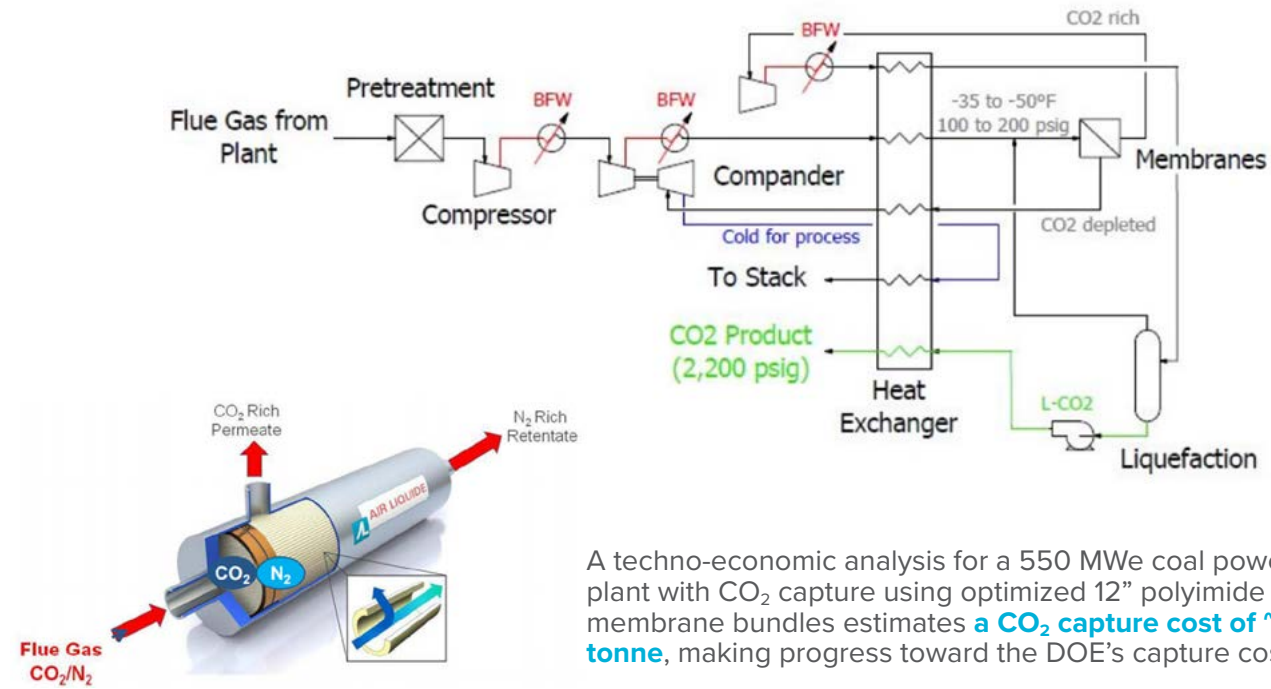


# NEXT GENERATION HOLLOW FIBER MEMBRANE MODULES REDUCE COST OF CO<sub>2</sub> CAPTURE

Polyimide-based membrane material for application in hybrid cold membrane/cryogenic distillation process yields cost-effective CO<sub>2</sub> separation from flue gas

## IMPROVED ECONOMICS FOR CARBON CAPTURE

Air Liquide's hybrid process combines cold membrane operation with cryogenic separation technology for CO<sub>2</sub> liquefaction to achieve 90% CO<sub>2</sub> recovery at >58% purity.

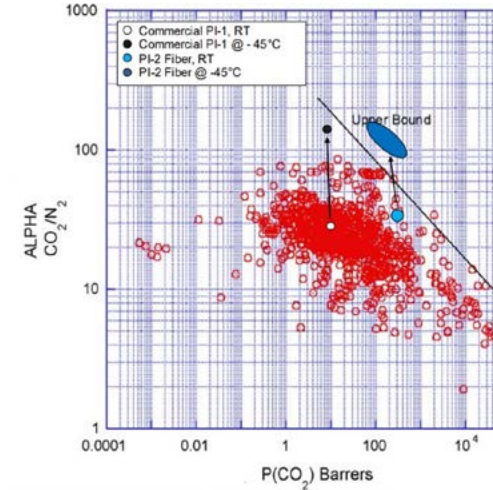


## STABLE MEMBRANE PERFORMANCE AT SUB-AMBIENT TEMPERATURES

Air Liquide completed testing of next generation hollow fiber membrane modules at the National Carbon Capture Center. Field testing on 6" PI-2 membrane bundles at 0.3 MWe scale was performed using actual flue gas. The membranes exhibited stable performance at -40°C for >700 hours and were capable of processing >650 Nm<sup>3</sup>/hr of flue gas at 90% CO<sub>2</sub> recovery and with a permeate composition of 59% CO<sub>2</sub> purity.



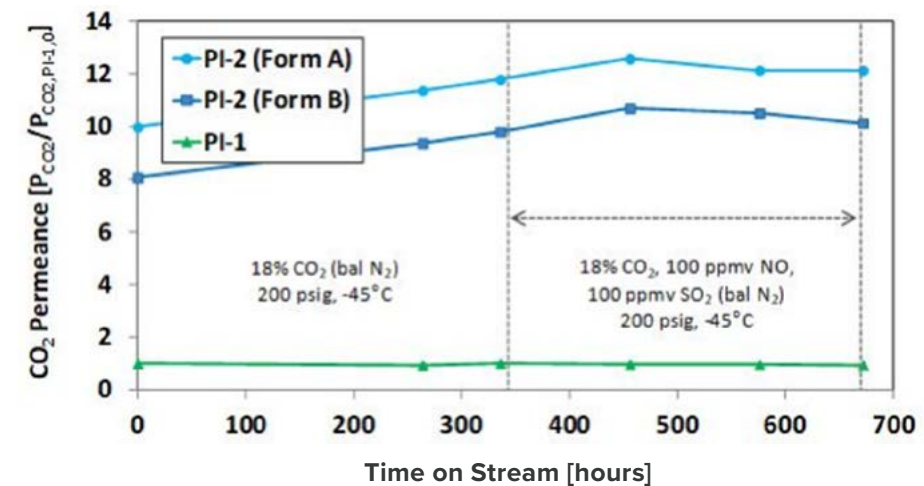
## POLYIMIDE MEMBRANES EXHIBIT COMBINATION OF HIGH PERMEANCE AND CO<sub>2</sub>/N<sub>2</sub> SELECTIVITY



- Polyimide (PI)-based membrane bundles show a two-to-four times higher CO<sub>2</sub>/N<sub>2</sub> selectivity with minimal loss of CO<sub>2</sub> permeance when operated at temperatures below -20°C, as compared to ambient temperature operation.
- PI-2 material exhibits CO<sub>2</sub> permeance >5x higher than PI-1 material.

## MEMBRANES RESISTANT TO ACIDIC COMPONENTS IN FLUE GAS

PI-2 membrane fibers are stable at 100 ppm NO and SO<sub>2</sub> and tolerant to 20 ppm NO<sub>2</sub>



## PARTNERS



AWARD NUMBER  
DE-FE0026422

## PROJECT BUDGET



- DOE .....\$3,314,494
- PERFORMER..... \$1,055,463

## CONTACTS

HQ PROGRAM MANAGER  
LYNN BRICKETT

TECHNOLOGY MANAGER  
DAN HANCU

FEDERAL PROJECT MANAGER  
ANDREW O'PALKO

PRINCIPAL INVESTIGATOR  
ALEX AUGUSTINE

## CORE COMPETENCIES

