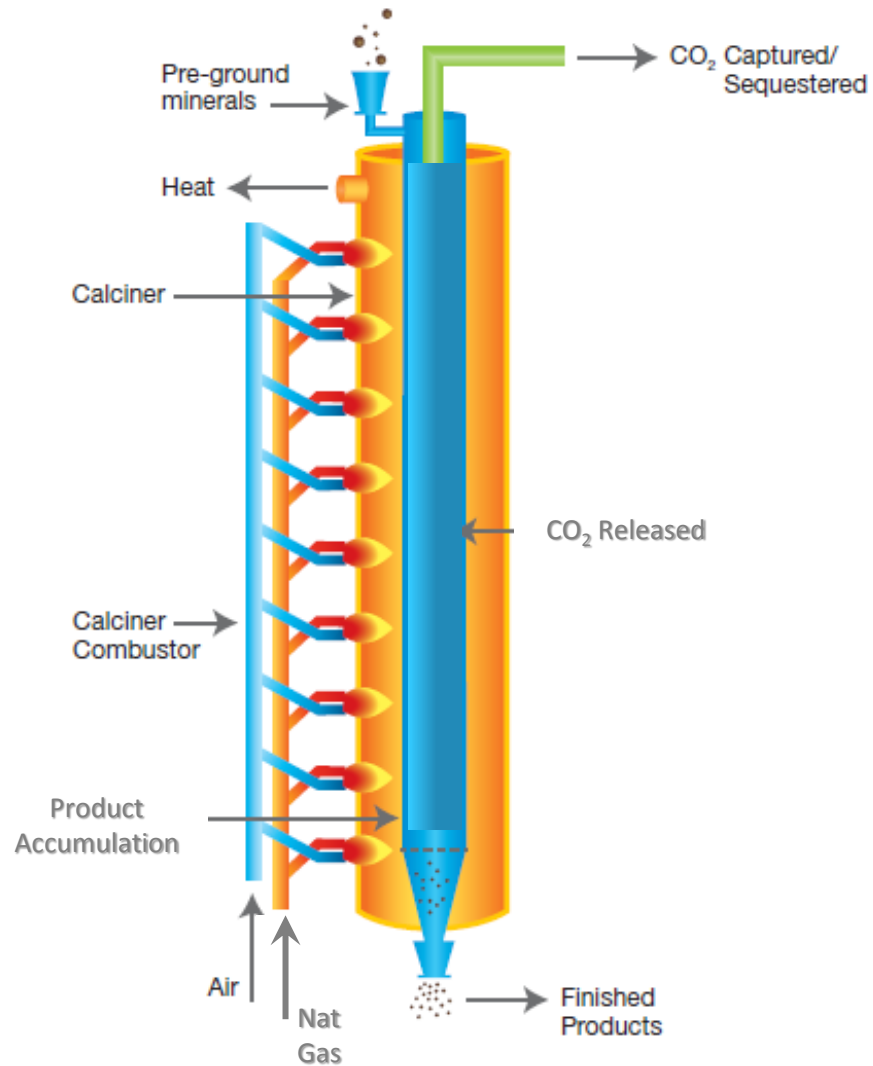
## ■ 10 tph demonstration plant, Lixhe-Belgium

- Cement & Lime applications
- [www.leilac.org.uk](http://www.leilac.org.uk)

