



Basic Immobilized Amine Sorbents (BIAS) for the Capture of Carbon Dioxide

For more information, contact techtransfer@netl.doe.gov



U.S. DEPARTMENT OF
ENERGY

National Energy
Technology Laboratory

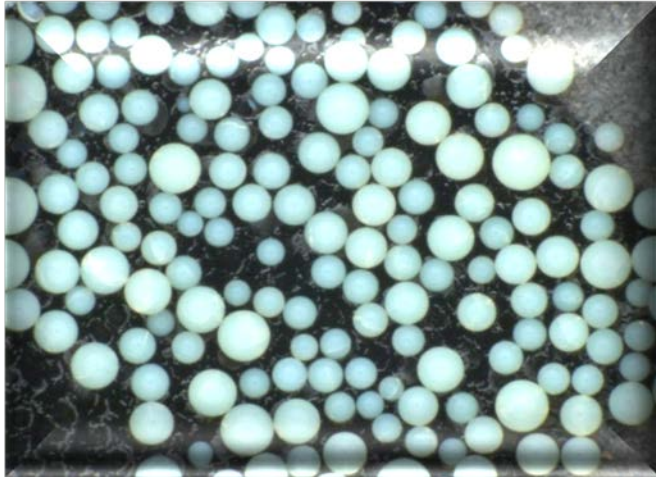
2012 R&D 100 Award Winning Technology

A portfolio of patented and patent-pending technologies for the capture of CO₂ from flue gas streams



From left to right, starting in the front row: Kathryn Klos, McMahan Gray, Jessica Sosenko, James Hoffman, Henry Pennline, Kevin Resnik, Kenneth Champagne, Dan Fauth, and Yee Soong

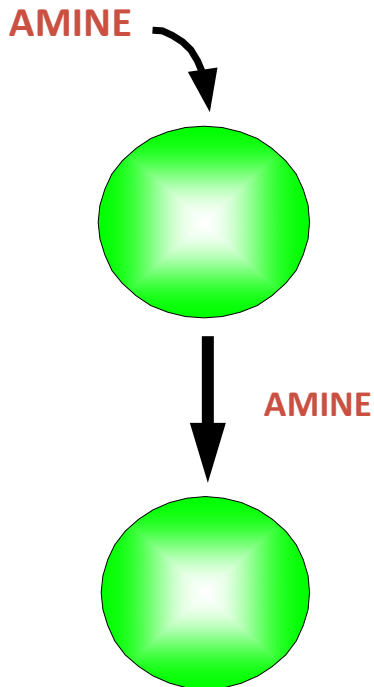
The Problem



- A power plant's combustion stream contains **15% CO₂ by volume**
- Current capture methods use amine-based wet scrubbing technology, which is **energy intensive**
- Basic Immobilized Amine Sorbents offer a **lower temperature, lower power requirement solution**

The Solution

IMMOBILIZATION

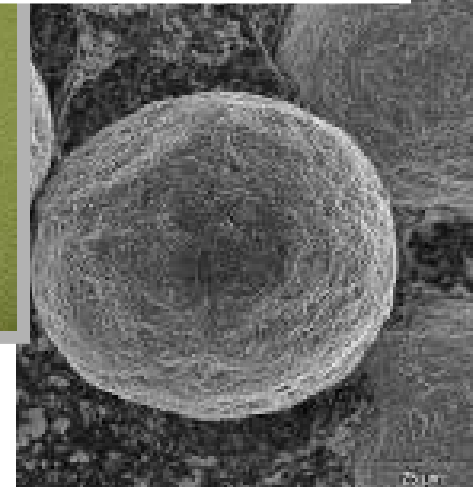
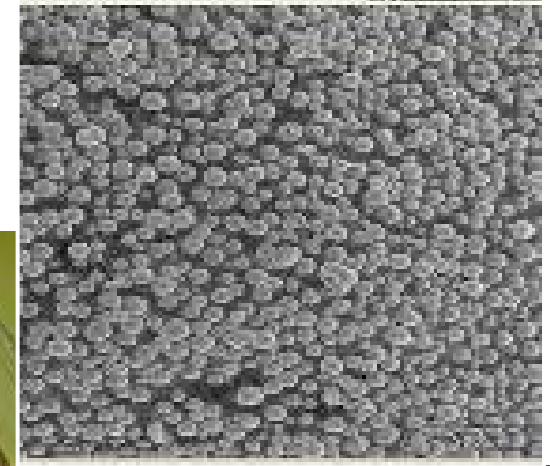


