

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Sequestration

03/2006



CARBON DIOXIDE CAPTURE FROM LARGE POINT SOURCES

Background

Capture of carbon dioxide at the source of its emission has been a major focus in greenhouse gas emission control. Current technologies used for capturing CO₂ suffer from inefficient mass transfer and economics.

In Phase I, Compact Membrane Systems, Inc. will fabricate and test a membrane-based absorption system for the removal of carbon dioxide from a simulated power-plant flue gas. The stability of the membrane system under various operating conditions and chemical environments will be tested.

CONTACTS

Sean Plasynski

Sequestration Technology Manager
National Energy Technology
Laboratory
626 Cochran Mill Road
P.O. Box 10940
Pittsburgh, PA 15236
412-386-4867
sean.plasynski@netl.doe.gov

David Lang

Project Manager
National Energy Technology
Laboratory
626 Cochran Mill Road
P.O. Box 10940
Pittsburgh, PA 15236
412-386-4881
david.lang@netl.doe.gov

John Bowser

Principal Investigator
Compact Membrane Systems, Inc.
325 Water Street
Wilmington, DE 19804
302-999-7996
john.bowser@compactmembrane.com

Primary Project Goal

The primary goal of this project is to develop a membrane-based absorption system that reduces the cost of CO₂ capture from large point sources, such as power plant stacks.

Objectives

Phase I objectives:

- Fabricate perfluorinated membrane on appropriate hydrophobic hollow fiber membrane contactors
- Demonstrate carbon dioxide removal from simulated flue gas mixture via amine absorption using the fabricated membranes
- Examine chemical compatibility of the membrane with amines and demonstrate enhanced stability of the perfluoro coated membranes.
- Perform economic analysis and demonstrate that the perfluoro coated hydrophobic hollow fiber membrane contactors are superior to existing commercial carbon dioxide removal technology.



PARTNER

Compact Membrane Systems, Inc.

COST

Total Project Value

\$100,000

DOE/Non-DOE Share

\$100,000 / \$0

ADDRESS

National Energy Technology Laboratory

1450 Queen Avenue SW
Albany, OR 97321-2198
541-967-5892

2175 University Avenue South
Suite 201
Fairbanks, AK 99709
907-452-2559

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
304-285-4764

626 Cochran's Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940
412-386-4687

One West Third Street, Suite 1400
Tulsa, OK 74103-3519
918-699-2000

CUSTOMER SERVICE

1-800-553-7681

WEBSITE

www.netl.doe.gov

Accomplishments

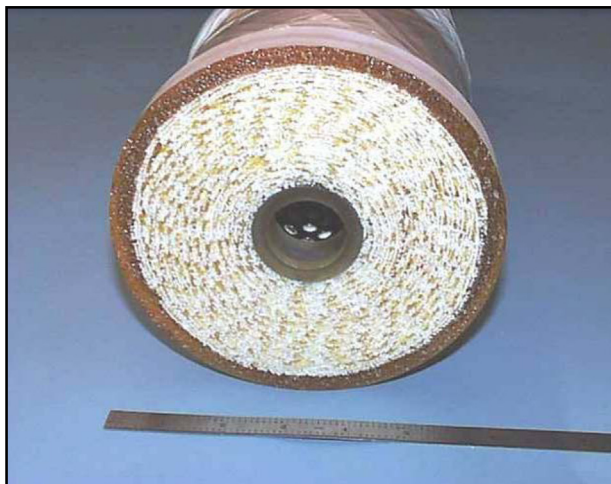
Phase I accomplishments included:

- Demonstration of CO₂ absorption into aqueous diethanolamine solution and subsequent regeneration of the absorbent liquor in membrane contactors at both high temperature (60 °C) and low temperature (25 °C).
- Integrated system successfully absorbed and desorbed simultaneously.
- Preliminary testing indicated the membranes are chemically compatible with amines.
- Preliminary economic analysis showed amine membrane contactor had economic advantage compared to conventional amine scrubbing towers.

Benefits

The United States has set a goal of reducing the CO₂ emissions intensity of economic activity (pounds of CO₂ emitted per dollar of GDP) by 18% by 2012.

In order to meet this goal, we must improve existing technology for capture of CO₂ from flue gas. Existing processes are technically feasible, but economically unsatisfactory. This project has the potential to move us forward toward the goal of an economically feasible process for capture of CO₂ from stack gases.



Commercial hollow fiber membrane cartridge [6" (D) X 17" (L)]