

CLEAN clinker by calcium  
looping for low-CO<sub>2</sub> cement



20-21 January 2020 – Geleen (The Netherlands)  
8th High Temperature Solid Looping Cycles Network Meeting

## Engineering and Construction of the CaL demonstration plant at Vernasca

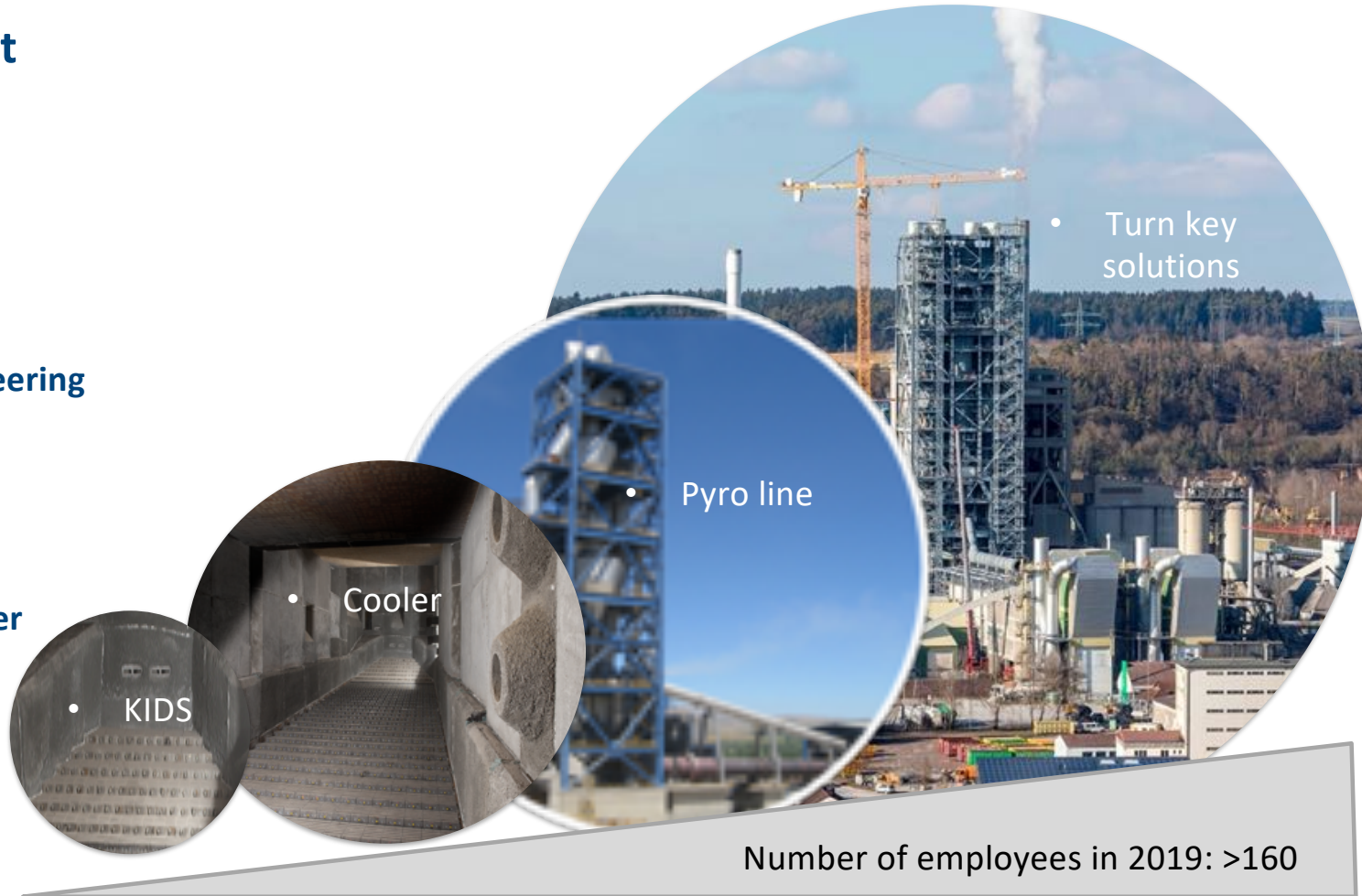
Jörg Hammerich, Reinhard Koehler  
IKN GmbH



# Engineering and construction of the CaL demonstration system

## IKN Development

- Cooler Specialist
- Turn key Plant Engineering
- Hanover Region, DE
- Jörg Hammerich  
R&D Projects Manager  
ha@ikn.eu



# Engineering and construction of the CaL demonstration system

## IKN R&D

- CEMCAP Project
- Clinker cooling with  $\text{CO}_2$
- $\text{CO}_2$  Recirculation line