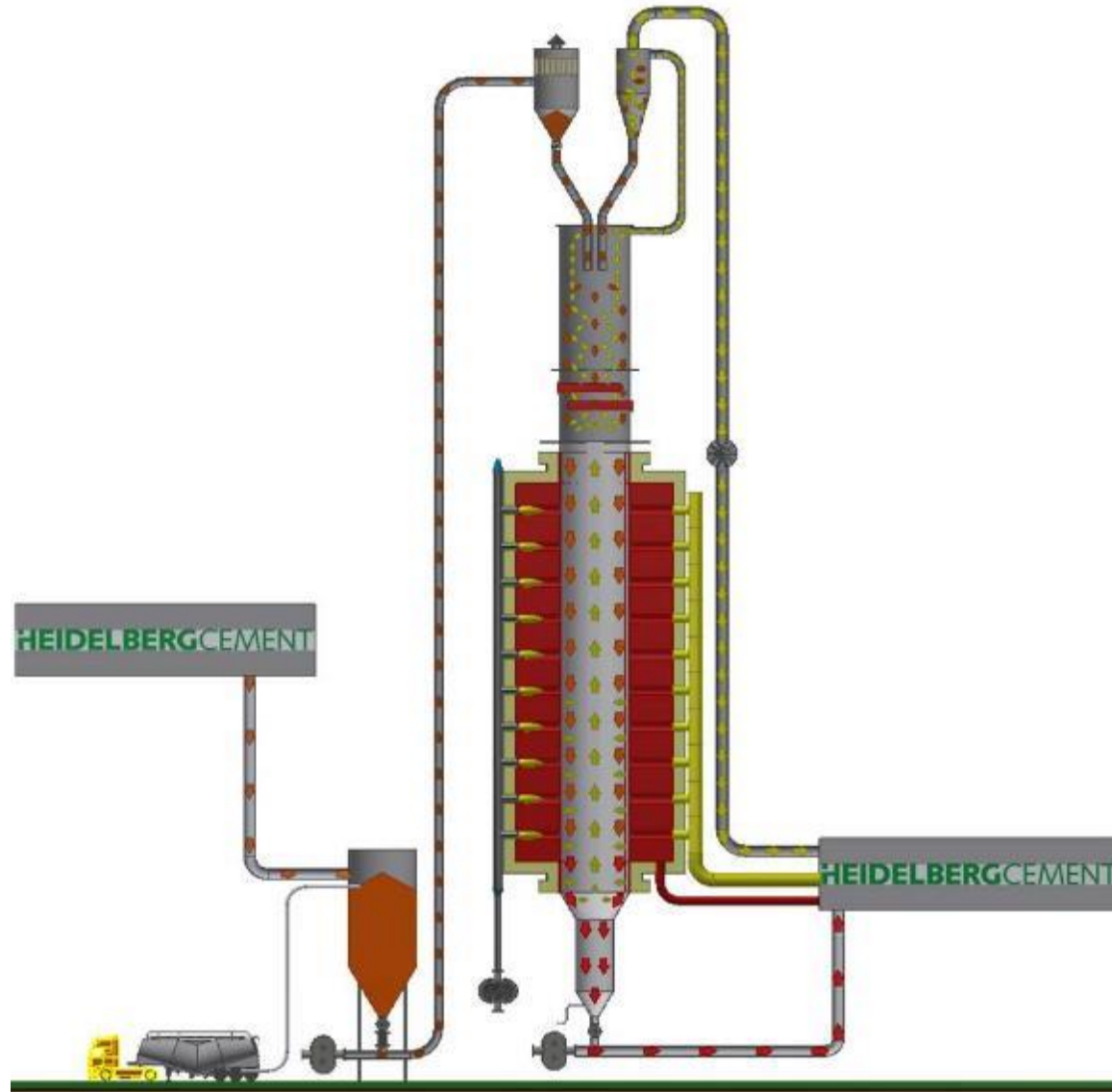




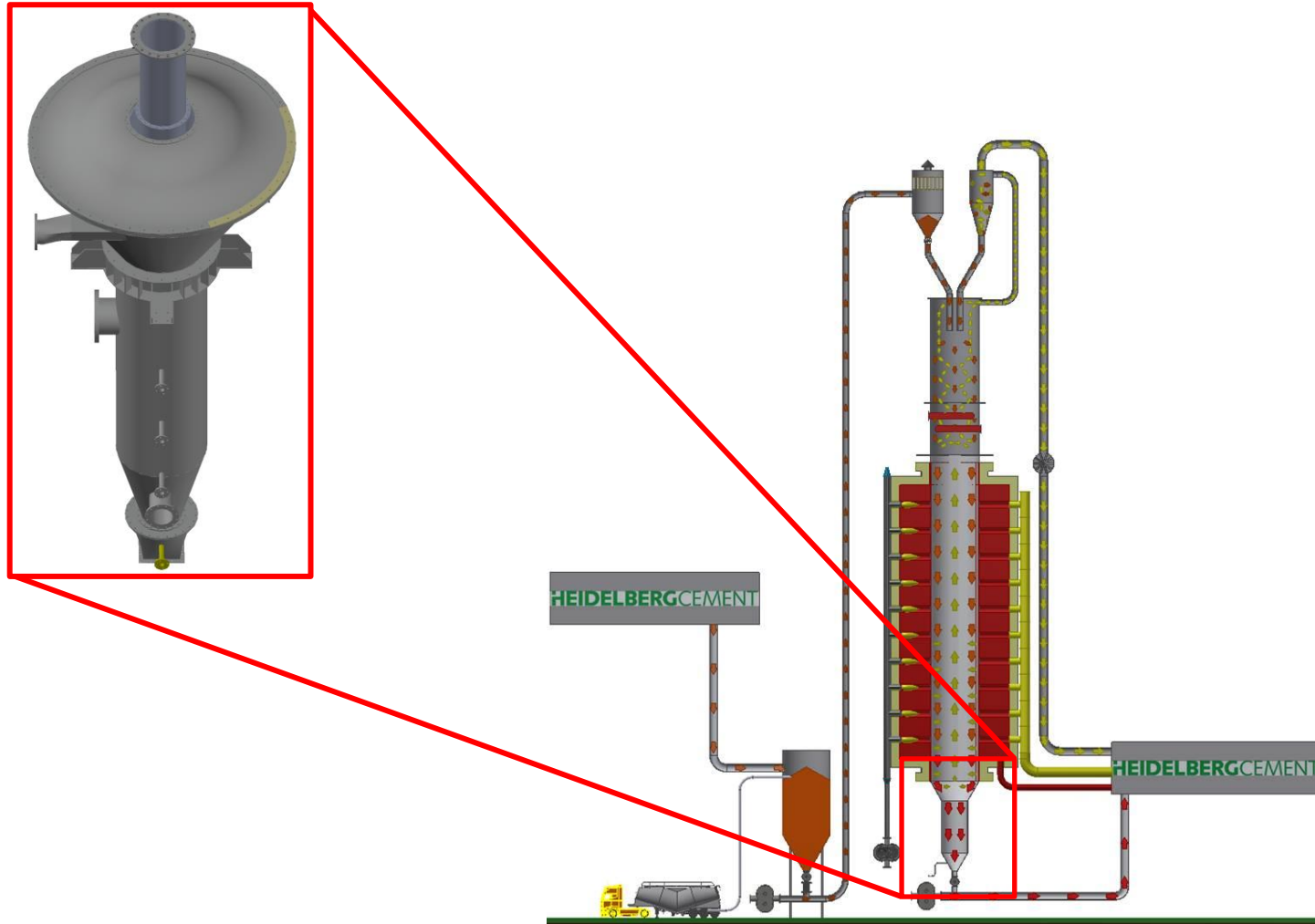
# Schematic drawing



# Principal design sketch

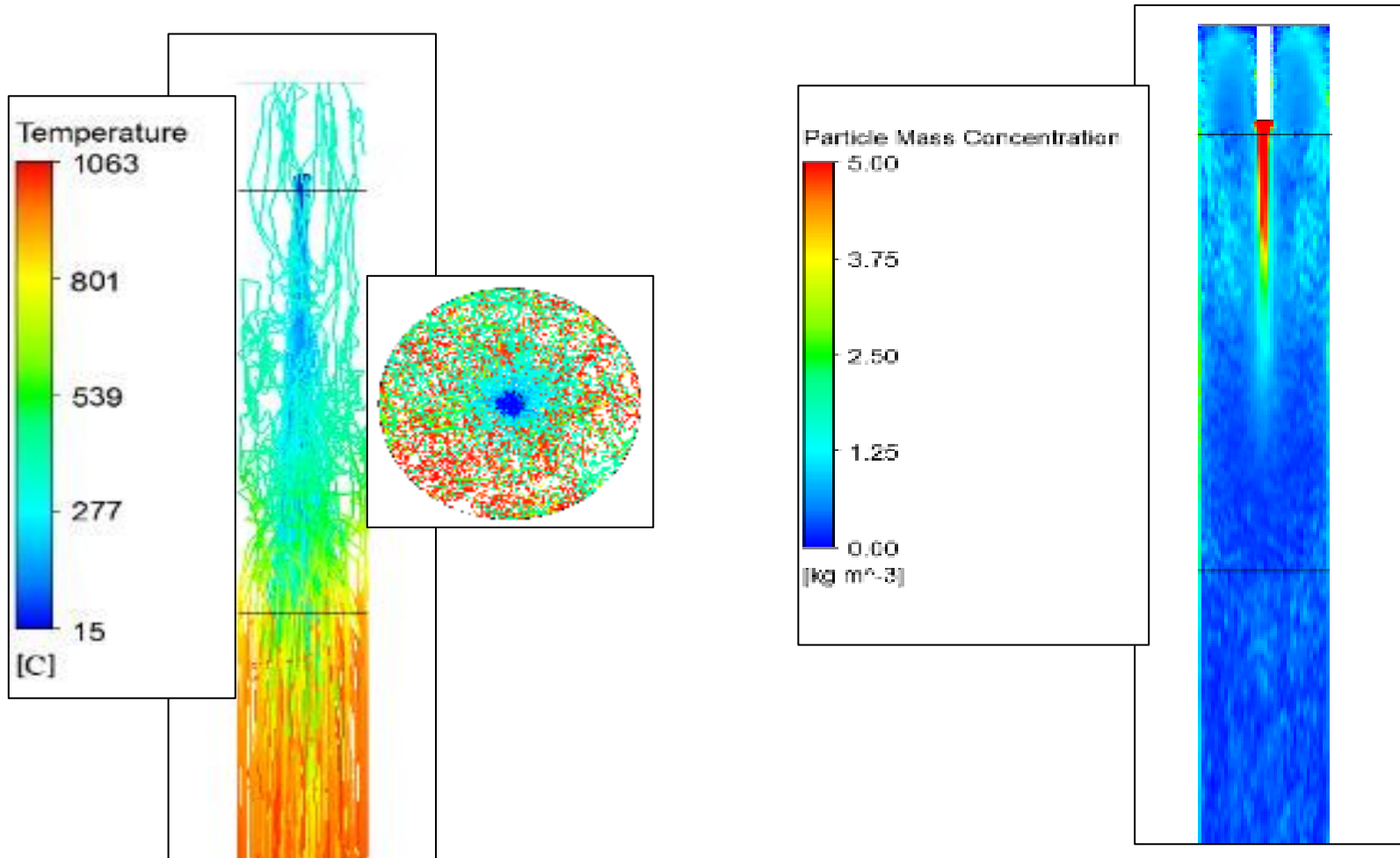


# Detailed design of 1 element (just as example)

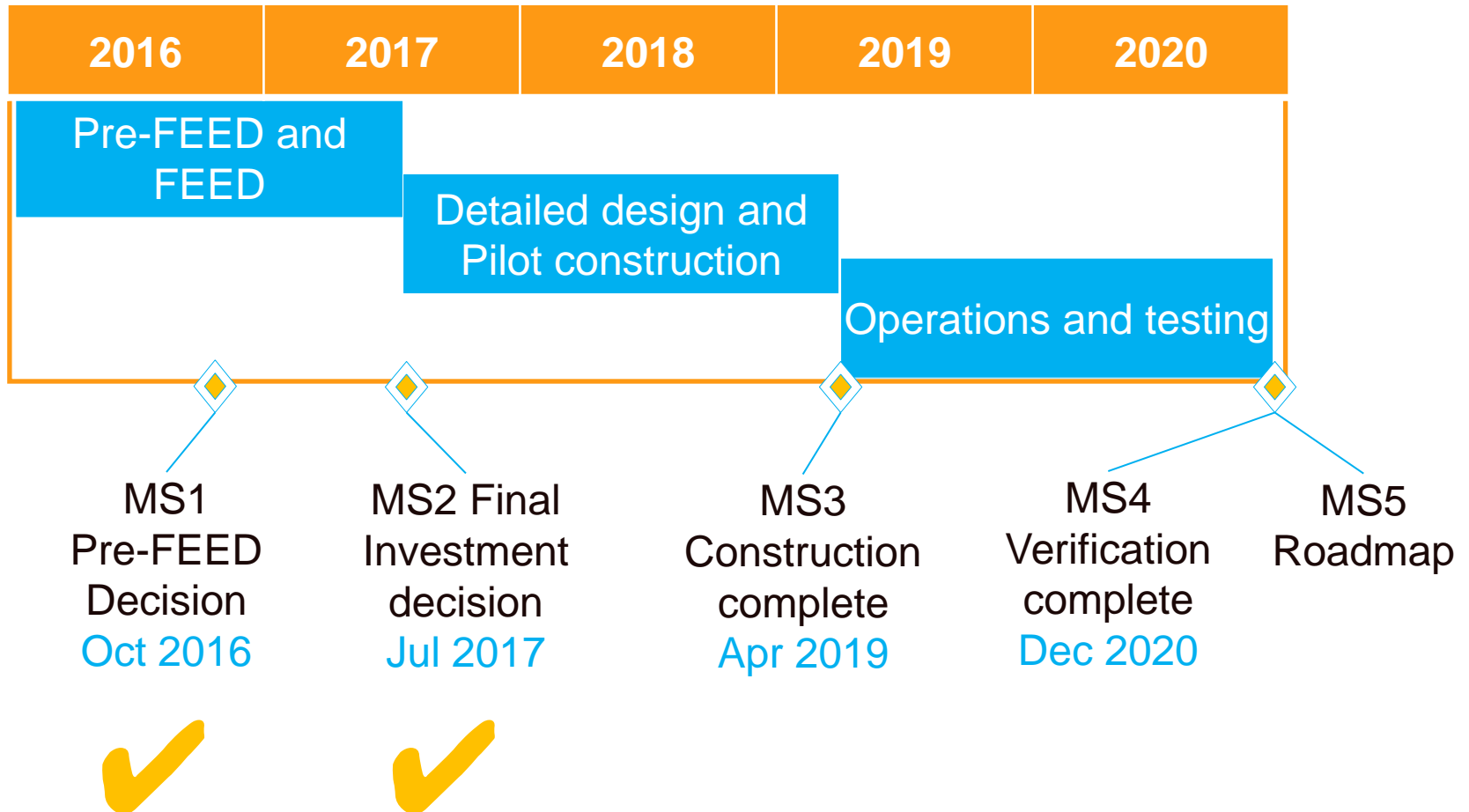


Design for EPC

# Lot of computer power used for the design



# Project on schedule and on budget



The pilot is currently on **budget** and **schedule**

# Ty-in to Lixhe plant + civil works finished



**Drier Tie-Ins (March 2018)**



**Piles ready for pouring (16 May 2018)**



**Slab completed (26 June 2018)**

# Steel structure sourced in Spain

Fabrication of LEILAC's supporting structure by Micesa in Madrid



# Fabrication of the DS\*-calciner in Belgium

\* Direct Separation = CO<sub>2</sub> is direct separated



Segments of the LEILAC pilot's furnace being fabricated by PERUWELD in Belgium





# Erection at Lixhe plant by Pirson Montage (Belgium)



The furnace for Project LEILAC is unloaded on site, allowing the final preparations to take place before being installed



