

CARBON ASSIST

Novel Hybrid CO₂
Capture System From
The Atmosphere (DAC)

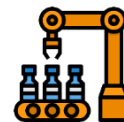
CSIRO
Amir Aryana



Why Direct Air Capture (DAC)?

Advantages

- Versatile – Anywhere
- Verifiable – Measurable
- Scalable – Modular
- Net negative



Challenges

- Innovation at **every part** across the whole DAC system
- **Large** quantities of CO₂ and how **fast**
- CO₂ storage / locking / utilisation (\$/tCO₂)
- **Energy** and **cost**



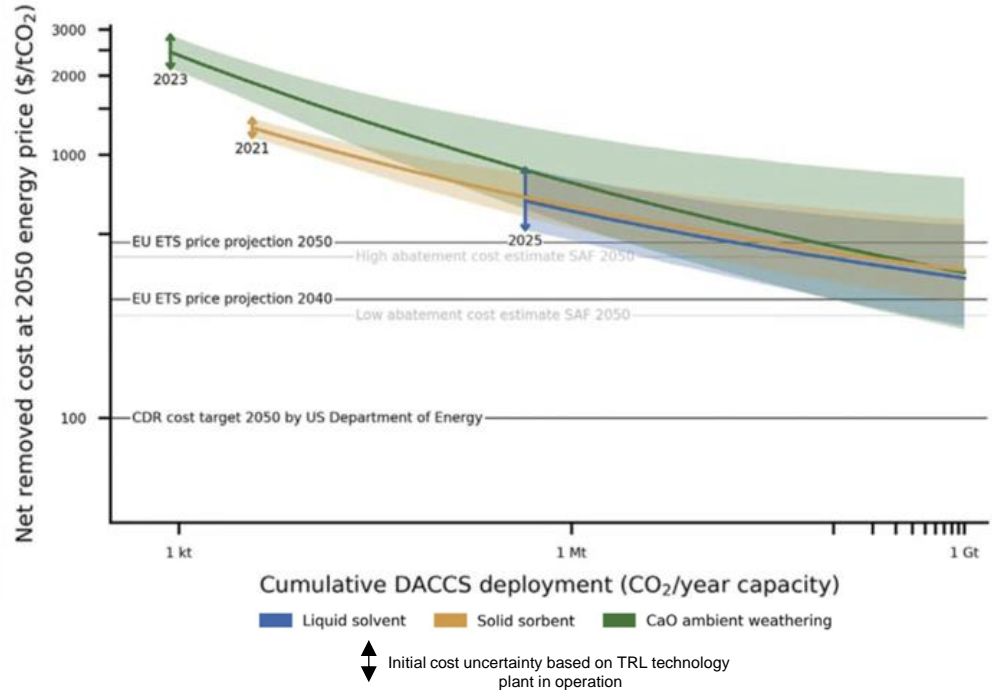
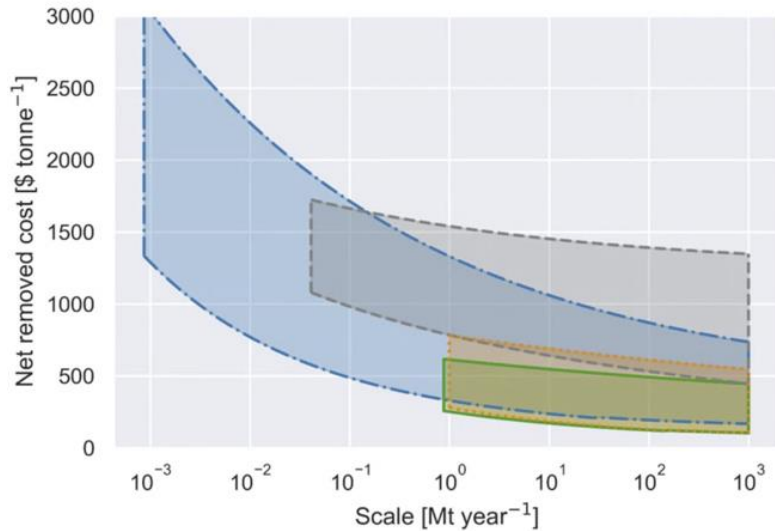
Fiscal / Regulatory