# Engineering and construction of the CaL demonstration system

## CLEANKER

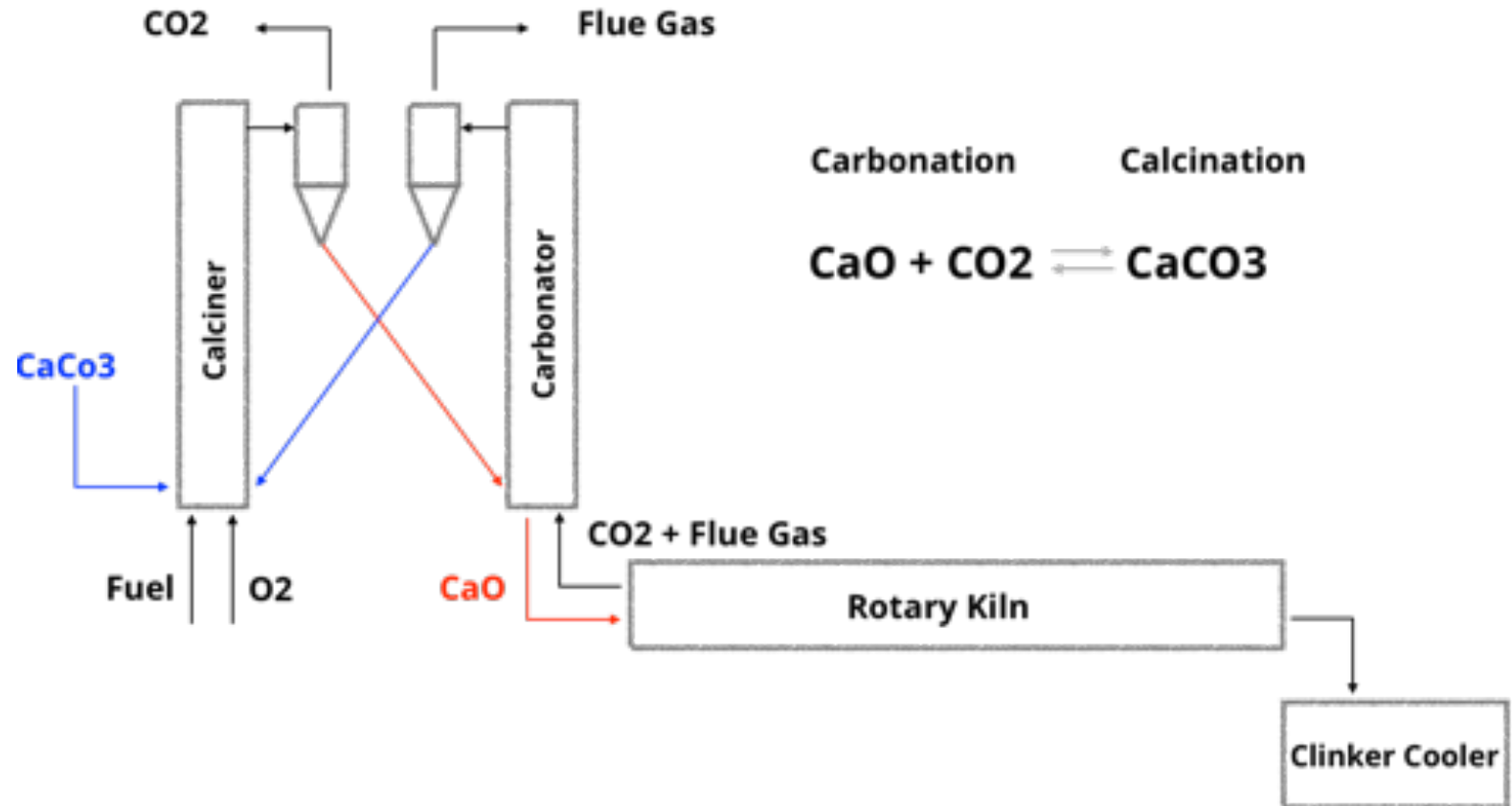
- **CLEANKER Consortium**
- **13 Partners**
- **6 Universities**
- **3 Research Institutes**
- **3 Industrial**
- **1 NGO**



