

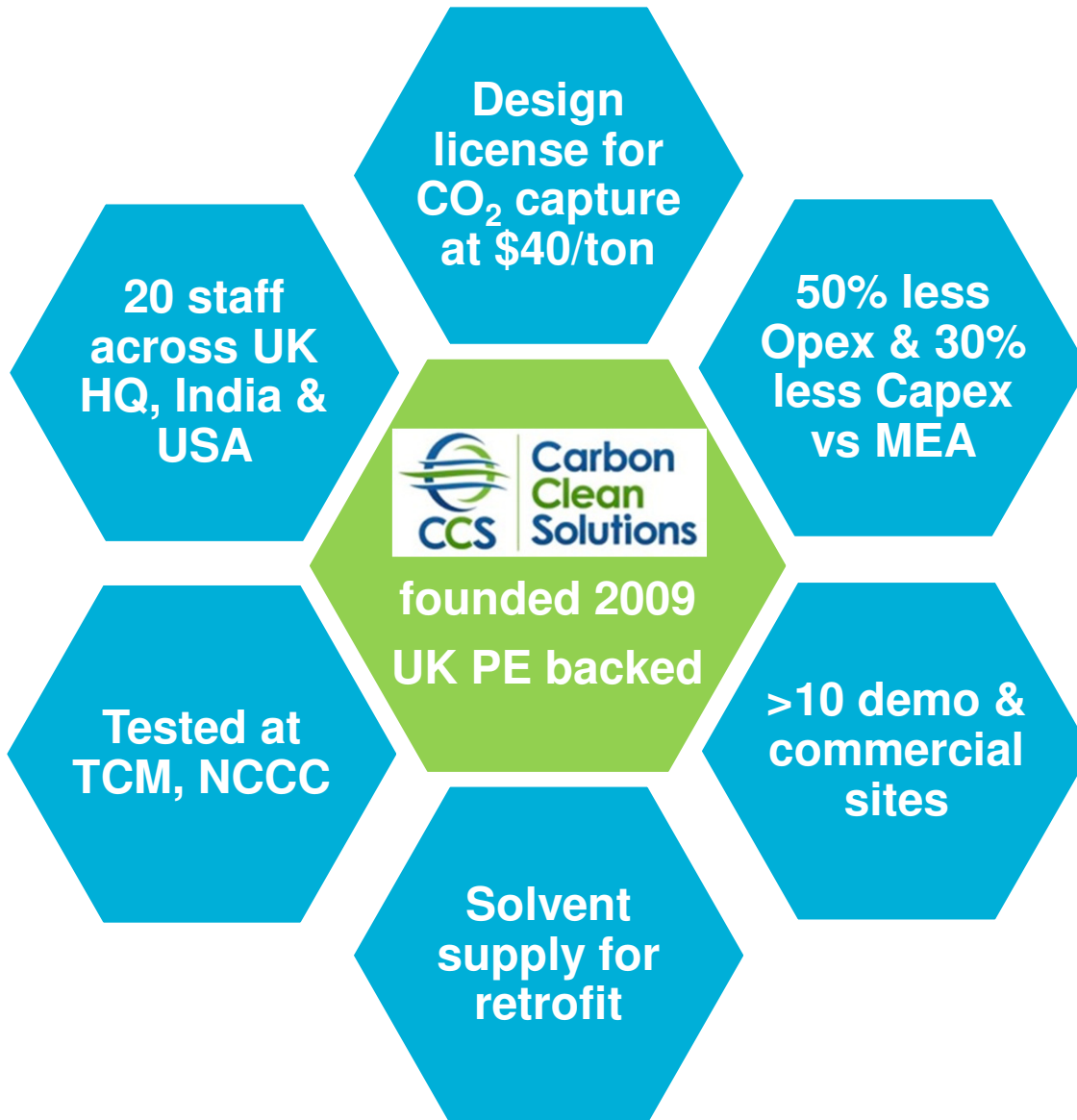
Commercializing CO₂ Capture for Reuse

Ramesh Kumar A | Team Leader

September 2016



Our Company



partners:



