

Opportunities for industrial CCS deployment in developing countries

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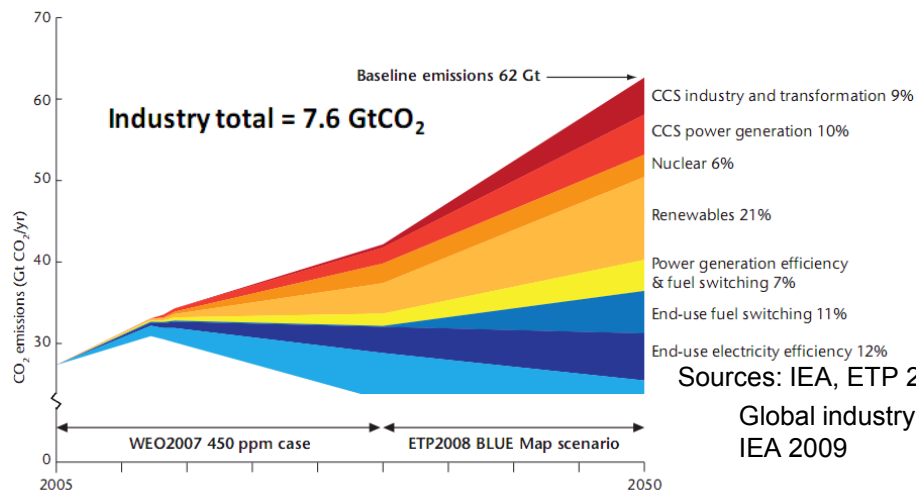
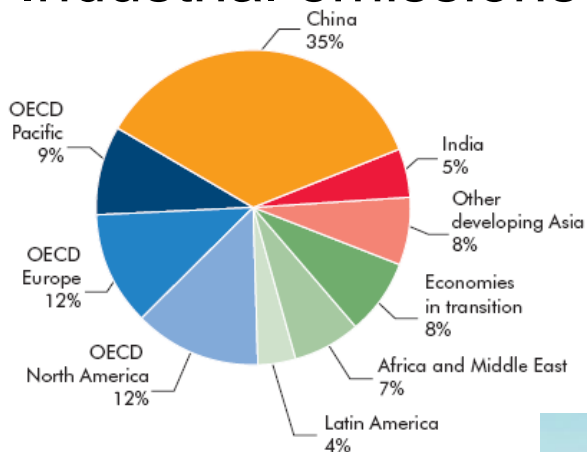


Overview

- Introduction
- CCS deployment
- CCS promotion
 - System competitiveness
 - EOF & CDM
- Conclusions