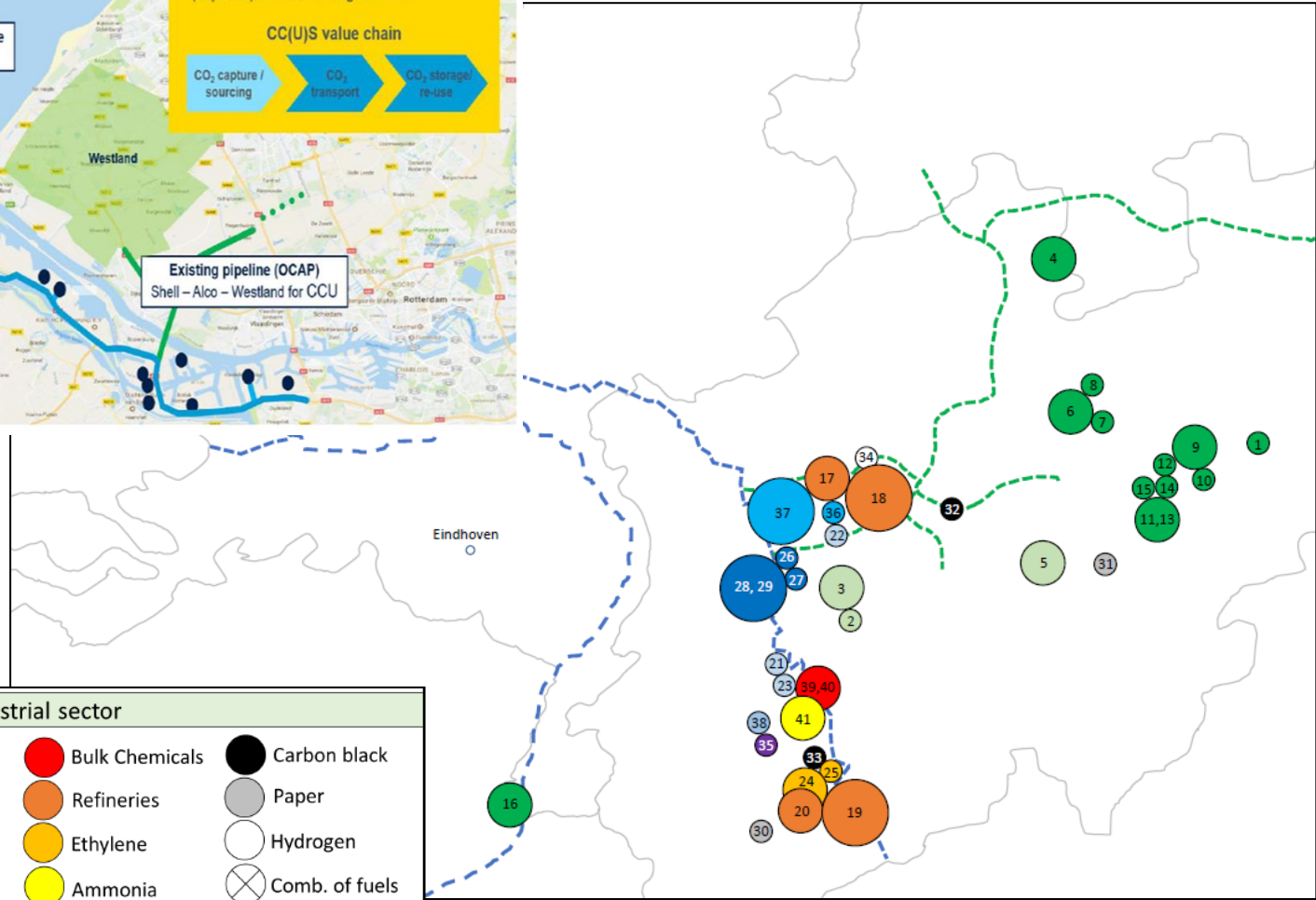
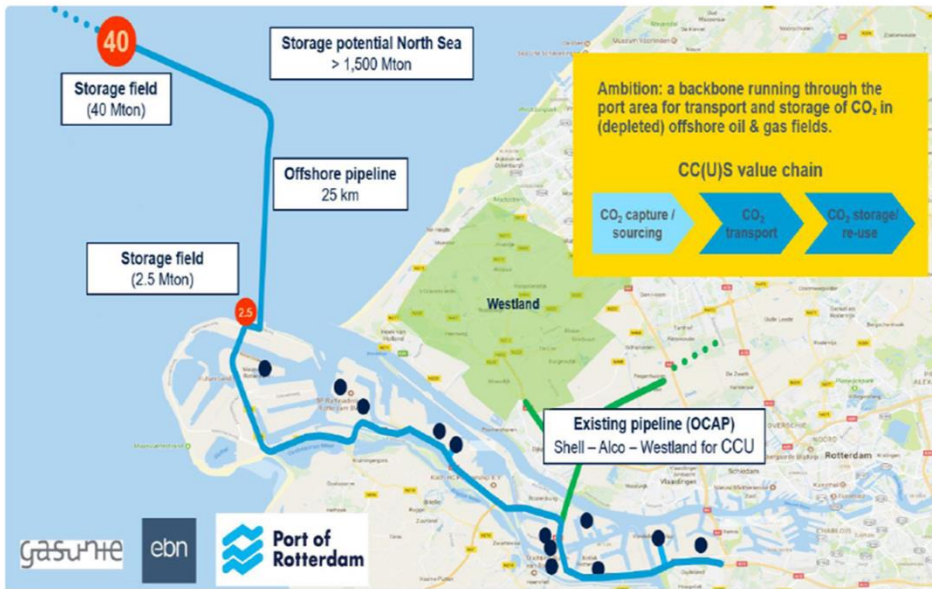
Close to reaching the top of the tower.....