# Engineering and construction of the CaL demonstration system

## Engineering

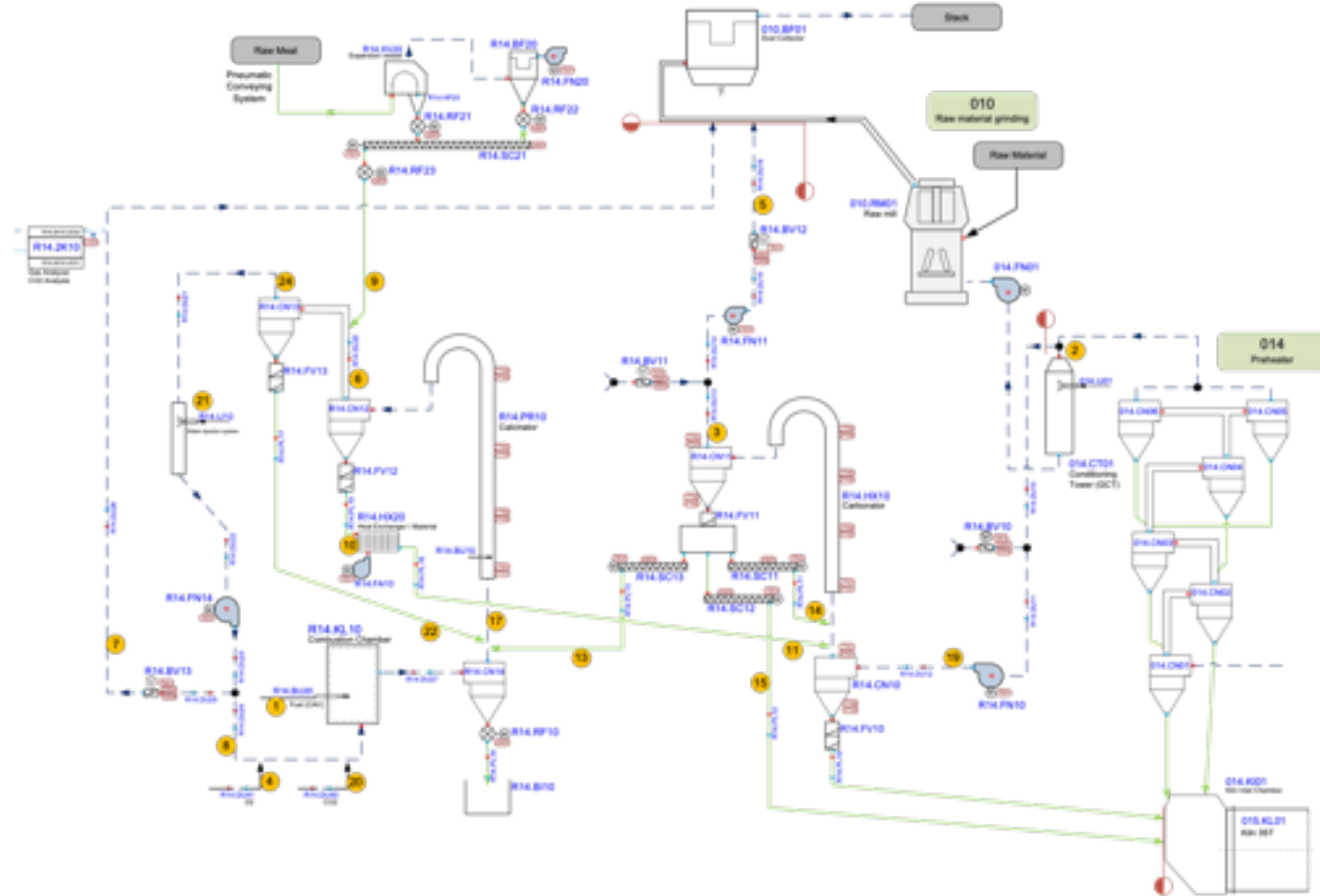
- Basic concept



# Engineering and construction of the CaL demonstration system

## Engineering

- First Flow sheet
- Basic functions added
  - Fans
  - Heat Exchanger
