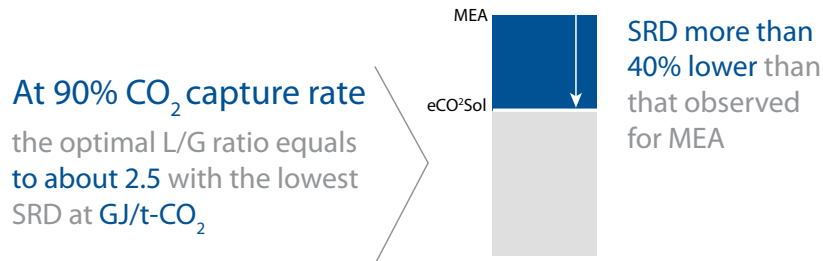


# eCO<sub>2</sub>Sol™ — Improving Sustainability of Fossil Fuel Resources

## Transformational Non-Aqueous Solvent-Based CO<sub>2</sub> Capture Process

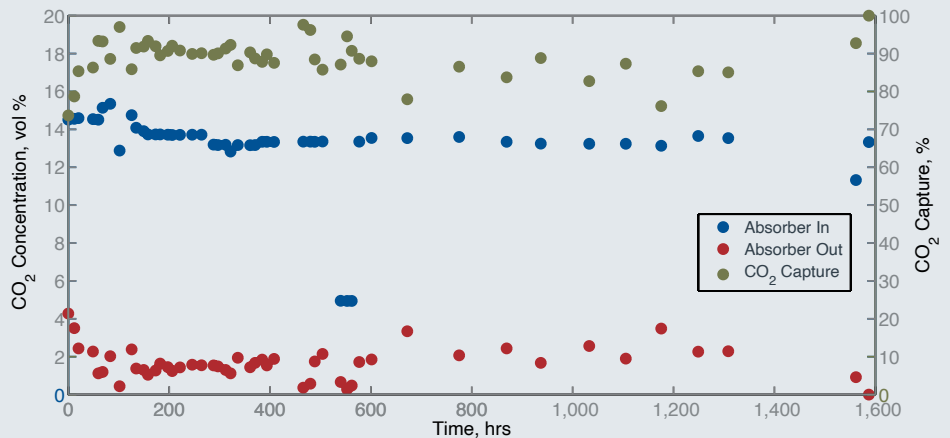
### Core Technology

RTI International's eCO<sub>2</sub>Sol substantially reduces the specific reboiler duty (SRD) to less than 2.3 GJ/t-CO<sub>2</sub> captured, with potential to go lower. This is a **30% to 50% reduction compared to state-of-the-art post-combustion CO<sub>2</sub> capture processes using aqueous amine solvents.**



### Long-Term Test of eCO<sub>2</sub>Sol

- Successfully tested for 1,600 hours at SINTEF's Tiller pilot plant using flue gas generated by a 250-kW coal burner
- Evaluated for Natural Gas Combined Cycle with an SRD of 2.1–2.3 GJ/t-CO<sub>2</sub>
- SRD relatively insensitive to CO<sub>2</sub> capture % relative to monoethanolamine (MEA), could enable deeper capture with minimal additional cost
- Can regenerate at higher pressure to reduce CO<sub>2</sub> compression costs with minor increase in SRD
- **100x lower** corrosion rates than MEA
- Column and plumbing construction could use carbon steel
- **10,000x lower** heat stable salts than MEA



RTI has been awarded \$10M from the Department of Energy to advance and test our technology using the existing, large-scale pilot infrastructure at the Technology Centre Mongstad in Norway.