Department
of Energy &
Climate Change



Technology Pioneer

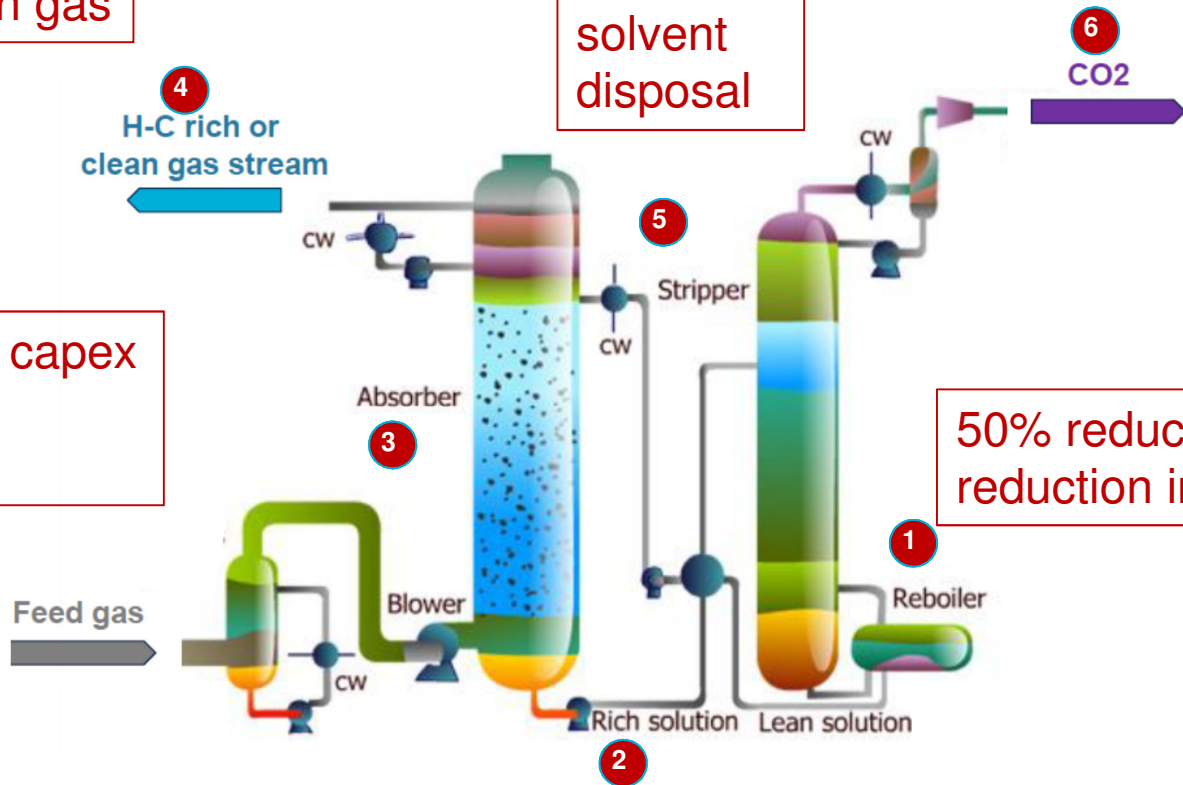
>50% reduction in lifecycle costs Vs MEA

ppb level of solvent emissions in lean gas

30% reduction in capex due to 10x lower corrosion

75% less solvent disposal

10% reduction in product CO₂ compression power

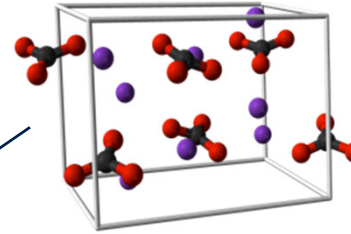
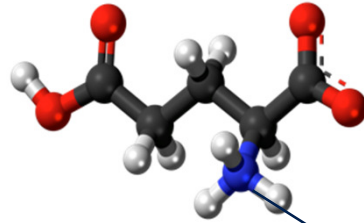


