

www.gti.energy

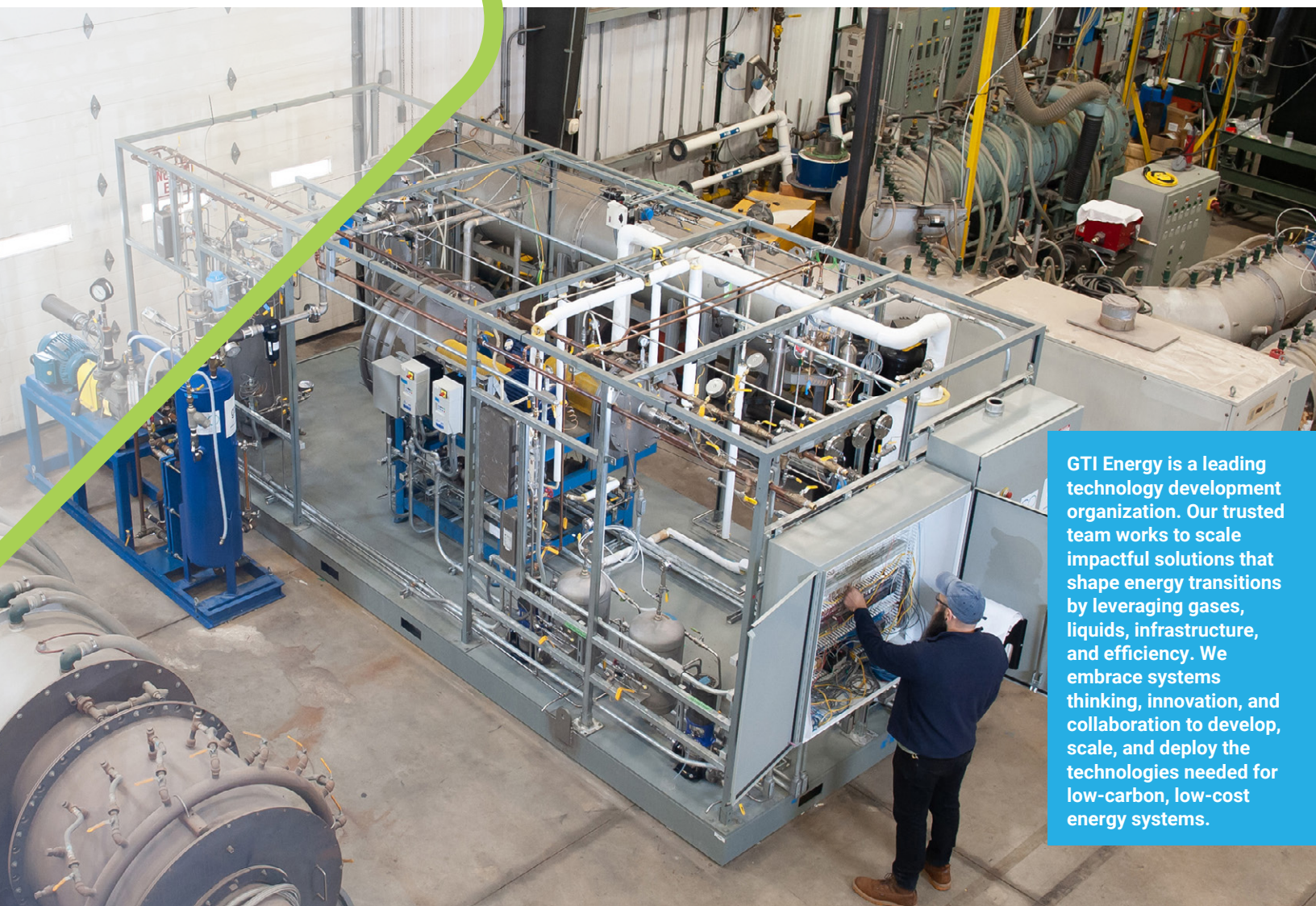


GTI ENERGY

solutions that transform

ROTA-CAP™

AN INTENSIFIED CARBON CAPTURE SYSTEM USING ROTATING PACKED BEDS

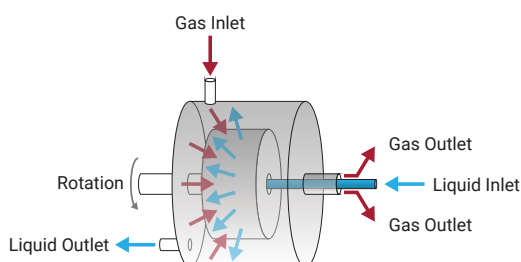


GTI Energy is a leading technology development organization. Our trusted team works to scale impactful solutions that shape energy transitions by leveraging gases, liquids, infrastructure, and efficiency. We embrace systems thinking, innovation, and collaboration to develop, scale, and deploy the technologies needed for low-carbon, low-cost energy systems.

