



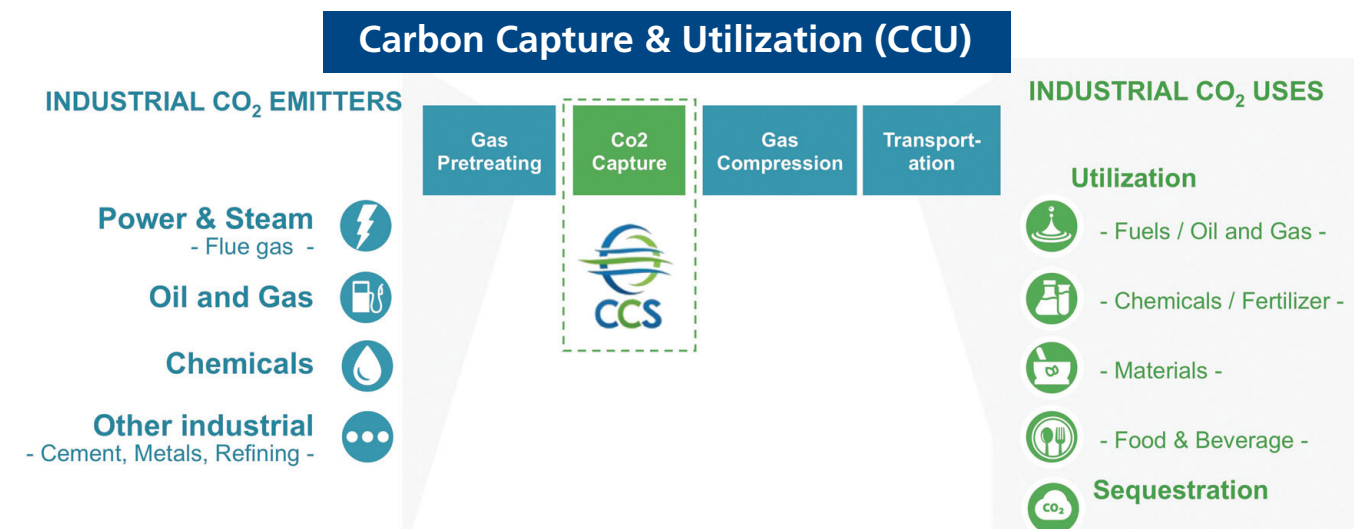
Cost-Cutting Technology for CO₂ Capture & Reuse

CDRMax® Flue Gas Process



The CDRMax® Process

The CDRMax® licensed process captures carbon dioxide (CO₂) from industrial flue gases or off-gases emitted from power plants, boilers, and chemical facilities. The technology removes from 50 to 95% of the CO₂ from natural gas, coal, and petroleum-fired processes to produce a high purity (>99.5%) industrial grade CO₂ for downstream use. The process is applicable from mid-scale (100s of metric tons per day) to large-scale (1,000s of metric tons per day) capacities for carbon capture and utilization (CCU) projects which can be integrated with materials, chemicals, and energy production.

