



Maturing 2nd Generation Technologies

Linde/BASF Advanced Aqueous Amine Solvent Process

DOE/FE/NETL has sponsored highly successful second-generation technologies that will dramatically reduce CO₂ capture costs. Linde/BASF's Advanced Aqueous Amine Solvent Process is one of those technologies.



National Carbon Capture Center (NCCC)

BACKGROUND

CHALLENGE:

- 1st generation amine-based solvents had regeneration energy requirements approaching 3.5 GJ/tonne CO₂
- High solvent degradation rates required significant make-up, contributing to elevated operating costs

LINDE/BASF'S SOLUTION:

- Regeneration energy reduced to ~2.7 GJ/tonne CO₂ depending on process configuration
- Minimal solvent degradation over 5,500+ hours of testing compared to significant MEA degradation after ~2,000 hours under similar conditions

SIGNIFICANT RESULTS

Techno-economic analyses indicate:

- ✓ **Reduced Capital Costs**
Lower corrosivity of OASE[®] blue solvent allows for use of lower cost materials
- ✓ **Reduced Operating Costs**
Lower energy requirements, reduced solvent make-up



Lab/Bench-Scale Development

Initiated 2007

- BASF developed the OASE[®] blue solvent based on:
- Screening analyses of over 400 substances
- Vapor-liquid equilibrium, reaction kinetics, and stability testing on about half of those
- Proof-of-concept testing on ~20 solvent mixtures
- Testing conducted at 0.45 MWe scale on actual flue gas at RWE's Coal Innovation Centre in Niederaussem, Germany beginning in 2009



Small Pilot-Scale Testing

Initiated 2011

- Testing conducted at 1.5 MWe scale at the National Carbon Capture Center (NCCC) in 2015/2016
- Over 4,000 hours of parametric and long-duration testing
- Validated solvent stability and demonstrated working capacity 20% higher and steam regeneration consumption 25% lower than MEA
- Data generated to support scale-up to large pilot



Large Pilot-Scale Testing

Initiated 2015

- Detailed techno-economic analysis and a preliminary plant design with engineering/cost estimates for construction of a 15 MWe pilot facility at the University of Illinois' Abbott Power Plant
- One of three capture technologies advancing efforts to develop large-scale pilots for transformational coal technologies



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