Introduction

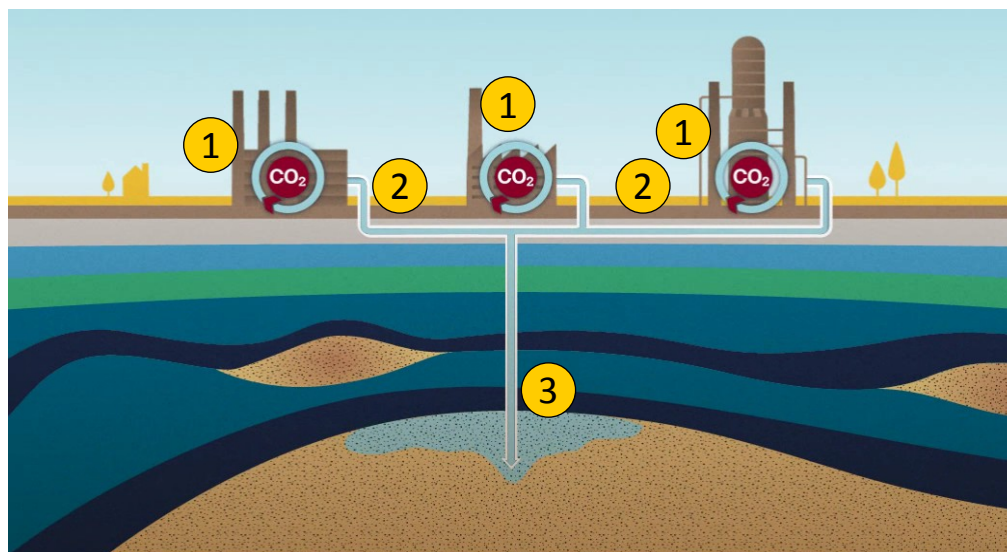
Industrial emissions



Sources: IEA, ETP 2008

Global industry emissions
IEA 2009

Carbon Capture and Storage



Source: European Technology Platform for Zero Emission Fossil Fuel Power plants

CCS deployment

Industries with high purity CO₂ emissions

Activity	Source stream	CO ₂ conc (%; inlet)	Pressure (MPa)	Partial pressure (MPa; CO ₂)	CO ₂ conc (%; outlet)
Gas processing	Reservoir gas feed	2 - 65	0.9-8	0.05-4.4	95-100
Ammonia	ATR/SMR/Gasifier	15 - 20	2.8	0.5	10
CTL	Gasifier	10 - 15	2.8		
Ethylene oxide	Reactor	8			

Currently presents high

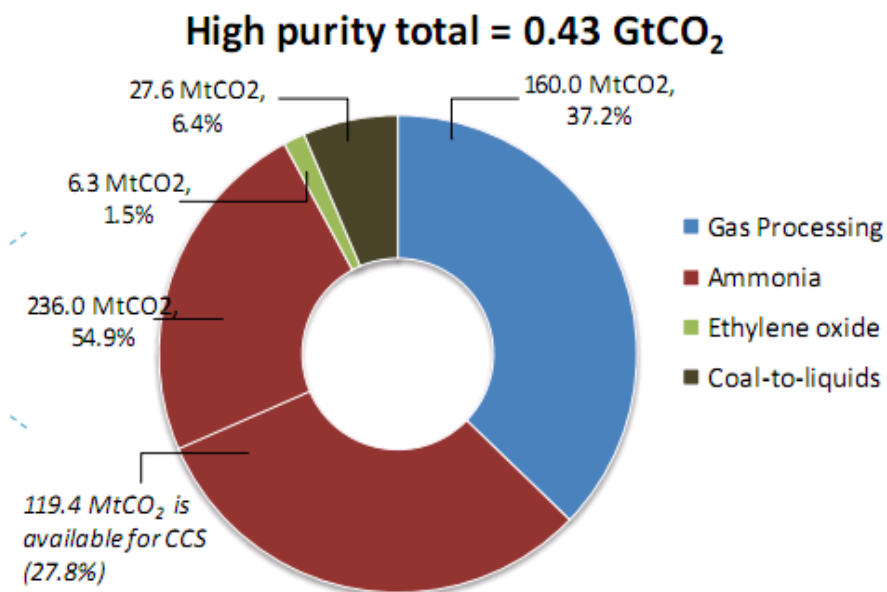
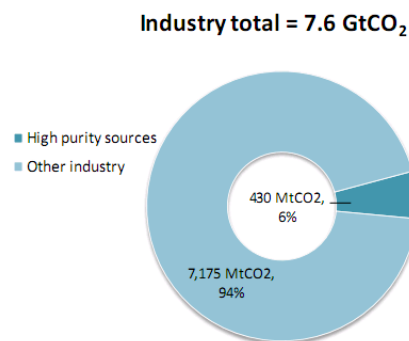
- New technology
- Few experience
- Reduces industrial

Impact of learning effects is unknown, but exists (Carbon Capture) !
Some system elements will not become cheaper (transport), but system management will help!
...takes time!

