



1st Post Combustion Capture Conference

"New results from the PCC pilot plant Niederaussem"

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1. Abstract

After one and a half year operation of the first German Post Combustion Capture Pilot Plant under real power plant conditions a significant number of data and experiences are collected for three different amine based solvents. The design, erection and operation of the pilot plant are part of the cooperation between RWE, BASF and Linde. The overall aim of this cooperation is the development of an optimized CO₂-scrubbing technology for power plant application.

The operation of the pilot plant started in July 2009. The daily CO₂ recovery capacity of the pilot plant is approximately 7.2 t at 90% CO₂ recovery rate. The pilot plant is equipped with all the required measurements and analysers for precise investigation of the plant performance. The loss of efficiency caused by the integration of the PCC technology should be less than 10%-points (including CO₂ compression for pipeline transport to the storage site) and the CO₂ avoidance costs should be less than the certificate prices.

Each of the three solvents were tested for at least 6 month. After the first campaign with 30% MEA as the benchmark solvent, two novel solvents, developed by BASF, were tested. The tests include the variation of a number of parameters:

- solvent circulation
- desorber pressure
- location of interstage cooler
- number of absorber beds
- inlet temperature of flue gas
- temperature of lean solvent and interstage cooler.

The parameter tests were used to identify the optimal operational set points regarding the specific energy demand of the capture process. After finishing the parameter studies the optimal operational parameters were maintained unchanged over longer periods to test the long term behaviour of the solvents (e.g. stability, losses).

During the long term test the PCC pilot plant was also combined with a second pilot plant at Niederaussem, a high performance FGD (REAplus). The REAplus reduces the SO₂ content below 10 mg/m_N³. During the combined operation of both pilot plants, the injection of NaOH_(aq) into the Direct Contact Cooler was stopped so that the operation without additional SO₂ purification could be investigated.

The presentation summarises the performance of the two new amine based solvents compared to MEA on basis of selected parameters. The new solvents show a significant lower specific energy consumption and solvent circulation rate compared to MEA as well as a reduced solvent consumption under real power plant conditions. The results from the pilot plant operations are the “break-through” step for the commercialisation of the Post Combustion Capture based on these new solvents.