**Introducing ANICA**

**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 CO₂ avoidance costs for CO₂ 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.

**The Motivation**
In order to decrease the global CO₂ 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 CO₂ emissions in the industry sector. During the production of lime and cement, natural Calcium Carbonate (CaCO₃) is calcinated to Calcium Oxide (CaO). The necessary heat for calcination is generated by combustion of fossil fuels and waste. Process and combustion CO₂ from lime-based production accounts for around 8% of global fossil CO₂ emissions. These CO₂ emissions can be efficiently captured with the IHCaL process.

**The Indirectly Heated Carbonate Lopping (IHCaL) Process**
Carbonate Lopping (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.

**Project Objectives**
- Integrating IHCaL into lime and cement plants.
- Testing at 300 kWth 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 MWth 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 CO₂ avoidance costs.
- Operation at high temperatures to efficiently generate power.

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