CCS promotion

Creating business cases for CCS

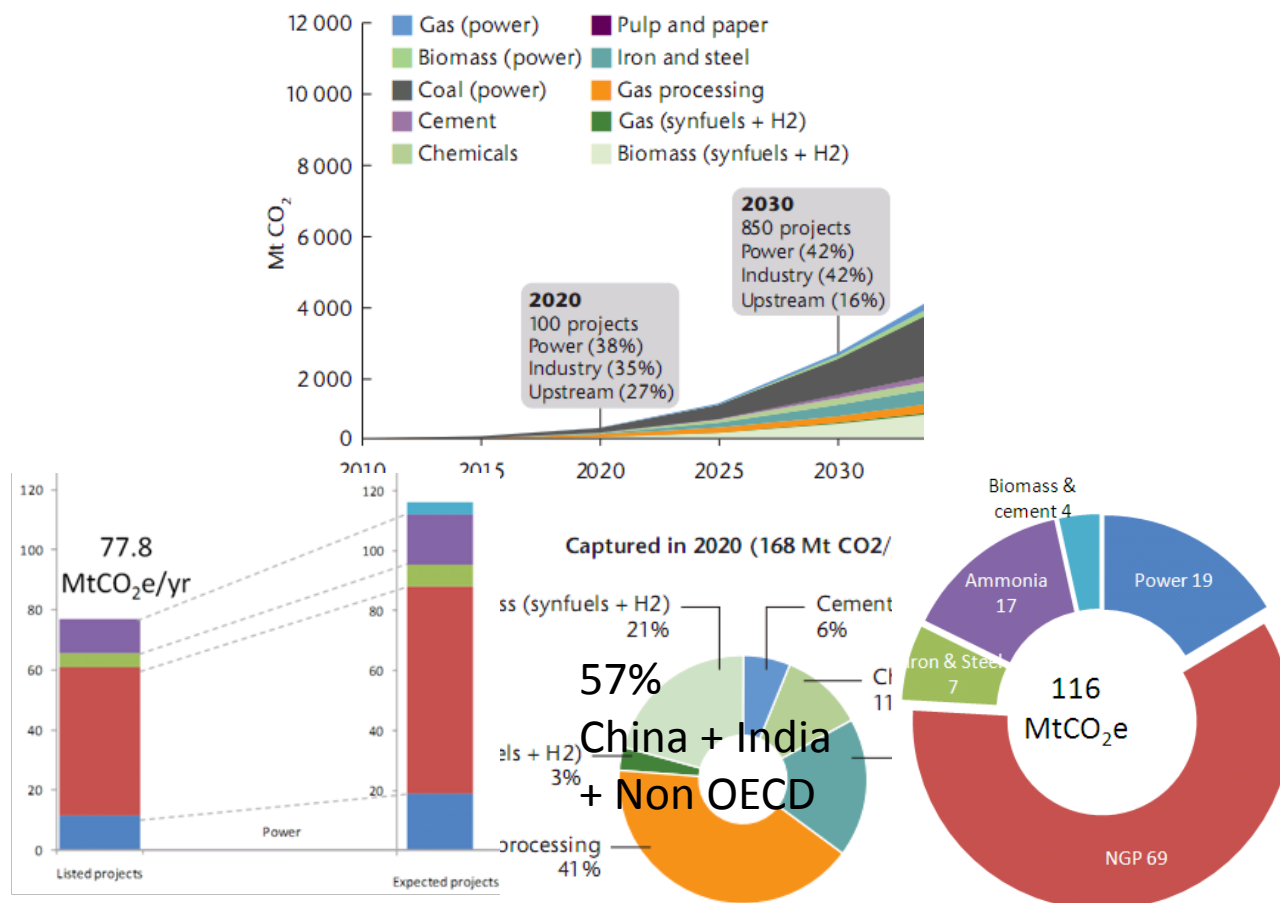
- Incentives: CDM!
- Enhanced Oil Recovery
- High purity sources: Industries



CCS promotion

Countries planning CCS projects:

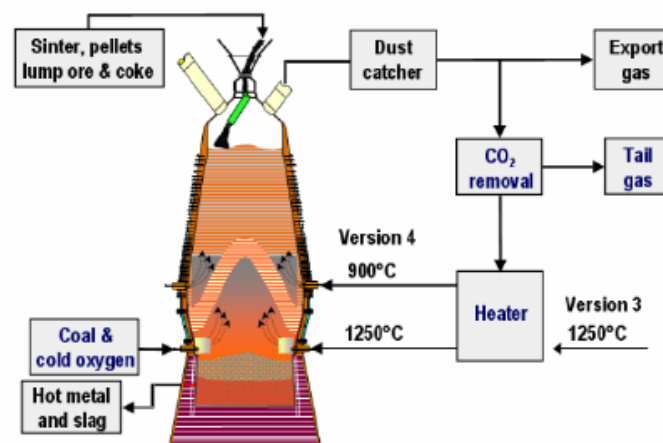
China, India, UAE, Algeria, South Africa, Brazil, Iran, Malaysia, Indonesia,