  - Screws for transport
  - Instruments



# Engineering and construction of the CaL demonstration system

## Engineering

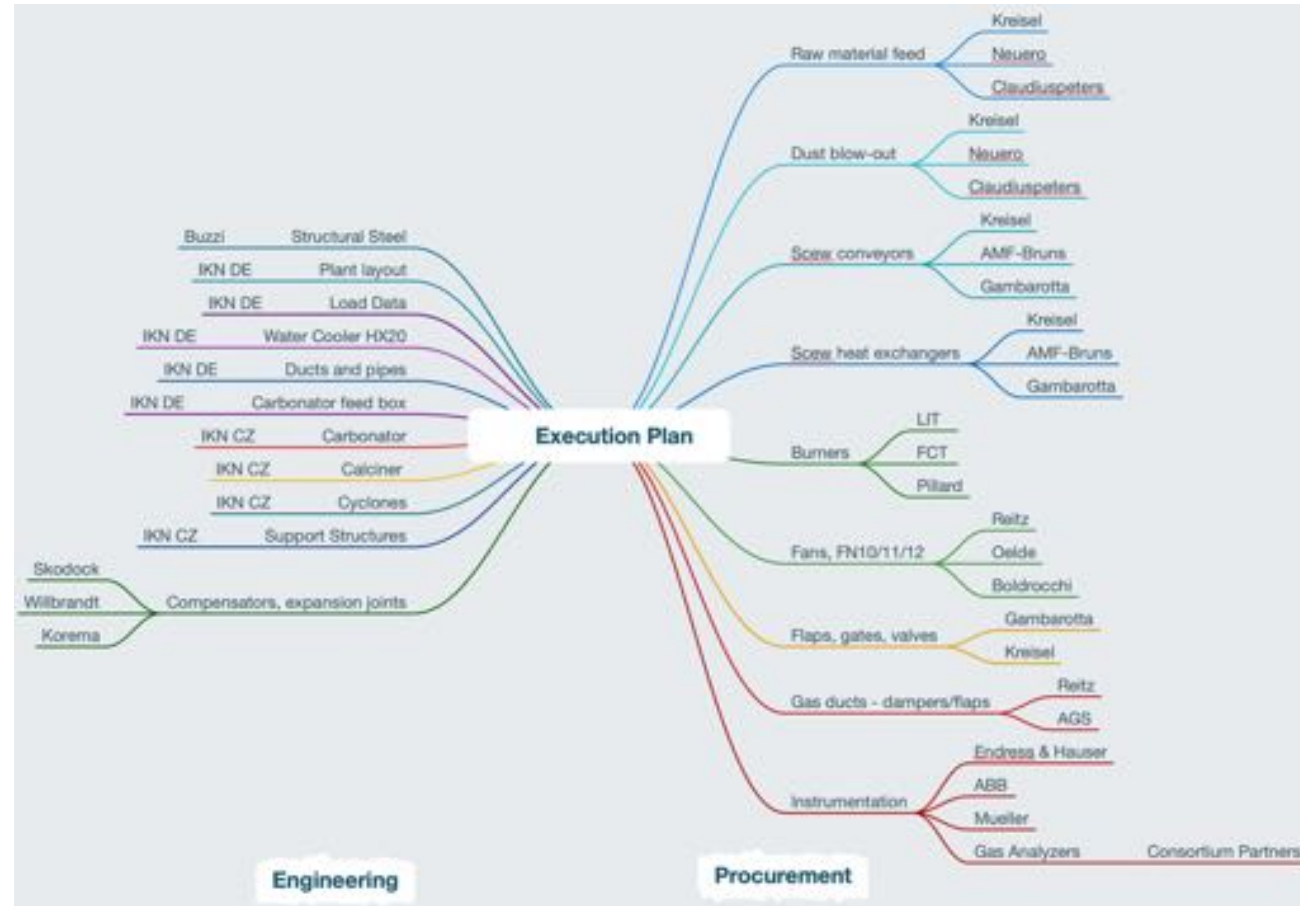
- Basic Engineering
- Flow Sheet
- Overview, Revision „O“
- Document for technical discussion and coordination in consortium



