



Accelerating Transformational Technologies to Commercialization

Research Triangle Institute's Water-Lean Solvent Process

The success of DOE/FE/NETL-sponsored transformational technologies in reducing CO₂ capture costs has resulted in licensing agreements with technology developers that will accelerate the technologies toward commercialization.

Research Triangle Institute's (RTI) Water-Lean Solvent Process is one of those technologies.



Technology Centre Mongstad (TCM)

CHALLENGE

- Current solvent capture technologies use mixtures of ~70% water and 30% amines to absorb CO₂
- The water has negative energy impacts and doesn't capture any of the CO₂ - unlike the amines - but the water controls the corrosivity and viscosity of the amines

RTI'S SOLUTION

- Replace water with a hydrophobic non-aqueous solvent
- Total water in the mixture goes from ~70% down to ~5-10%

Lab/Bench-Scale Development 2010-2016



- Solvent formulation finalized
- Reboiler heat duty < 2.0 GJ/tonne
- Preliminary techno-economic analysis shows capture cost ≤ \$40/tonne

Scale-up Testing 2016-2018



- 1500+ hours of parametric and long-term testing at SINTEF's Tiller Plant pilot-testing facility (60 kWe) on coal-derived flue gas
- 570 additional hours of testing at the National Carbon Capture Center (50 kWe) using coal-derived flue gas to evaluate operational issues

Large Pilot-Scale Testing 2018-2022



- ~12 MWe-scale testing at Technology Centre Mongstad confirmed performance and evaluated the RTI solvent as a drop-in replacement for conventional amine capture systems
- Total energy consumption < 2.6 GJ/tonne CO₂
- >99% CO₂ capture from natural gas combined cycle flue gas

SIGNIFICANT RESULTS

Techno-economic analyses indicate:

- ✓ **Reduced Capital Costs**
Enhanced solvent performance results in smaller columns, heat exchangers, and footprint
- ✓ **Reduced Operating Costs**
Lower energy requirements

LICENSING AGREEMENT

RTI signed a licensing agreement with Schlumberger to continue developing their non-aqueous solvent (NAS; water-lean) technology that enhances the efficiency of absorption-based CO₂ capture in industrial applications. RTI and Schlumberger will develop models that enable fast design and process customization to improve cost and performance to support demonstration and deployment.



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