Process Summary:

- Treat the amine compound to make it more selective to CO_2
- Immobilize the amine onto a porous solid support to formulate the sorbent
- React and absorb CO_2
- Sorbent is thermally regenerated at low, steam, temperatures

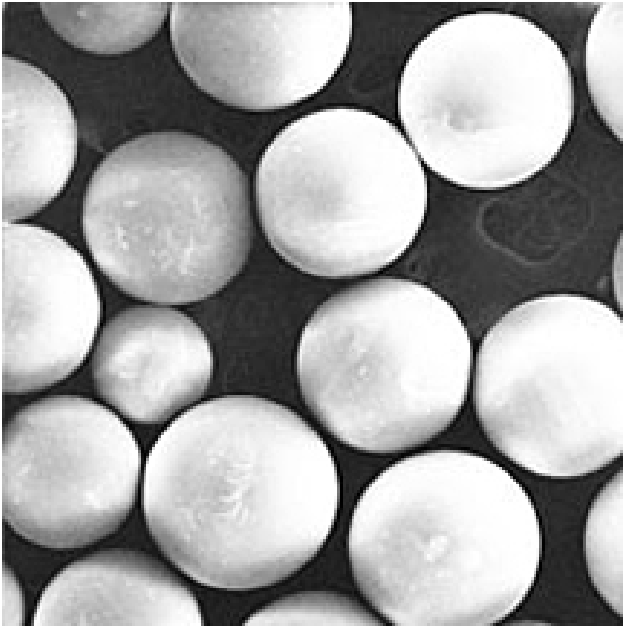
Types of Sorbents

- **Two different formulations studied at NETL:**
 - Clay substrate, amine impregnated.
 - Silica (catalyst support).
- **Both manufactured with commercial processes/partner.**



NETL CO₂ Sorbent , spray dried formula, 80 μ m

NETL Sorbents



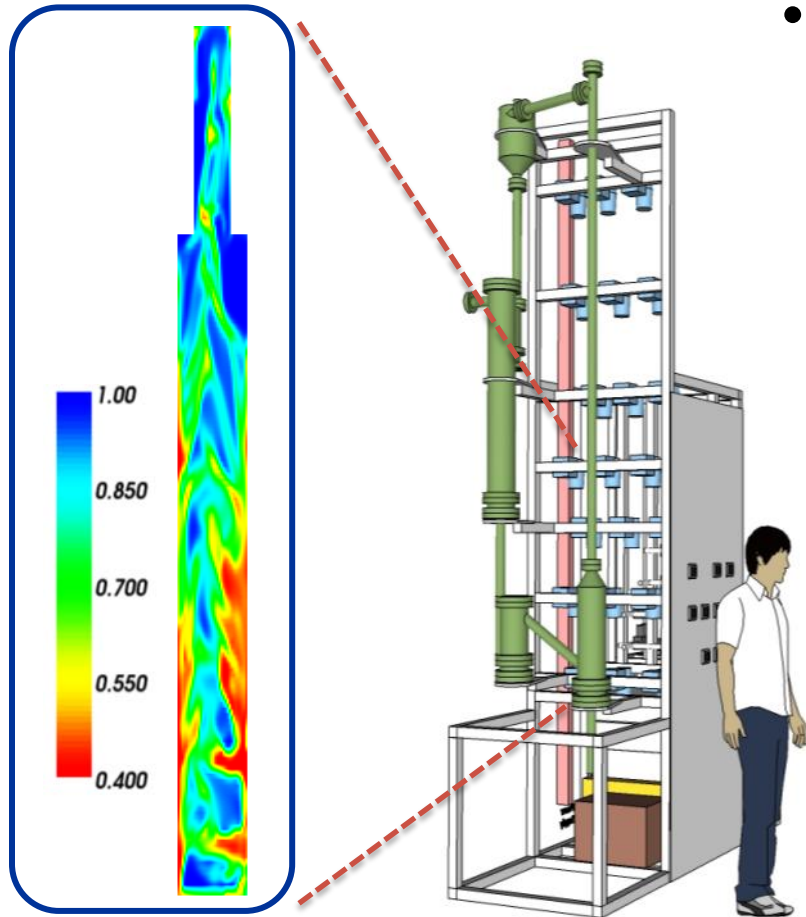
- **Simple**
- **Scalable**
- **Increased Capture Capacity**
- **Moisture Resistance**
- **Reduced Corrosion**
- **Potential for Lower Energy Requirements and Costs**
- **Minimized Water Usage**
- **Stability**