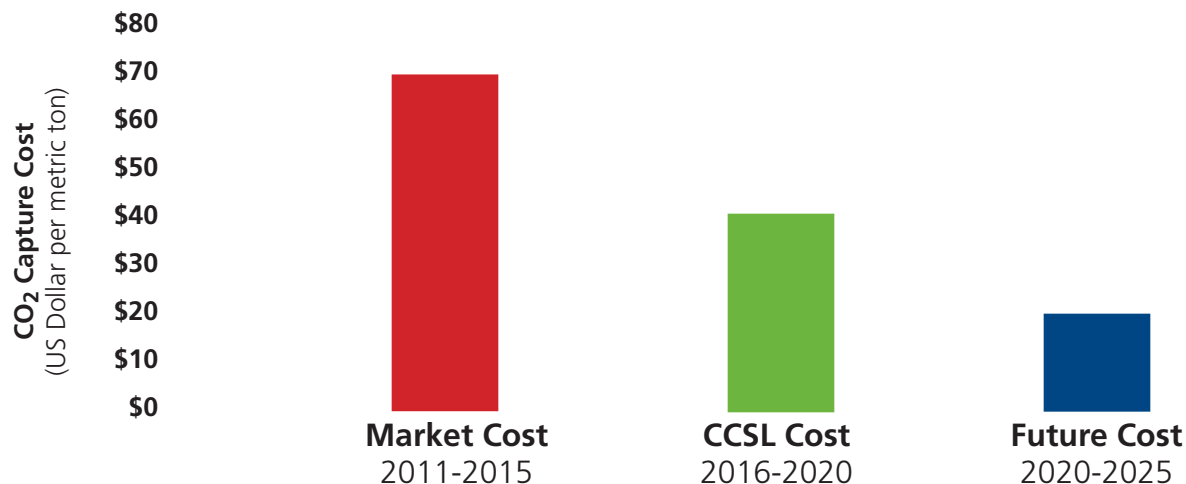


Technology Benefits

CDRMax® operates at atmospheric pressure to capture and purify CO₂ from low pressure flue gas and off-gas streams. The technology can be flexed to manage CO₂ concentrations in the source gas from 3% to 25% and produce CO₂ with purities between 95-99.99%.

CDRMax® is a proven chemical absorption-based process technology that combines the use of an advanced proprietary solvent with novel heat integration to reduce the cost of capture to an estimated \$40 (USD) per metric ton, a 40% life-cycle cost reduction versus* conventional CO₂ capture technologies.

Economic Impact – Cost of CO₂ Capture: Today and Tomorrow

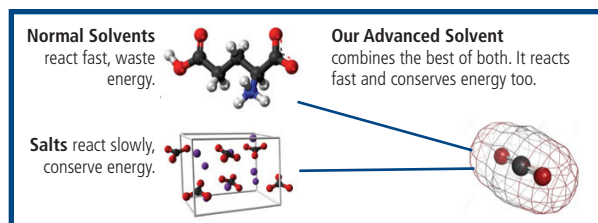


*Conventional technologies bench-marked using a monoethanolamine (MEA) chemical absorption process for low pressure CO₂ capture.

Reduced Life-Cycle Costs

Our CDRMax® process captures more CO₂ with less hardware and lower utility costs. CAPEX drops by 25% and OPEX by 40% when compared to conventional MEA-based absorption. Our proprietary solvent:

- Increases CO₂ loading to reduce pump sizing & circulation
- Reduces heat/power duties by 25-45%
- Minimizes corrosion thereby extending equipment life
- Requires no anti-foaming and anti-corrosion additives
- Keeps working — resists solvent degradation and foaming
- Lowers solvent emissions and waste-disposal costs



For either greenfield plants or as drop-in replacements at brownfield sites, our advanced solvents will reduce costs and extend plant life without equipment changes.