50% reduction in direct reduction in thermal energy

75% reduction in solvent make-up

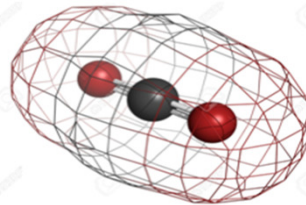
Performance Chemistry for CO₂ Capture

AMINES:
Fast reaction,
Small Equipment,
High energy,
Amine Emissions



SALTS:
Slow Reaction,
Large Equipment,
Low energy

Carbon Clean's Amine Promoted Buffer Salts



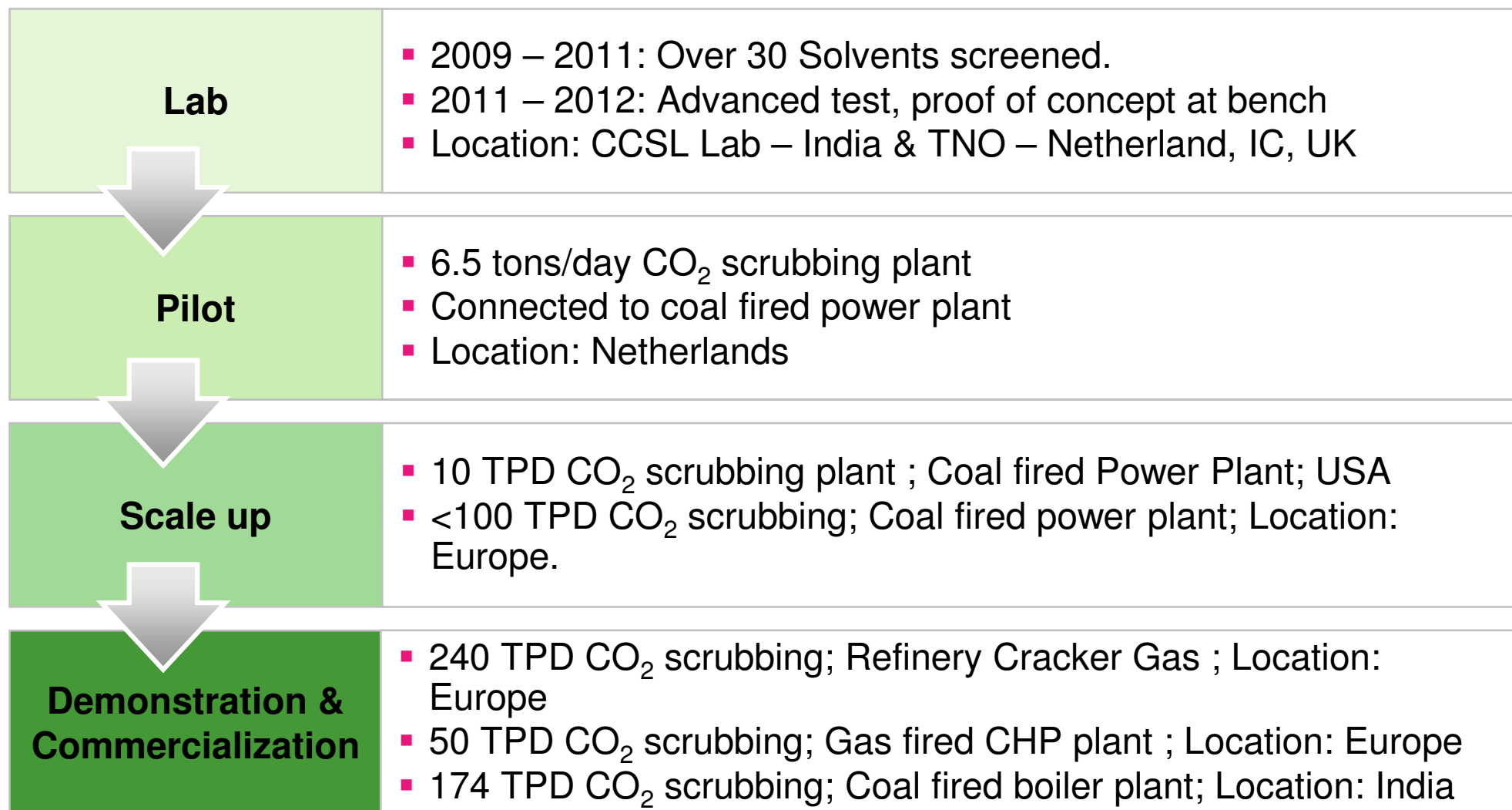
CDRMax Solvent

Solvent System	Net Capacity (mol /L)
MEA CO ₂ loading capacity	1.2 mol/L
CDRMax CO ₂ loading capacity	2.5 mol/L

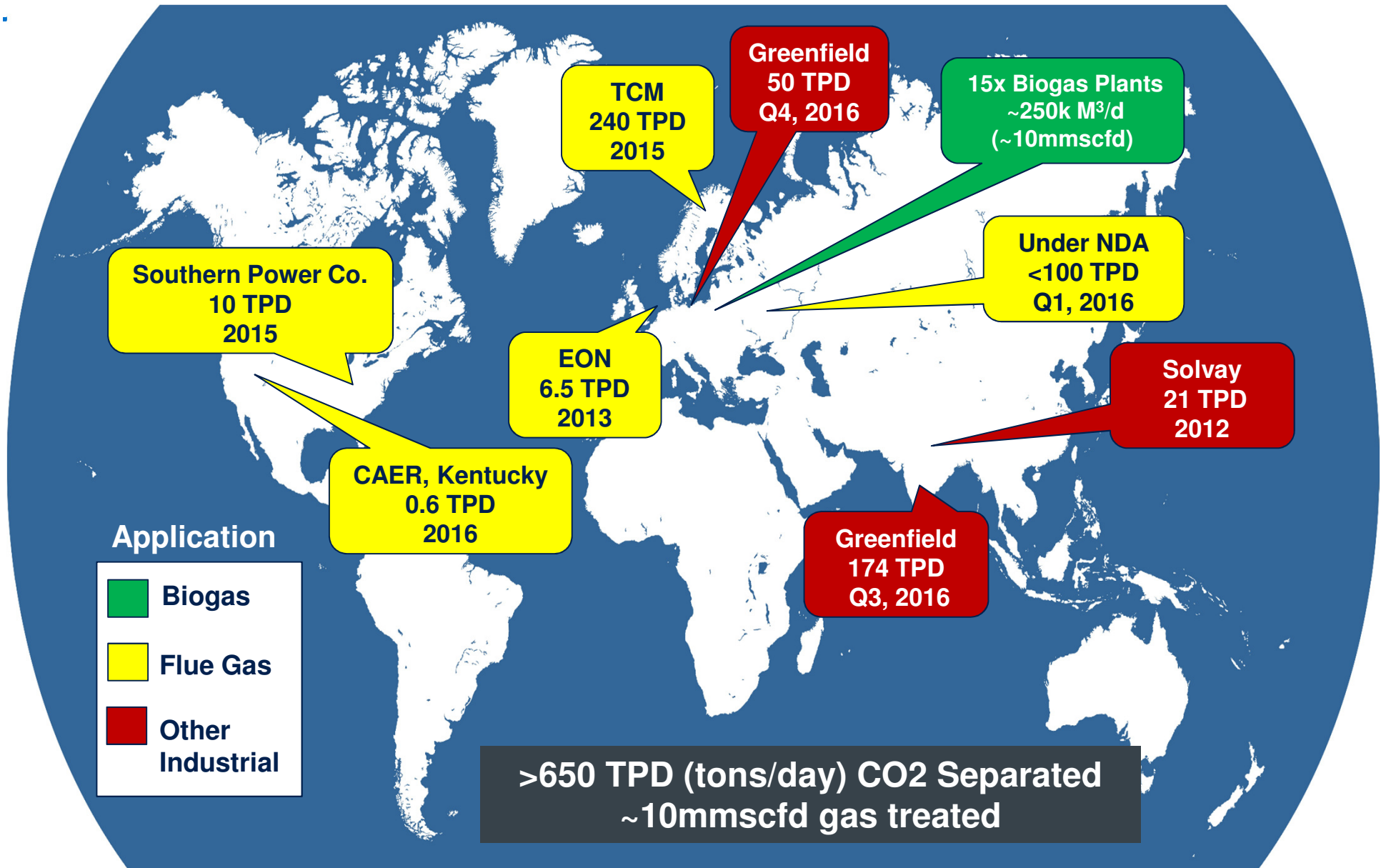
Solvent circulation rate is half for CDRMax compared to MEA leading to smaller equipment