# Engineering and construction of the CaL demonstration system

## Engineering

- Basic Question: Make or Buy ?

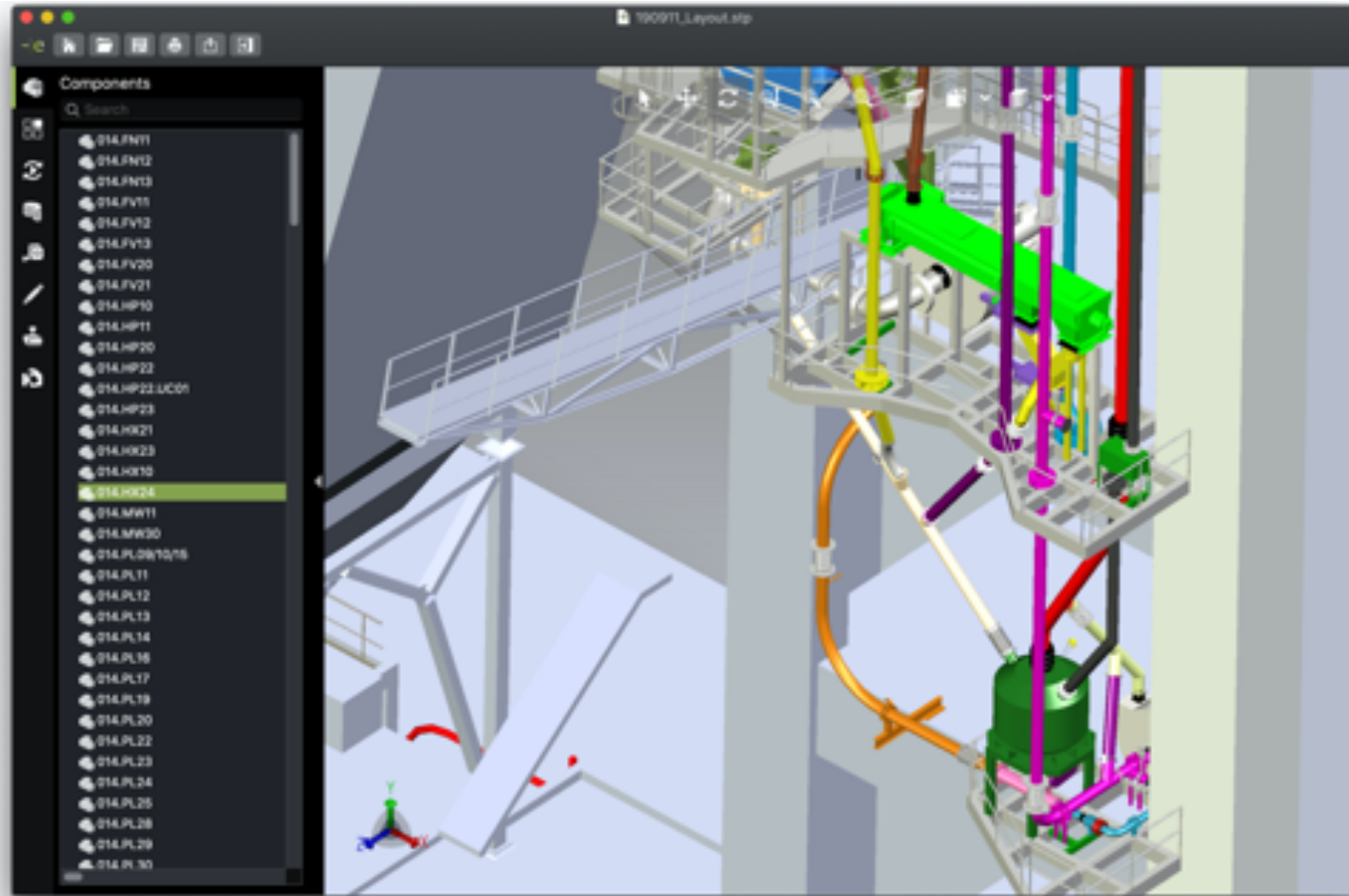




# Engineering and construction of the CaL demonstration system

## Plant Design

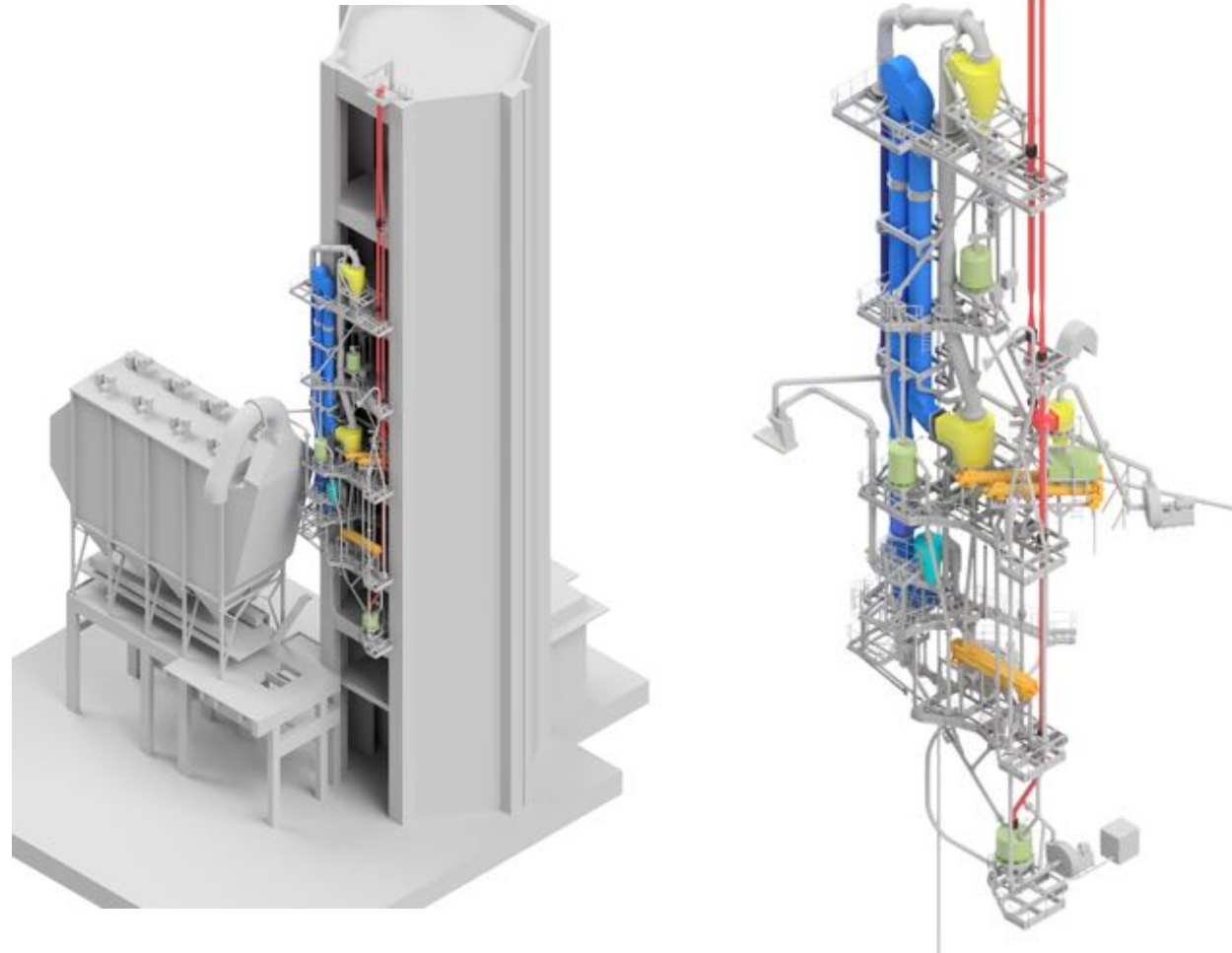
- 3D-Engineering
- Tagging in 3D-model also available in stp-viewer or parasolid-exports