- Internationally recognised trading schemes, standards and certification
- Policy, regulation and financial



Predicted DAC cost $\$/\text{tCO}_2$

- Based on current TRL level and similar known technology cost curves



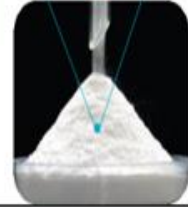
Cumulative DACCS deployment (CO₂/year capacity)

Liquid solvent (Blue line), Solid sorbent (Orange line), CaO ambient weathering (Green line)

Initial cost uncertainty based on TRL technology plant in operation

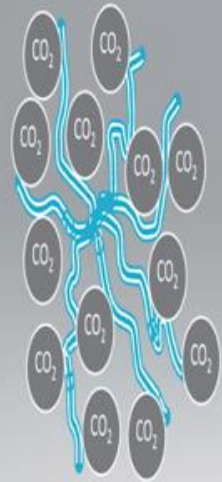
Existing Approaches

Global solutions		Hybrid
Liquid Solution	Solid Solution	CSIRO Energy Liquid Amine Particle Solution (LAP)

Liquid Systems	Solid Systems	Liquid Amine Particles
Amines used for NG purification or post-combustion capture		
	 	 

The CSIRO innovation uses a particulate material to remove carbon dioxide (CO₂) from gas/air streams. The process is different from existing systems which use either a solid adsorbent or a liquid system to extract the CO₂.

Most importantly, the CSIRO innovation, using the particulate material, *can be adapted to almost any application for carbon capture.*



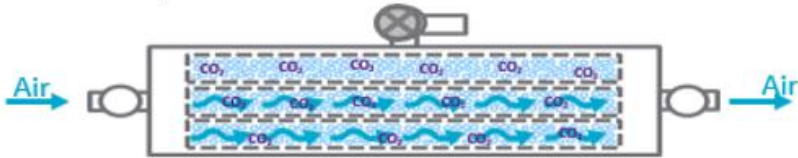
Normal Liquid Amine



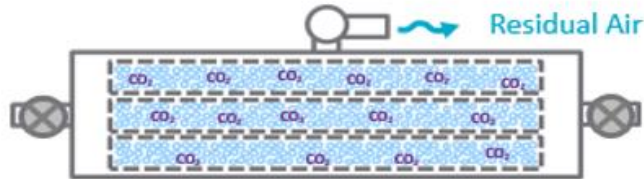
An innovative Carbon Capture Sorbent Material Solution which significantly exceeds current industry benchmarks of utility, economy and efficacy.

How does CarbonAssist work (DAC)?

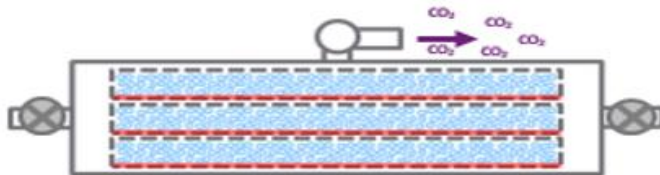
1. Air flows through CarbonAssist™ unit where carbon dioxide is adsorbed by LAPs.



2. Close air inlet and outlet valves. Open exhaust valve and pull vacuum to remove residual air in chamber.



3. Apply **heat**, release carbon dioxide from sorbent and pull vacuum to exhaust carbon dioxide.



CONFIDENTIAL

CARBON ASSIST



CarbonAssist 0.25 tCO₂/day



Thank You & Visit Us

GHGT (Perth) 2025!



Colin Wood

Team Leader

Energy | CSIRO

Colin.wood@csiro.au | 08 6436 8701

Jason Czapla

Principal Research Engineer

Energy | CSIRO

Jason.czapla@csiro.au | 07 3327 4185

Amir Aryana

Group Leader

Energy | CSIRO

Amir.aryana@csiro.au | 02 9490 8109