Pressure Chemical Pan Dryer Used to Manufacture Sorbents

CO₂ Capture

Sorbents Process Development



Predicted absorber gas fraction *

- **NETL experimental system.**

- Lab size/scale allows rapid screening of component options.
- circulating absorber & regenerator
- validates thermal, hydrodynamic, transport, and kinetic performance

Validating data: enabling rapid scale-up with models.

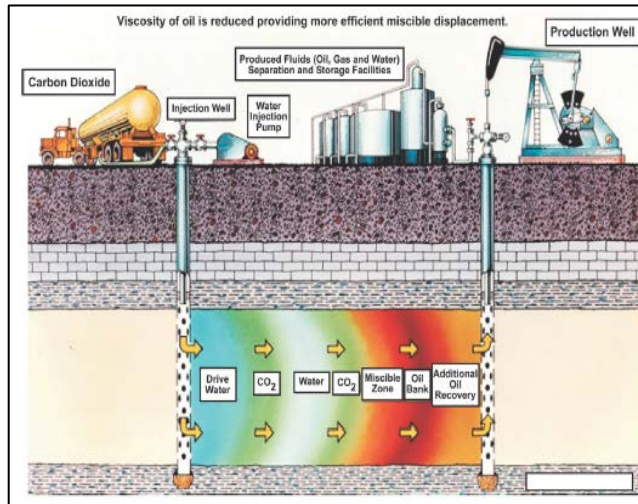
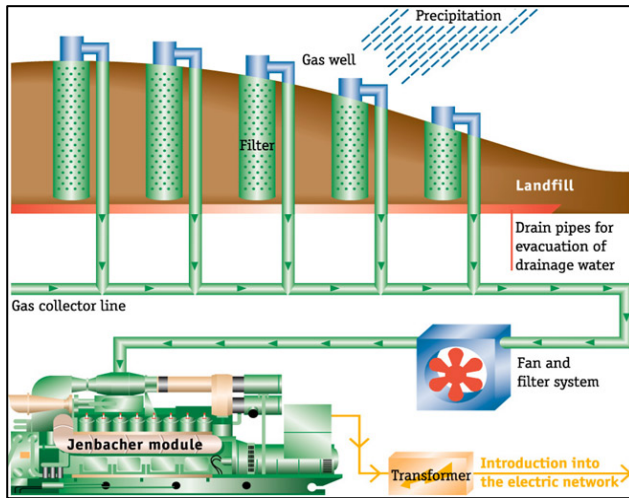
- Partnership with commercial developer [ADA-ES](#).
- Case study for [Carbon Capture Simulation Initiative \(CCSI\)](#).



Sorbent pilot unit developed by ADA, Inc.

Other Applications

Landfill Gas Cleanup

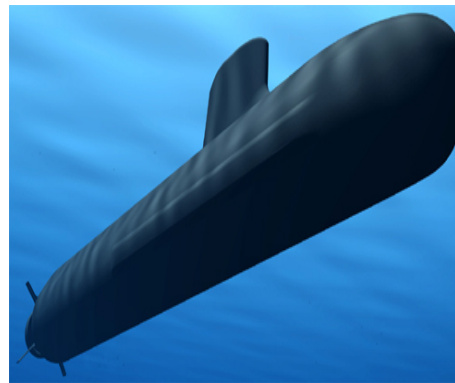


Biogas Application

Enhanced Oil Recovery Application

- Landfill gas is a by-product of the decomposition of municipal solid waste. Contains 50% CO₂, 50% methane.
- EOR Natural gas sweetening
- Biogas clean up
- Carbon dioxide reduction in confined spaces life support systems.

Life Support System Applications



Partnership Opportunity

This technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory.

For more information, contact techtransfer@netl.doe.gov