# Engineering and construction of the CaL demonstration system

## Plant Design

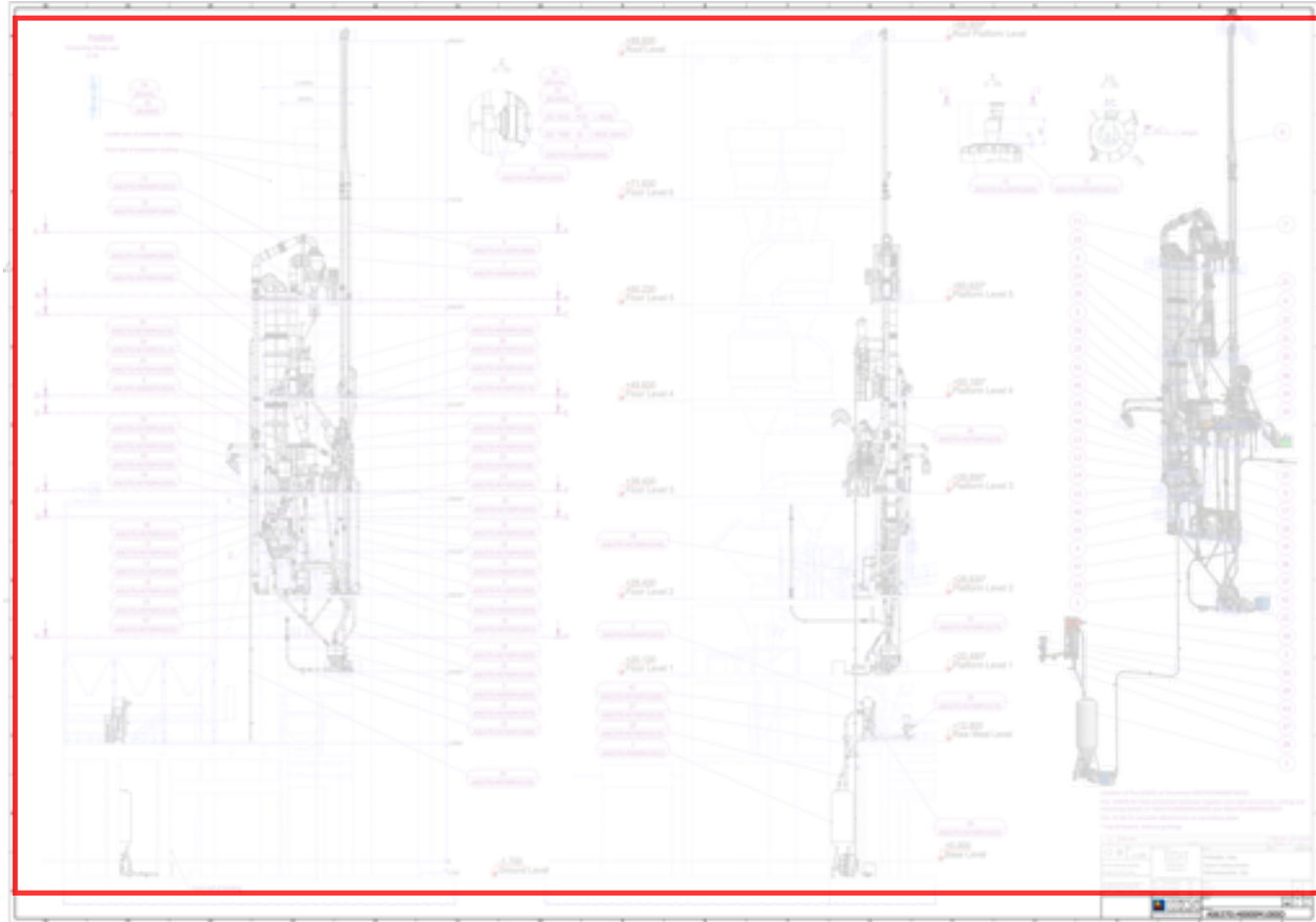
- Plant Layout
- 3D Data model of the demo plant