Performance Chemistry: Less Energy, Simplified and Smaller Equipment

Technology Scale-Up



Proven Globally ~ 25 Facilities



Pilot: 6.5 TPD at EON Benelux



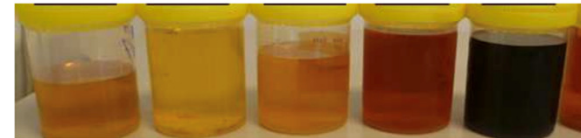
1000 hour test campaign:

- Coal / biomass fired power plant campaign (CO₂ concentration 12 vol%)

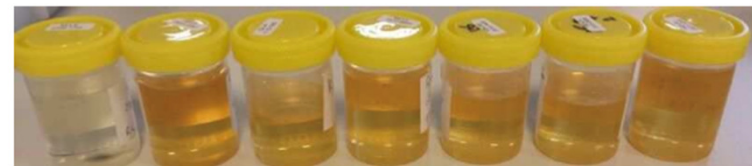
Result Vs MEA campaign:

- Zero degradation of solvent
- 15x reduction in corrosion
- 10x reduction in ammonia emissions
- 50x reduction in aerosol emission

MEA visual change in 1000 operating hours



APBS visual change in 1000 operating hours



Demo: 240 TPD at Technology Centre Mongstad (TCM), Norway



25000 tons CO₂ captured over 3500 hours

2-Part campaign:

- Gas fired CHP campaign (CO₂ 3.6 vol%)
- Cracker gas campaign (CO₂ 13 vol%)

Result:

- CHP Emissions = PPB level aerosol / solvent emissions
- Reliability = 100% plant availability
- Corrosion = 'Outstanding' quality for SS 304L
- No make-up of solvent

Commercial:174 TPD CO₂ Greenfield Project



Coal fired Boiler Flue gas CO₂ capture:

- Commissioning October, 2016
- FEED completed 2015
- CCSL's design

Benefits to customer:

- 30% lower capex
- 50% lower opex
- "PPB" solvent emissions
- Ion exchange re-claimer
- Absorber: H= 27m , D= 3.8m