ROTA-CAP™

AN INTENSIFIED CARBON CAPTURE SYSTEM USING ROTATING PACKED BEDS

ROTA-CAP™ is a transformational CO₂ capture process, combining compact rotating packed bed (RPB) technology with advanced solvent technology. ROTA-CAP represents a significant breakthrough in reducing the capital and operating expenditure as well as size requirements for CO₂ capture systems. The technology is suitable for power plant and industrial carbon capture applications. CO₂ capture costs can be reduced by 30–50% compared to conventional process approaches.



Technology Features and Advantages

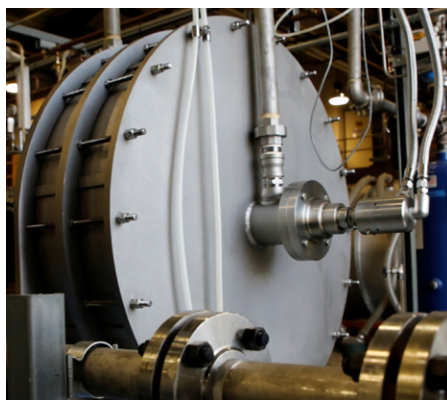
ROTA-CAP's rotation of the packing in the RPB increases the mass transfer between the contacting fluids (the flue gas and the CO₂ capture solvent), leading to a highly compact capture system with lower capital expenditures, while opening the door to the application of advanced, low energy solvent systems that are beyond the operating capabilities of conventional solvent columns. The technology outperforms the industry benchmark by delivering enhanced solvent performance and size reductions of the carbon capture unit. RPBs use <20% of the packing height required by conventional columns. Lower solvent circulation rate reduces sizing requirements of heat exchangers, pumps, and coolers by up to 50%. The reduced

size of the RPB contactor results in substantially reduced solvent inventory.

In ROTA-CAP, an advanced solvent is fed into the RPB absorber through the inner radius and flows to the outer radius. The

CO₂-rich flue gas stream is introduced into the absorber from the outer radius and flows towards the inner radius, contacting the solvent in a counter-current flow process. The rotation around the axis generates a centrifugal force that is significantly greater than the gravitational force in a conventional packed bed column.

Faster and more efficient CO₂ mass transfer are achieved from the flue gas phase to the solvent liquid phase when compared to a conventional packed bed column.



Installation photo in Alabama is courtesy of National Carbon Capture Center

STATUS: GTI Energy has developed a RPB design concept and built a compact, skid-mounted integrated carbon capture system in collaboration with the U.S. Department of Energy NETL. After testing the integrated RPB absorber + RPB desorber system under simulated conditions at GTI Energy, the skid was moved to the National Carbon Capture Center (AL) in 2021, where it has been successfully operating for over 1600 hours under various real flue gas conditions including coal, natural gas-fed power plant flue gas, and a range of typical industrial flue gas compositions. Solvent was provided by Carbon Clean.

A follow-on project to test a 3-tonne CO₂ per day engineering-scale carbon capture system at U. S. Steel's Edgar Thomson industrial iron and steel production facility in Braddock, PA has been selected for award of DOE funding.

Key Features

- Rotating Packed Bed (RPB) technology for highly efficient solvent / gas contacting
- Solvent flexibility

Applications

- CO₂ capture from industrial flue gas (cement, steel, industrial boilers)
- Power plant flue gas
- Other acid gas separations

Benefits

- Compact, modular design
- Low CAPEX & OPEX
- >98%+ CO₂ capture

Markus Lesemann

Senior Director, Business Development
mlesemann@gti.energy, +1 847.768.0914

GTI Energy

www.gti.energy

1700 S Mount Prospect Road
Des Plaines, IL 60018 USA

2.24