# Engineering and construction of the CaL demonstration system

## Design

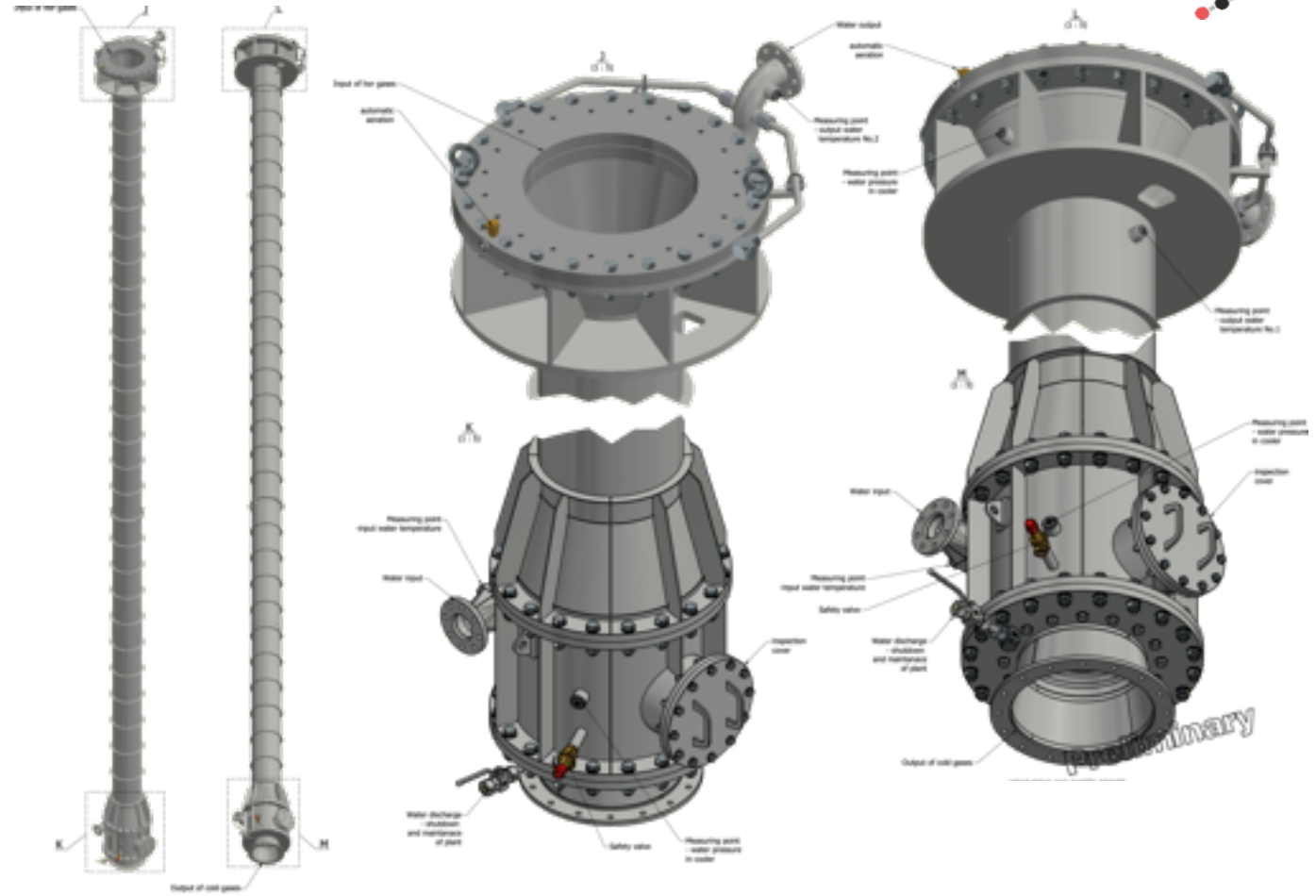
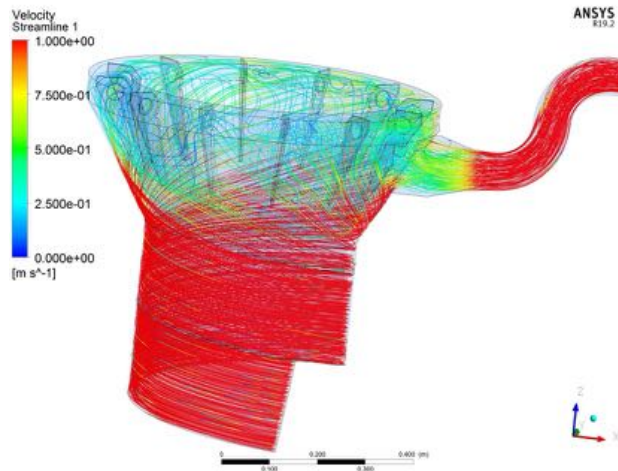
- Overall assembly drawing
- Total height: 90 m
- Total weight: 110 tons
- + Refractory: 40 tons



# Engineering and construction of the CaL demonstration system

## Equipment Design

- Equipment design
  - Heat Exchanger HX20

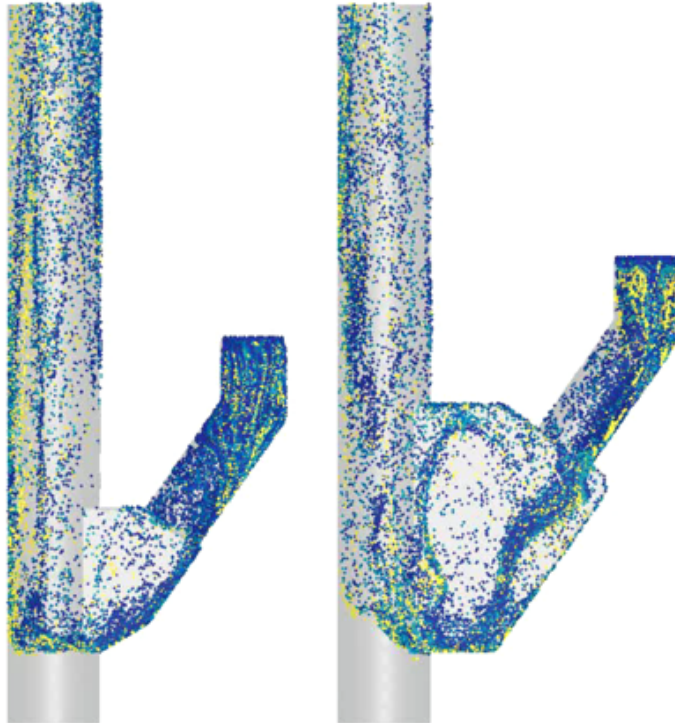




# Engineering and construction of the CaL demonstration system

## Equipment Design

- Equipment design
  - Splash boxes





# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, TR
- Calciner Swirl Head



# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, TR
- Carbonator
- Venturi nozzle



# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, TR
- Quality Inspections
- Cyclones, Ducts





# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, TR
- Heat Exchanger HX20
- Pressure test
- Preassembly



# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, DE
- Kreisel
- Reitz





# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, IT
- Quality Inspections
- Screw Conveyors
- Motor with integrated VFD



# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, DE
- Quality Inspections
- Expansion joints



