CEMCAP

CEMCAP is a Horizon 2020 project that will prepare the grounds for cost- and resource-effective CCS in European cement industry.

CEMCAP is positioned to
- Utilize competence and knowledge from ongoing and concluded CCS projects for power industry
- Complement the Norcem CCS project by testing and evaluating additional post-combustion capture technologies
- Strengthen and advance the ongoing ECRA CCS project for cement industry (component testing for oxyfuel)

Key figures:
Duration: May 2015-October 2018
Budget: 10,030 kEUR
EC contribution: 8,779 kEUR
Swiss government funding: 704 kEUR
Industrial funding: 547 kEUR
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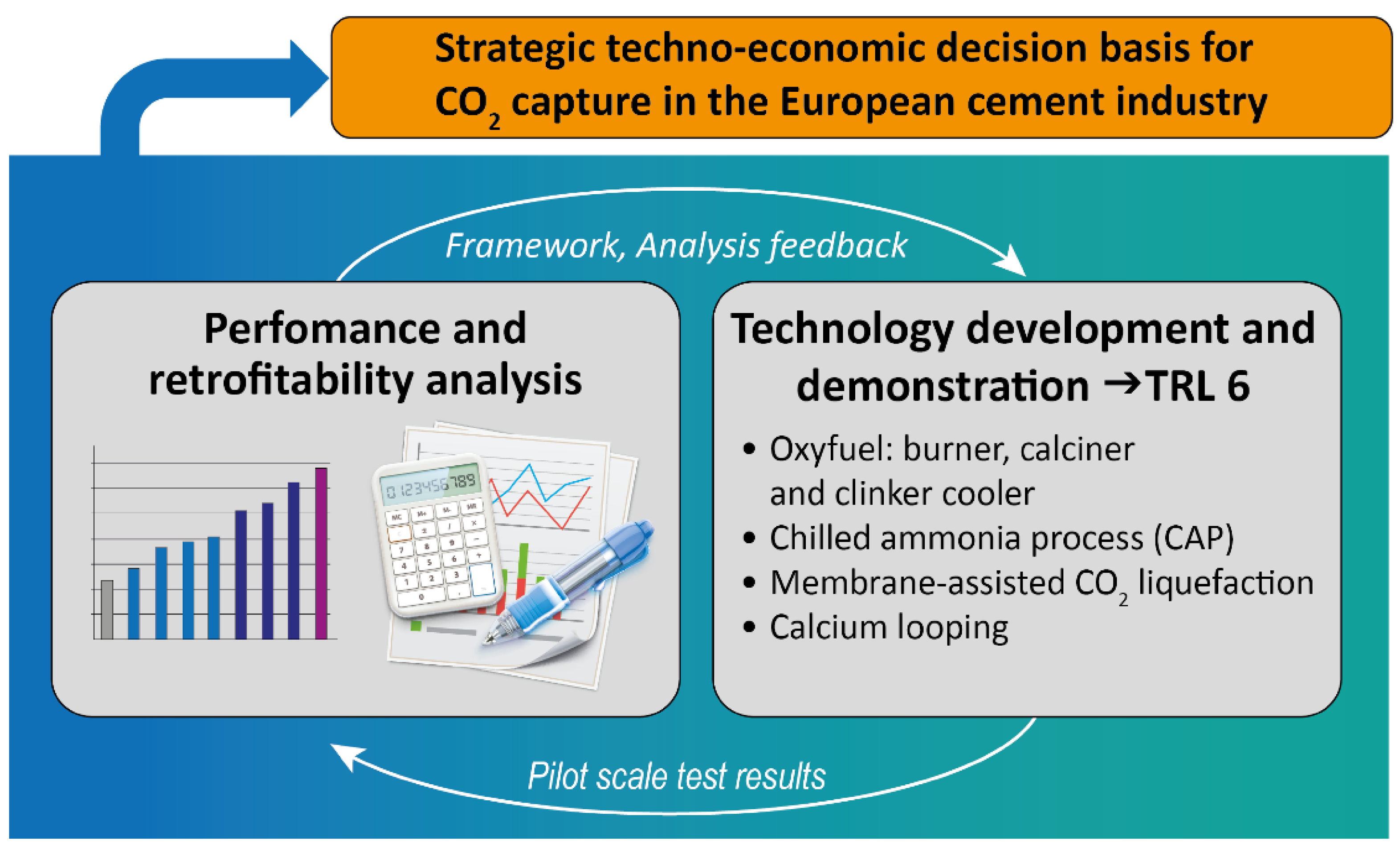
Making CO_2 capture retrofittable to cement plants

- CO_2 emissions from the cement production process constitute ~5 % of global anthropogenic CO_2 emissions.
- CO_2 generation is an inherent part of the cement production process where $CaCO_3$ is converted to CaO and CO_2
- The only viable option to significantly reduce GHG emissions from the cement industry is (CCS)
- Cement plant lifetime is 30-50 years or more. CEMCAP therefore investigates technologies for CO_2 capture retrofit



The **CEMCAP framework document** provides a common and consistent basis for analytical and experimental research in the project.
The framework document will be made public by the end of 2017.

Above: CEMCAP – iterating between experimental and analytical research.
Below: CO_2 capture technologies investigated in CEMCAP – characteristics as anticipated at project startup.

		Post combustion		
	Oxyfuel	Chilled ammonia	Membrane-assisted CO_2 liquefaction	Calcium looping
CO_2 capture principle	Combustion in oxygen (not air) gives a CO_2-rich exhaust. CO_2 is separated through condensation after compression and cooling.	Exhaust passes through a cold NH_3/water mixture, which absorbs CO_2. CO_2 is released as heat is added to the solution in a subsequent vessel.	A polymeric membrane is used to increase exhaust CO_2 concentration. CO_2 is separated through condensation after compression and cooling.	CaO particles react with CO_2 to from $CaCO_3$. CO_2 is released in a subsequent vessel through the addition of heat.
Required cement plant modifications	Retrofit possible through modification of burner and clinker cooler.	Retrofit appears simple, minor modifications required for heat integration.	No modifications of cement plant. SOx, NOx, H_2O removal required upstream of capture unit.	$CaCO_3$/CaO integration: Waste from capture process (CaO) is cement plant raw material.
Clinker quality	Maintained quality must be confirmed.	Unchanged.	Unchanged.	Clinker quality likely to be maintained.
CO_2 purity and capture rate	CO_2 purification unit (CPU) needed. High capture rate and CO_2 purity possible (trade-off against power consumption).	Very high CO_2 purity, can also capture NOx, SOx. High capture rate possible.	High CO_2 purity (minor mpurities present). Trade-off between power consumption and CO_2 purity and capture rate.	Rather high CO_2 purity (minor/moderate CO_2 impurities present). High capture rate.

The CEMCAP consortium consists of
- Cement producers: Norcem, Italcementi, HeidelbergCement
- Technology providers: GE Carbon Capture, GE Power Sweden, IKN, ThyssenKrupp Industrial Solutions
- RD&I providers: SINTEF Energy Research, ECRA, TNO, ETH, IFK/University of Stuttgart, Politecnico di Milano, CSIC, VDZ