CO₂ conversion to high value products



CO₂ emission from
Power generation



CO₂ emissions from
industry



Air Pollution is 5th
largest cause of deaths



Integrated
CDRMax™ System
for capturing CO₂
and reusing it



Chemicals



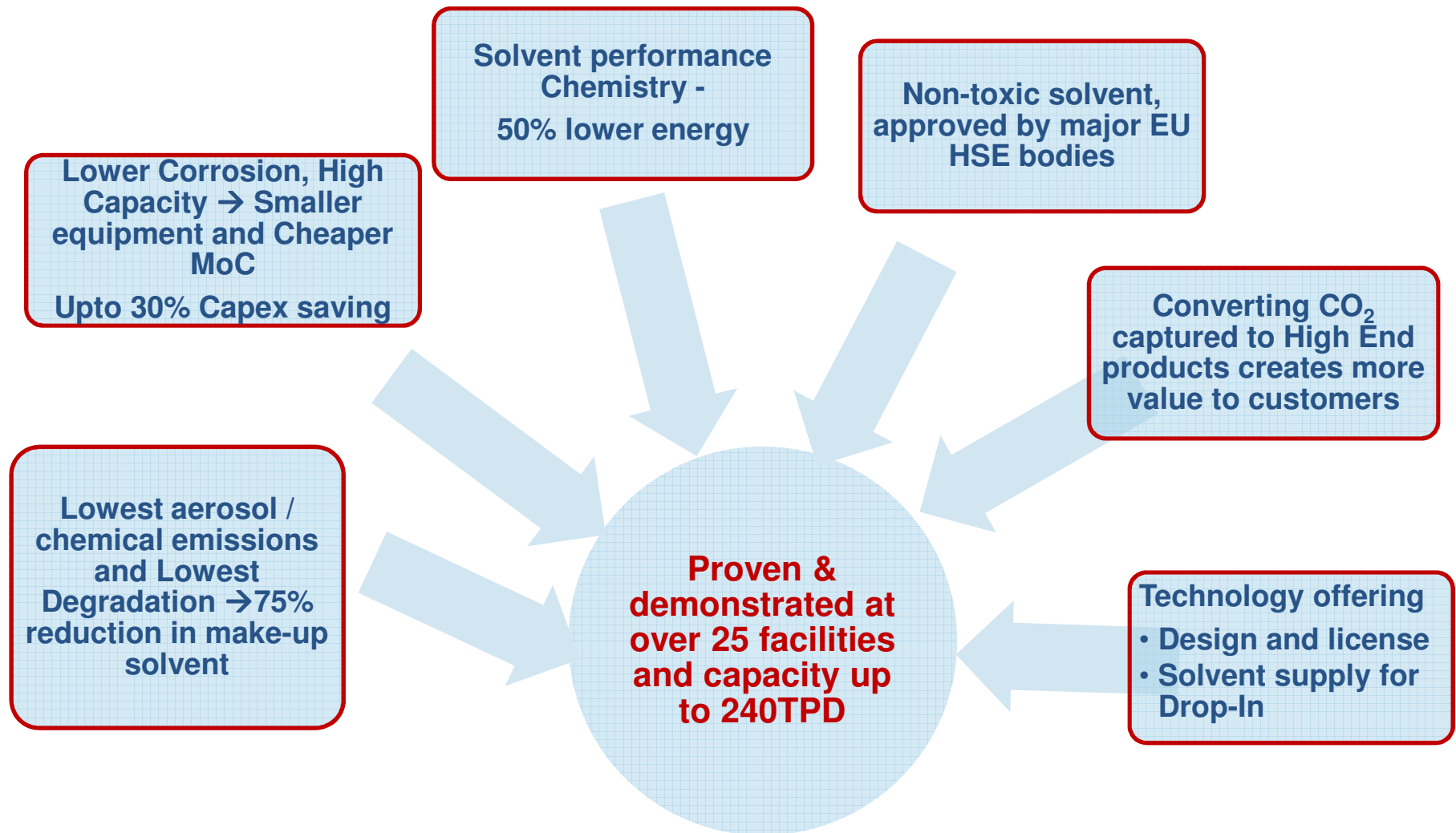
Enhanced Oil
Recovery



Plastics

Potential to capture & reuse of over 5 Million Tons of CO₂ annually, economically. The Lowest CO₂ capture cost of CCSL technology enable customers creates more value

Summary



Are you interested in our offerings?

In case of any questions, do not hesitate to contact us:

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