**HEIDELBERGCEMENT**

# What to do with the CO<sub>2</sub> captured ?

# CCS in Netherlands = opportunity for NRW and Cement



Industrial sector			
<span style="color: green;">●</span> Cement	<span style="color: blue;">●</span> Steel	<span style="color: red;">●</span> Bulk Chemicals	<span style="color: black;">●</span> Carbon black
<span style="color: lightgreen;">●</span> Lime	<span style="color: lightblue;">●</span> Aluminum	<span style="color: orange;">●</span> Refineries	<span style="color: grey;">●</span> Paper
	<span style="color: cyan;">●</span> Coke	<span style="color: yellow;">●</span> Ethylene	<span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Hydrogen
		<span style="color: yellow;">●</span> Ammonia	<span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block; text-align: center; vertical-align: middle;">X</span> Comb. of fuels

# Why Germany?

STAHL- UND ZEMENTINDUSTRIE

## Umweltministerin will Klimaprojekte fördern

06. April 2018



Die Verarbeitung von Stahl ist besonders energieintensiv. Etwa hier im Stahlwerk Arcelor Mittal.  
Bild: imago

**Umweltministerin Svenja Schulze will Unternehmen bei der CO<sub>2</sub>-Reduktion unterstützen. Für die Entwicklung alternativer Technologien mit emissionsfreien Energien sollen bis zu 50 Prozent der Kosten übernommen werden.**

Die neue Umweltministerin Svenja Schulze hat ein neues Förderprogramm für CO<sub>2</sub>-mindernde Klimaschutzprojekte in energieintensiven Branchen wie der Stahl- und Zementindustrie