Working Principles *(Refer to Process Flow Diagram below.)*

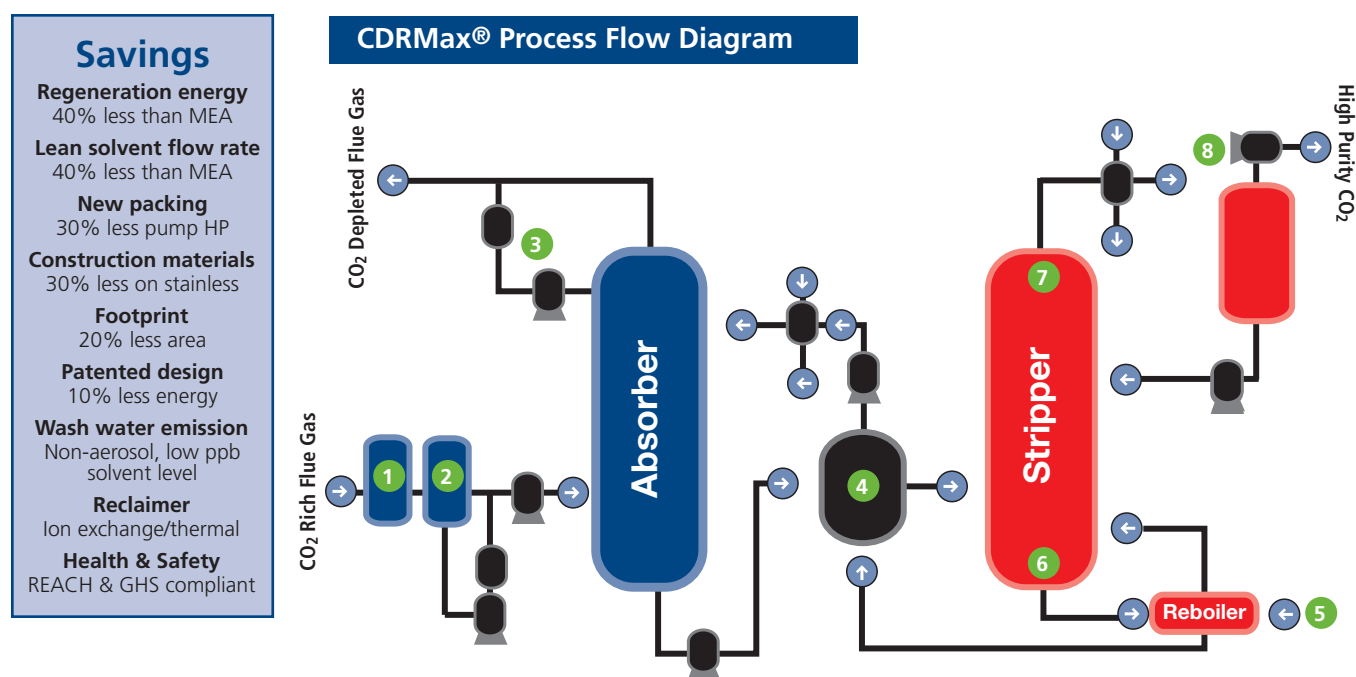
Flue Gas Conditioning – Flue gas is conditioned by an SO_x/NO_x scrubber **(1)** and then cooled **(2)**.

Absorption – The conditioned gas enters an absorption column where it contacts the counter-current flow of our proprietary solvent for efficient CO₂ absorption.

Washing – The depleted flue gas exits the absorber column and passes through an integrated water washer **(3)** to minimize the loss of the solvent.

Stripping – The CO₂ rich solvent from the absorber bottom flows to the lean/rich heat exchanger **(4)**, where the rich solvent is heated before entering the stripper column. The lean solvent (low CO₂) flows to the reboiler, where it is heated by auxiliary steam **(5)**. The steam from the reboiler enters the stripper tower **(6)** flowing upward, counter-current to the rich solution. The absorbed CO₂ is released from the rich solvent and flows to the top of the stripper tower **(7)**. The lean solvent is returned to the absorber column via the lean/rich heat exchanger for further flue gas processing.

The 95-99.99% purity CO₂ is directed to the end-use application. (8)

