



Novel Solvents for CO₂ Capture

Prateek Bumb – Director

Carbon Clean Solutions Pvt. Limited

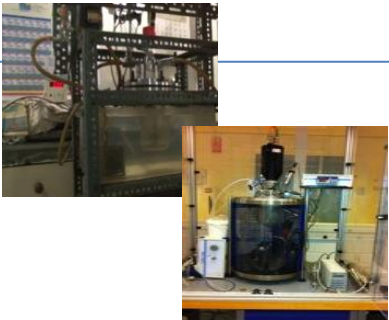
London, 26th March 2013

About: Carbon Clean Solutions

2009

Established in India

Extensive R&D on CO₂ capture solvents



2011

Partnership with TNO

Lab scale testing



TNO

2012

UKTI: Top 5 cleantech

DECC grant: £3.6m

Partners: IC, UoL, Pse



Imperial College London

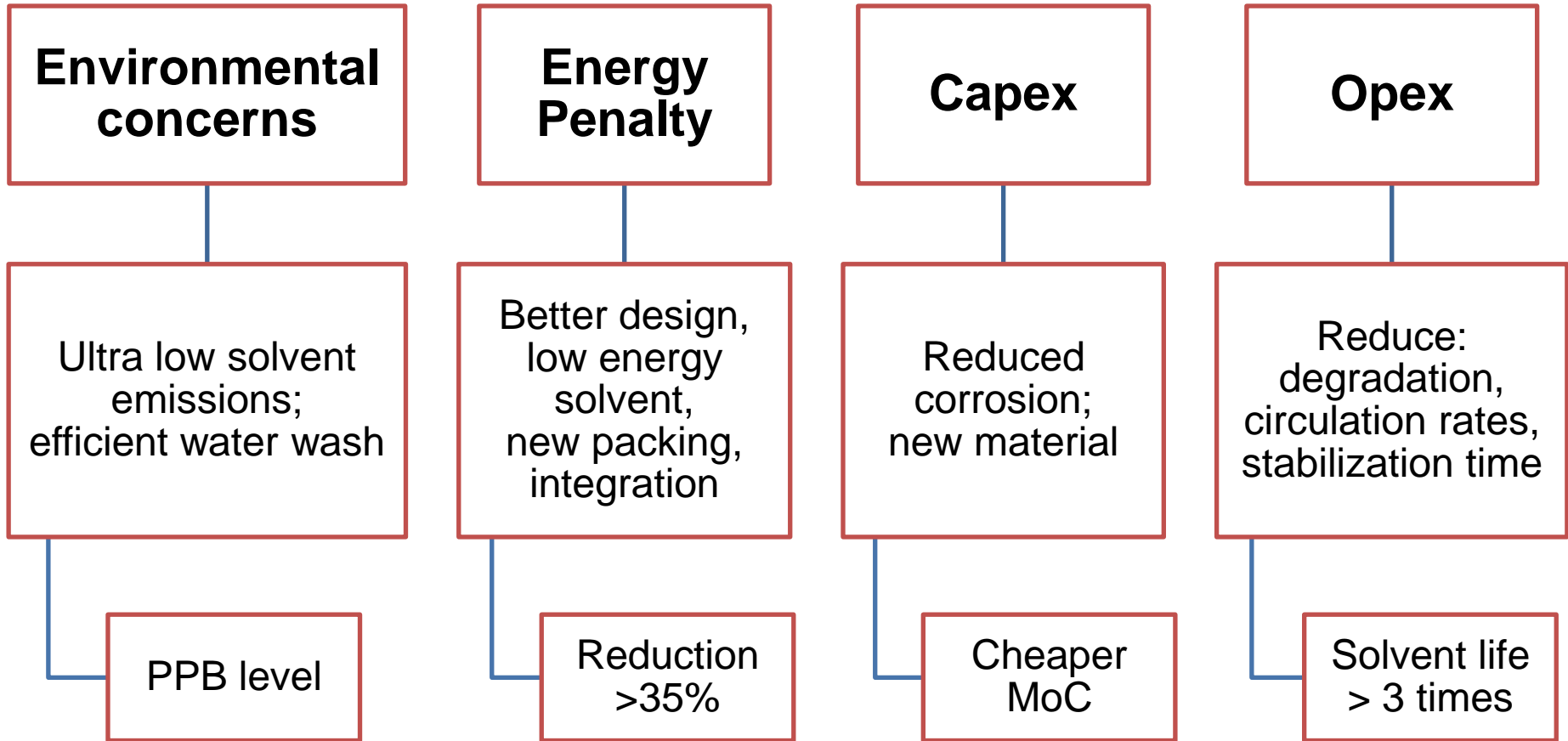
2013

Signup suppliers: equipment, chemicals

Build team in UK

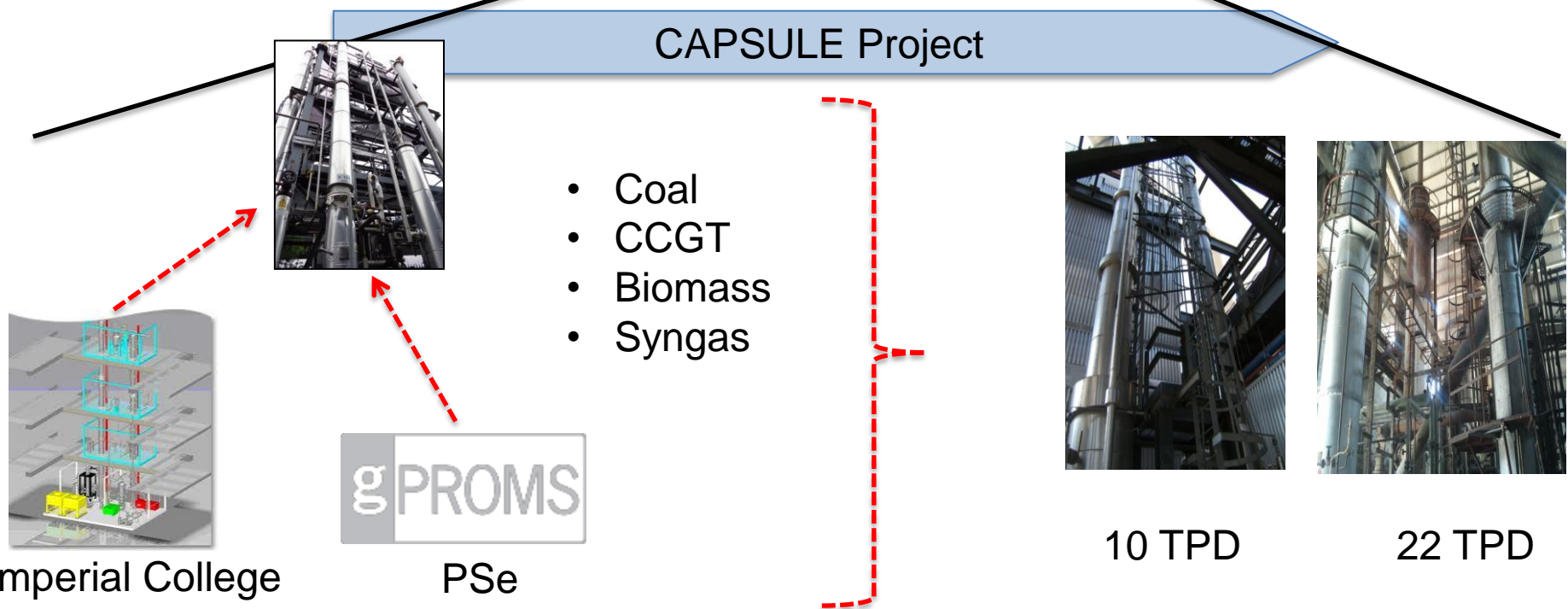


CCS Technology Focus

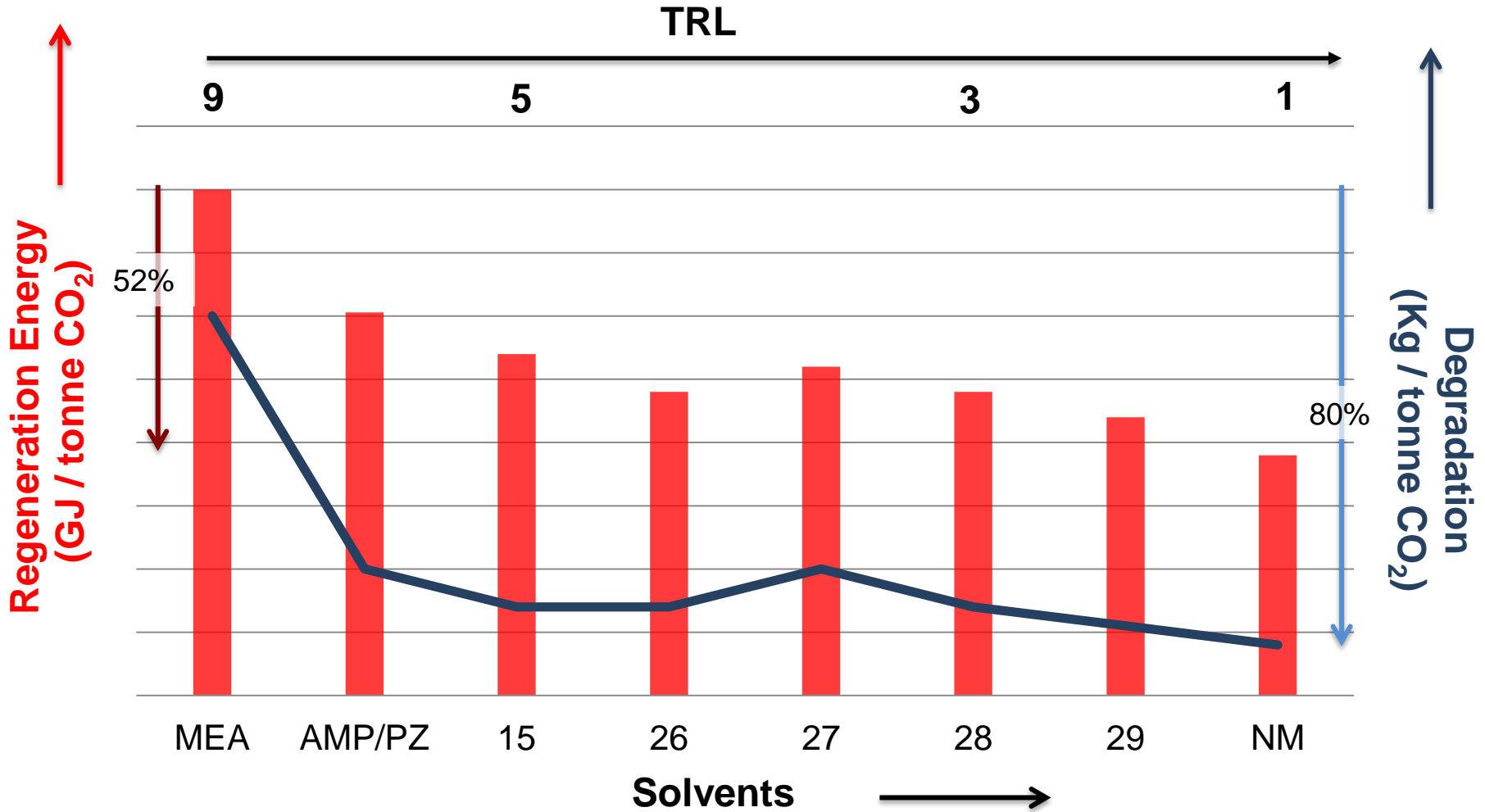


DECC Grant: Future development

TRL	1	2	3	4	5	6	7	8	9
Work	>30 solvents screened			Detailed data, demo & pre-commercial scale pilots			Commercial scale pilots		