# Engineering and construction of the CaL demonstration system

## Progress

- Fabrication, TR
- Quality Inspections
- 2nd Piping, Stainless steel





# Engineering and construction of the CaL demonstration system

## Progress

- Refractory Installation

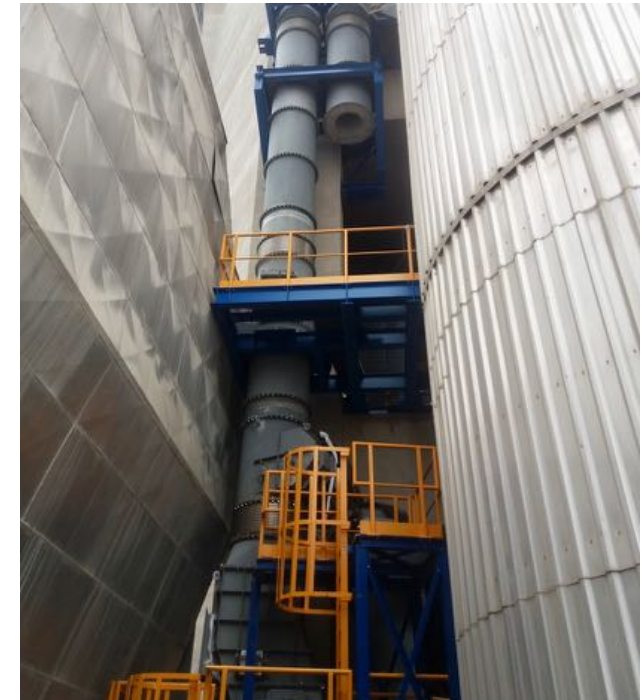
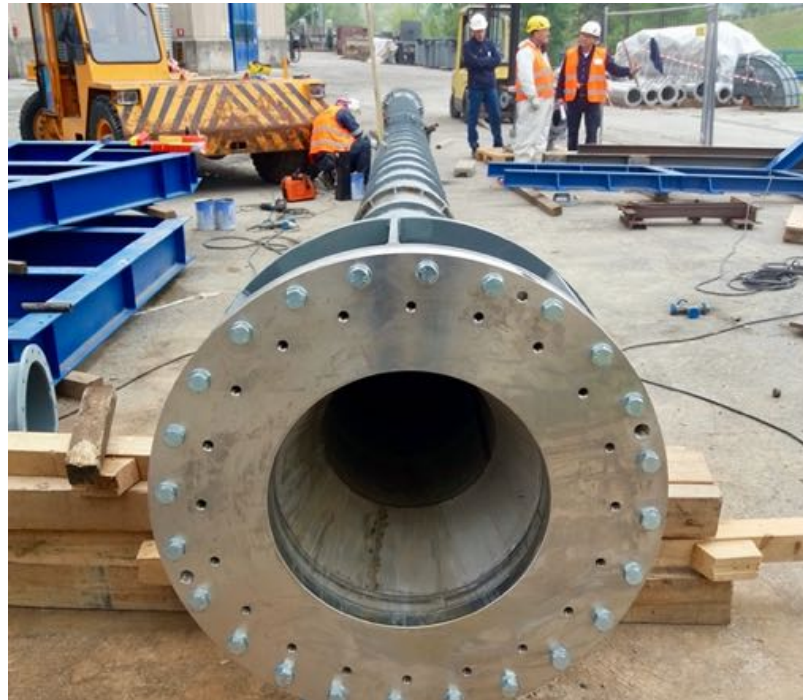


# Engineering and construction of the CaL demonstration system

## Progress

- Vernasca Installation
- Assembly of the Heat exchanger HX20
- First parts installed

October 2019



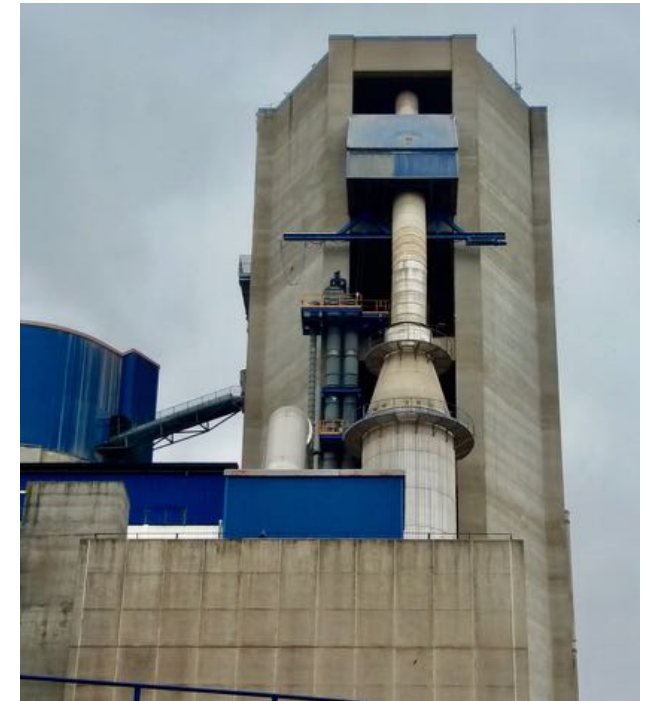


# Engineering and construction of the CaL demonstration system

## Progress

- Vernasca Installation
- Calciner finished
- Heat Exchanger HX20

November 2019



# Engineering and construction of the CaL demonstration system

## Progress

- Vernasca Installation
- Calciner Swirl Head
- Cyclone CN12
- Overflow Bin HP23

November 2019



# Engineering and construction of the CaL demonstration system

## Progress

- Vernasca Installation
- Heavy parts in place
  
- December 2019



# Acknowledgments



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