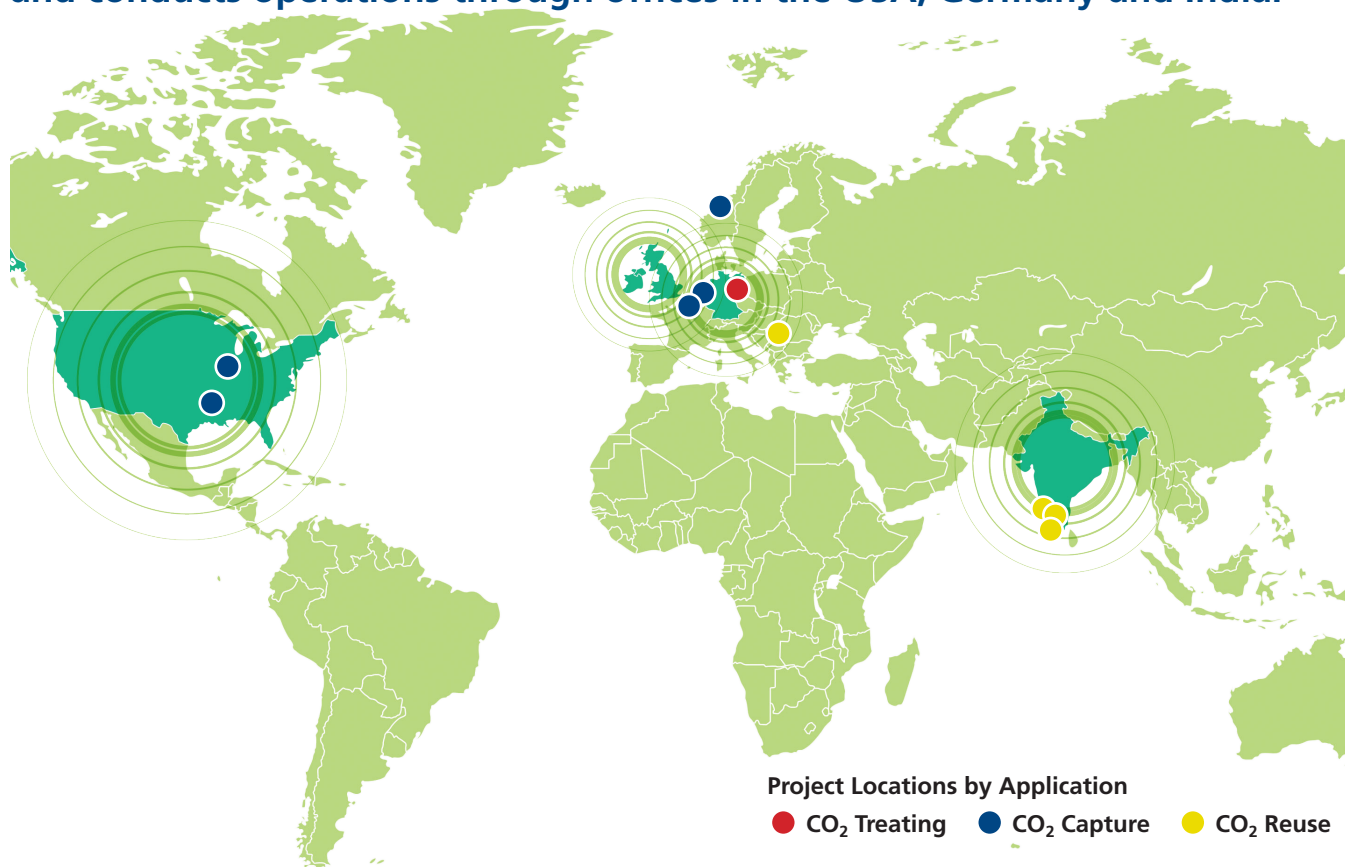


Savings

- Regeneration energy**
40% less than MEA
- Lean solvent flow rate**
40% less than MEA
- New packing**
30% less pump HP
- Construction materials**
30% less on stainless
- Footprint**
20% less area
- Patented design**
10% less energy
- Wash water emission**
Non-aerosol, low ppb solvent level
- Reclaimer**
Ion exchange/thermal
- Health & Safety**
REACH & GHS compliant

Presence and Experience

Carbon Clean Solutions maintains headquarters in the UK, and conducts operations through offices in the USA, Germany and India.



A Proven Track Record

CCSL is a recognized leader in CO₂ treating, capture and reuse as demonstrated by > 25 plants now operating with our technology. Our proprietary solvents combine with patented processes to deliver cost-effective and easy to operate solutions for treating flue gas, biogas, renewable gas, natural gas and syngas. EPCs, equipment suppliers and end users will benefit from lower life-cycle costs and reduced emissions.

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