Status	Completed			Started			Planned		



Performance: Energy & Solvent Loss



Research & Development

Extensive simulations & modeling

Rate Kinetics

VLE (vapor liquid equilibrium) data

Solvent stability & strength

Degradation & Corrosion Studies

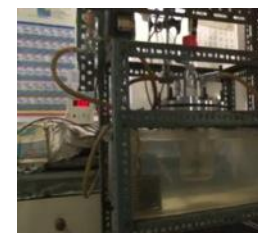
Toxicity Studies

MSDS

Bench scale demonstration

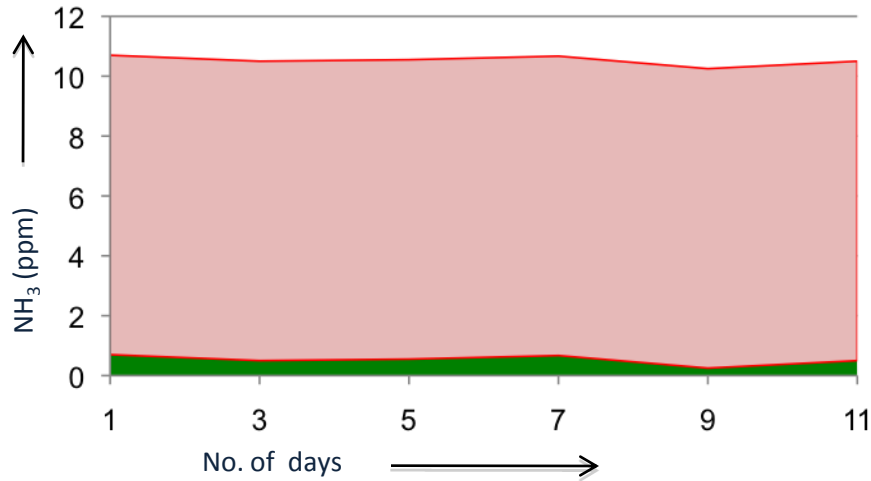


Long Term Pilot Testing (UK)



