DOE/FE/NETL has sponsored highly successful second-generation technologies that will dramatically reduce CO₂ capture costs. Research Triangle Institute’s (RTI) Water-Lean Solvent Process is one of those technologies.

**BACKGROUND**

**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%.

**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.

**Lab/Bench-Scale Development**
- Initiated 2009/2010
- Proof of concept/feasibility in 2009 and lab-scale testing initiated in 2010.
- Bench-scale testing initiated 2014.
- Solvent formulation finalized.
- Reboiler heat duty < 2.0 GJ/tonne.
- Preliminary techno-economic analysis shows capture cost ≤ $40/tonne.

**Scale-up Testing**
- Initiated 2016
- Testing at 60-kWe scale conducted using actual flue gas at SINTEF’s Tiller Plant pilot-testing facility in Norway.
- 1500+ hours of parametric and long-term testing on coal derived flue gas.
- Additional testing at the National Carbon Capture Center.
- 570 hours at 50-kWe scale using coal-derived flue gas to evaluate operational issues.

**Large Pilot-Scale Testing**
- Initiated 2018
- ~12 MWe scale testing at Technology Centre Mongstad (TCM) to evaluate the viability of the RTI solvent as a drop-in replacement for conventional capture systems.
- Additional testing will modify TCM’s existing equipment to evaluate optimized operation with the RTI solvent.

https://www.netl.doe.gov/research/coal/carbon-capture