ANICA

ADVANCED INDIRECTLY HEATED CARBONATE LOOPING PROCESS

Accelerating CCS Technologies

https://act-anica.eu/

jochen.stroehle@est.tu-darmstadt.de

INTRODUCING ANICA

NEWSLETTER I
APRIL, 2020

WHAT IS ANICA?

ANICA is an ACT project focused on developing novel integration concepts of the state-of-the-art indirectly heated carbonate lopping (IHCaL) process in cement and lime production. The project aims at lowering the energy penalty and CO_2 avoidance costs for CO_2 capture from lime and cement plants. Within the 36 months, the project brings the IHCaL technology to a high level of technical maturity by carrying out long-term pilot tests in industry-relevant environments and deploying accurate 1D and 3D simulations.

The ANICA consortium, is composed of 12 partners from Germany, United Kingdom and Greece.

ANICA Consortium.

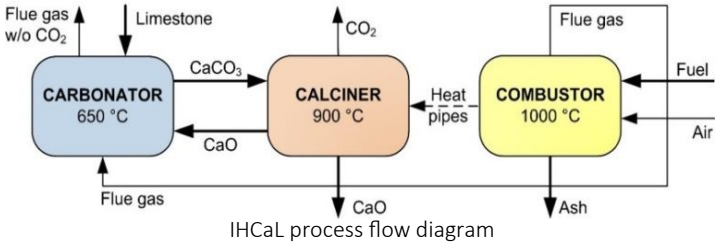
THE MOTIVATION

In order to decrease the global CO_2 emissions, sustainable and economical processes need to be applied in the energy and carbon-intense industry sectors. The production of lime and cement is one of the major sources of CO_2 emissions in the industry sector. During the production of lime and cement, natural Calcium Carbonate ($CaCO_3$) is calcinated to Calcium Oxide (CaO). The necessary heat for calcination is generated by combustion of fossil fuels and waste. Process and combustion CO_2 from lime-based production accounts for around 8% of global fossil CO_2 emissions. These CO_2 emissions can be efficiently captured with the IHCaL process.

ANICA 300 kW_{th} pilot plant at TU Darmstadt.

THE INDIRECTLY HEATED CARBONATE LOPPING (IHCAL) PROCESS

Carbonate Looping (CaL), also known as calcium looping, is a CO2-capture technology in which limestone is used as the sorbent that captures CO2. The indirectly heated carbonate lopping (IHCaL) process is a variation of CaL in which the heat is provided externally, thus avoiding the necessity of an air separation unit (ASU) and therefore achieving higher efficiencies and lower CO2 avoidance costs. The main components involved in the process are the combustor that provides thermal energy for the separation; the carbonator, where the CO2 is captured by reacting into CaCO3; and the calciner, where the CaO is regenerated and the CO2 is released.



IHCaL process flow diagram

PROJECT OBJECTIVES

- Integrating IHCaL into lime and cement plants.
- Testing at 300 kW_{th} pilot plant under realistic conditions
- Proving feasibility of utilizing of spent sorbent in the processes
- Developing novel concepts of the IHCaL reactor system.
- Generating risks assessments, economic performance analysis, and environmental impact analysis of the full process.
- Designing a 20 MW_{th} demonstration plant.

ANICA PROJECT HIGHLIGHTS

- Synergic integration between IHCal and cement and lime production processes.
- Utilization of raw material for lime and cement production as sorbent to reduce costs and environmental impact.
- Utilization of cheap waste fuels of biogenic sources to achieve net negative emissions and reduce costs.
- Avoidance of the air separation unit (ASU) within the IHCaL process, which yields lower energy penalties and lower CO_2 avoidance costs.
- Operation at high temperatures to efficiently generate power.

To receive regular updates on the project, subscribe to the biannual newsletter.

This project ANICA is funded through the ACT programme (Accelerating CCS Technologies, Horizon2020 Project N° 294766). Financial contributions made from; the German Federal Ministry of Economic Affairs and Energy (grant no. 03EE5025), the Department for Business, Energy and Industrial Strategy of the United Kingdom (grant no. 691712), and the Greek General Secretariat for Research and Technology are gratefully acknowledged.