# Why Germany? The CCS-word is not forbidden anymore !

acatech – DEUTSCHE AKADEMIE DER TECHNIKWISSENSCHAFTEN

Stand: 10.08.2018, Dateiversion: POSITION-iCCUS-V27-Satz.docx

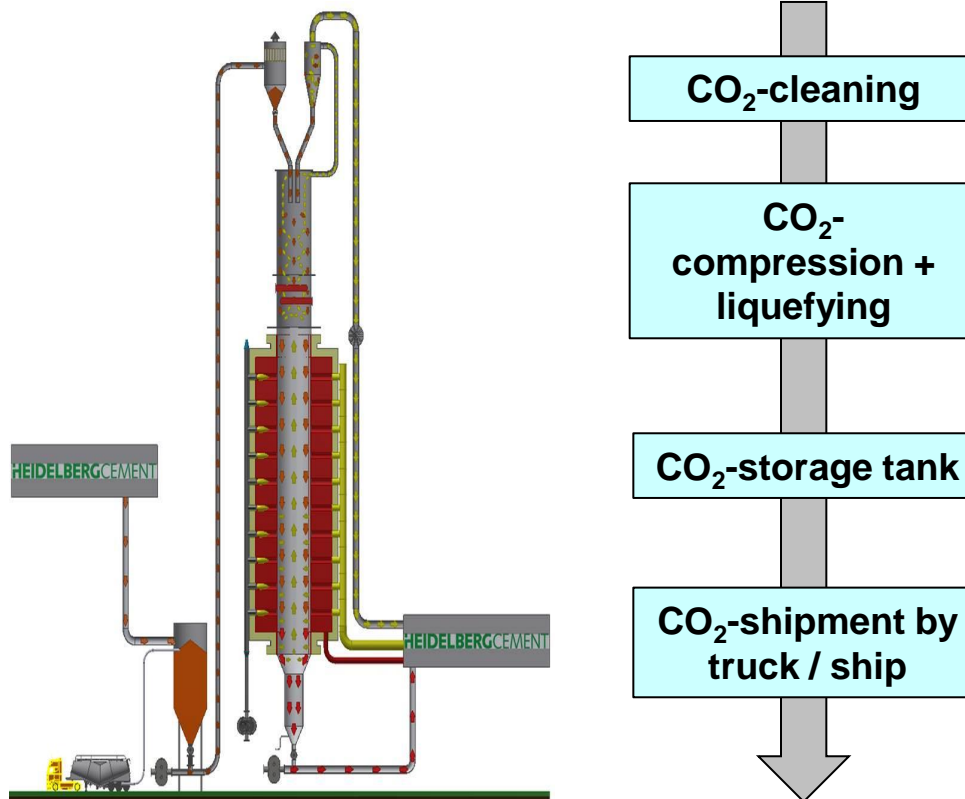


DEUTSCHE AKADEMIE DER  
TECHNIKWISSENSCHAFTEN

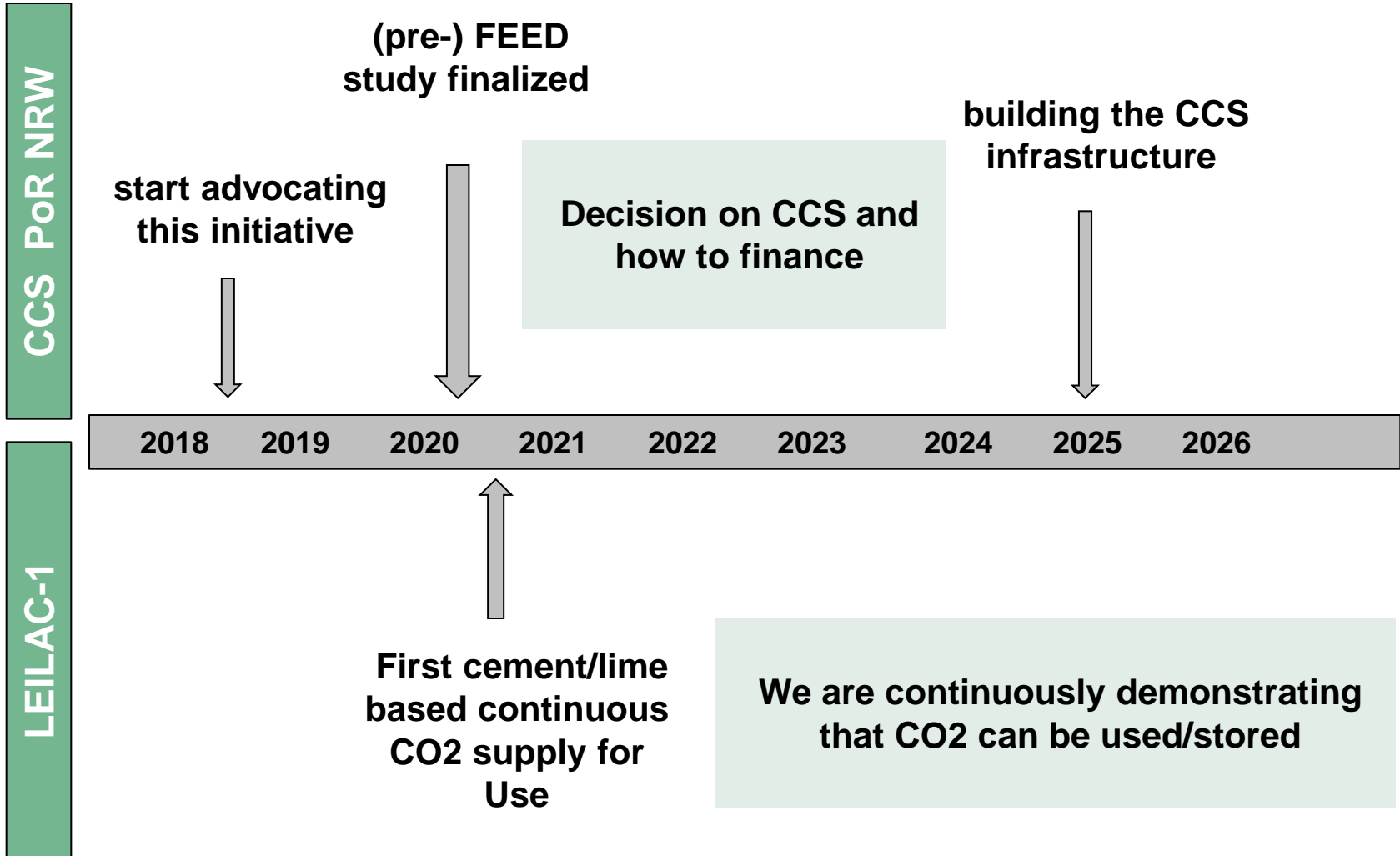
unterscheiden und sind in dieser Priorisierung vorzusehen: erstens Vermeidung von CO<sub>2</sub>-Ausstoß durch höhere Effizienz, zunehmende Elektrifizierung sowie Energie-, Prozess- und Materials substitution, zweitens Verwertung von ausgestoßenem CO<sub>2</sub> durch Verlängern der stofflichen Nutzung, also Carbon Capture and Utilization (CCU), und drittens dauerhafte geologische Speicherung der restlichen, nicht anderweitig vermeidbaren CO<sub>2</sub>-Emissionen durch Carbon Capture and Storage (CCS). Eingelagertes CO<sub>2</sub> soll im Bedarfsfall als Rohstoff rückgefördert werden können.



## Extension with CO<sub>2</sub>-treatment



# LEILAC 1C





# CO<sub>2</sub> a challenge and an opportunity.....



## Contacts:

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