The three main objectives of the project are as follows:



Confirming the potential to reduce the parasitic energy penalty associated with the capture of CO<sub>2</sub> from flue gas by 20% to 40% compared with that of the MEA process



Demonstrating the long-term process operational reliability at static and dynamic conditions

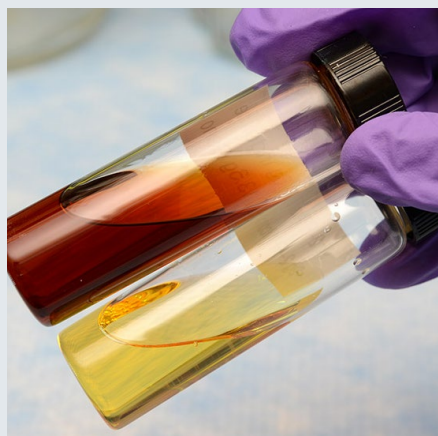


Verifying the solvent degradation rate, emissions, solvent loss, and corrosion characteristics of the solvent at engineering scale.



Projected Technology Readiness Level (TRL) Maturation During Project

## Technology Scale-Up Path



**Lab-Scale Development and Evaluation**  
2010–2013  
Solvent screening and  
lab-scale evaluation



**Large Bench-Scale System**  
RTI Facility, 2014–2016  
Testing of key process features  
( $\leq 2.0$  GJ/t CO<sub>2</sub>) at bench scale  
1,000s of hours testing  
0.1 t/day



**Pilot Testing at Tiller Plant**  
Norway, 2015–2018  
Validation of all process  
components at pilot scale  
2,000 hours testing  
1 t/day



**Pilot Testing at SSTU (Slipstream Solvent Test Unit)**  
National Carbon Capture Center, 2018  
Degradation, emissions, and corrosion  
characterizations under real flue gas  
580 hours testing using coal power plant-derived flue gas  
1 t/day



**Emissions Control**  
Tiller, 2018+  
Effective emissions mitigation strategy  
for water lean solvent (WLS) at engineering-scale  
1 t/day



**Engineering-Scale Validation**  
Norway, 2018+  
Pre-commercial demonstration at  
Technology Centre Mongstad  
24 t/day

## Publications

- Gupta, V., Mobley, P., Tanthana, J., Cody, L., Barbee, D., Lee, J., Pope, R., Chartier, R., Thornburg, J., & Lail, M. (2021). Aerosol emissions from water-lean solvents for post-combustion CO<sub>2</sub> capture. *International Journal of Greenhouse Gas Control*, 106, 10328. <https://doi.org/10.1016/j.ijggc.2021.103284>
- Tanthana, J., Mobley, P., Rayer, A. V., Gupta, V., Soukri, M., & Lail, M. (2021). Lab-scaled performance evaluation of novel water-lean solvents for post combustion CO<sub>2</sub> capture. *International Journal of Greenhouse Gas Control*, 111. <https://doi.org/10.1016/j.ijggc.2021.103469>
- Tanthana, J., Rayer, A. V., Gupta, V., Mobley, P. D., Soukri, M., Zhou, J., & Lail, M. (2019). Experimental study of a hydrophobic solvent for natural gas sweetening based on the solubility and selectivity for light hydrocarbons (CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>) and acid gases (CO<sub>2</sub> and H<sub>2</sub>S) at 298–353K. *Journal of Chemical and Engineering Data*, 64(2), 545–556. <https://pubs.acs.org/doi/10.1021/acs.jced.8b00735>

**eCO<sub>2</sub>Sol will be ready for commercial demonstration in 2023.**

To explore partnership opportunities, contact Marty Lail at 919.485.5703 or [mlail@rti.org](mailto:mlail@rti.org).

RTI International is an independent, nonprofit research institute dedicated to improving the human condition. Clients rely on us to answer questions that demand an objective and multidisciplinary approach—one that integrates expertise across the social and laboratory sciences, engineering, and international development. We believe in the promise of science, and we are inspired every day to deliver on that promise for the good of people, communities, and businesses around the world. For more information, visit [www.rti.org](http://www.rti.org).

RTI International is a trade name of Research Triangle Institute. RTI and the RTI logo are U.S. registered trademarks of Research Triangle Institute.