Laboratory Tests (India/Netherlands)

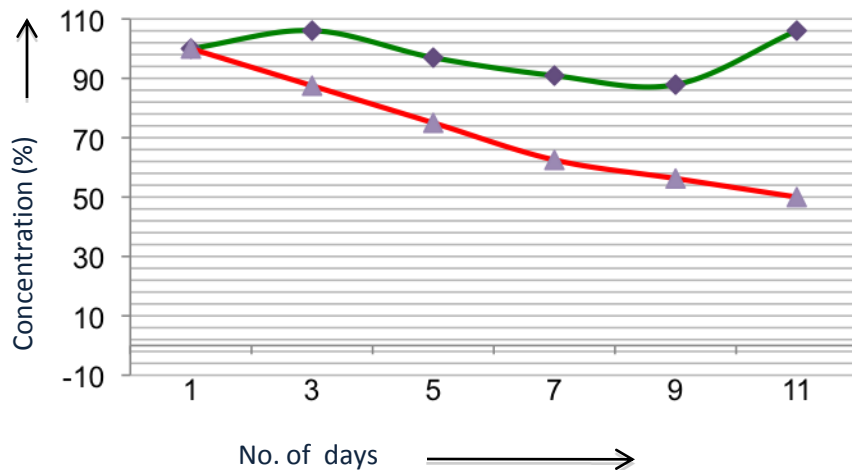
Thermal & Oxidative Degradation Performance



Oxidative degradation test

- 16% O_2 in flue gas, extreme conditions
- NH_3 : primary oxidative degradation product
- 10 times better performance*

◆ CCS Solvent ■ MEA



Thermal degradation test

- No change in solvent strength after 11 days
- Active concentration
- 2-3 times in solvent life*

— CCS solvent
— MEA

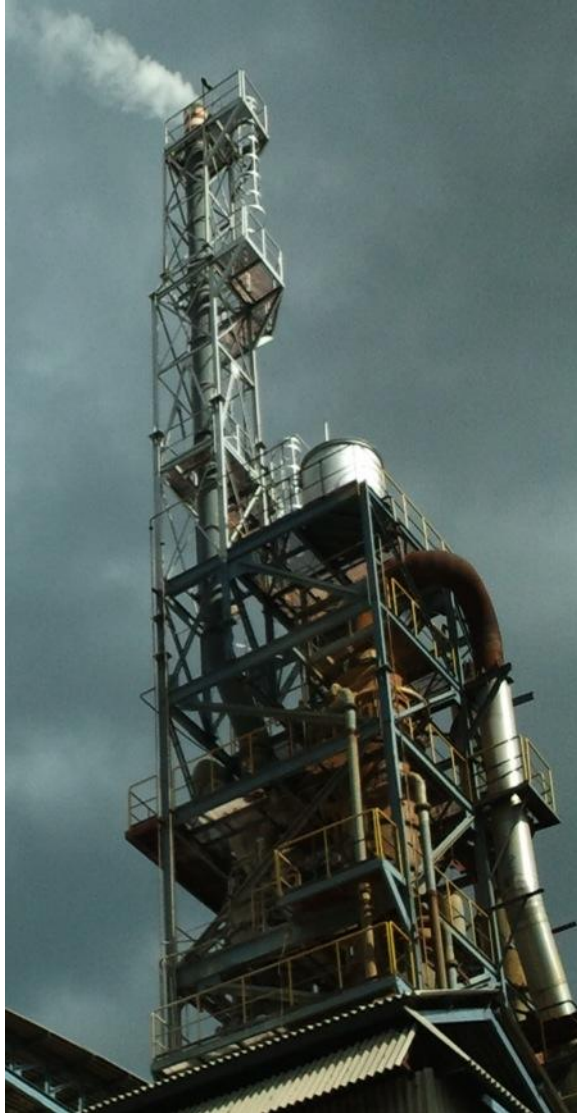
* As compared with MEA

CASE STUDY – CO₂ capture in chemical plant



- **Customer: largest specialty chemical producer in EU**
- **CO₂ capture from kiln**
- **Captured CO₂ used for producing specialty chemical**
- **Carbon Clean Solutions' APBS technology to:**
 1. **Reduce operating costs by 48%**
 2. **Increase solvent life to 3 times**
- **Contract award in 2012**

Onsite Operations





Power –
CO₂ Capture from
coal / gas fired
power plants

Steel –
TGR. CO₂ capture
to reduce
coke/LNG
consumption

Fertilizer & Chemicals –
CDR (CO₂ recovery) for
reusing CO₂ in
fertilizer/chemical
plants

Biogas upgrade
to CNG

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