CCS promotion

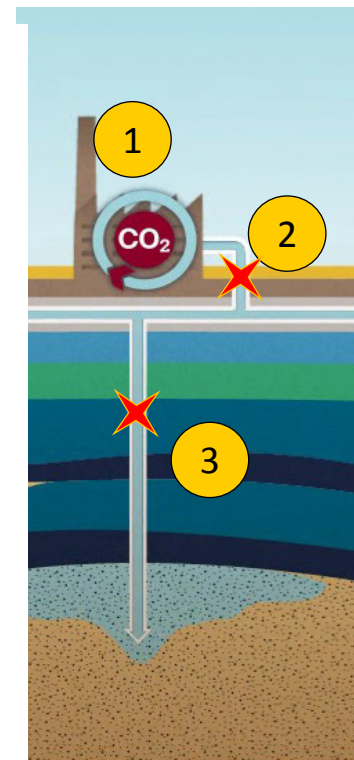
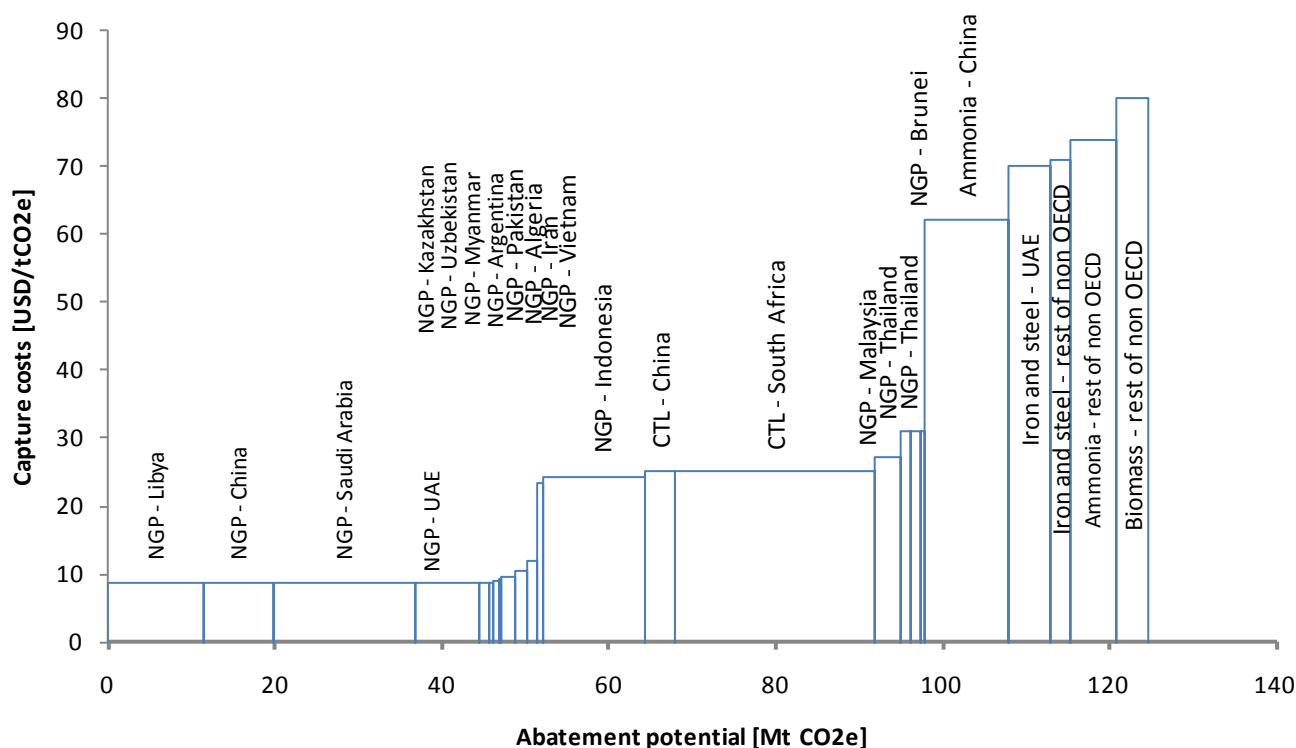
Costs:

NGP	Sweetening of gas (amines and membranes)
Ammonia	Capture from hydrogen production
Cement	Clinker (Post combustion, oxy-comustion)
Steel	Gas recycling (ETSAP)



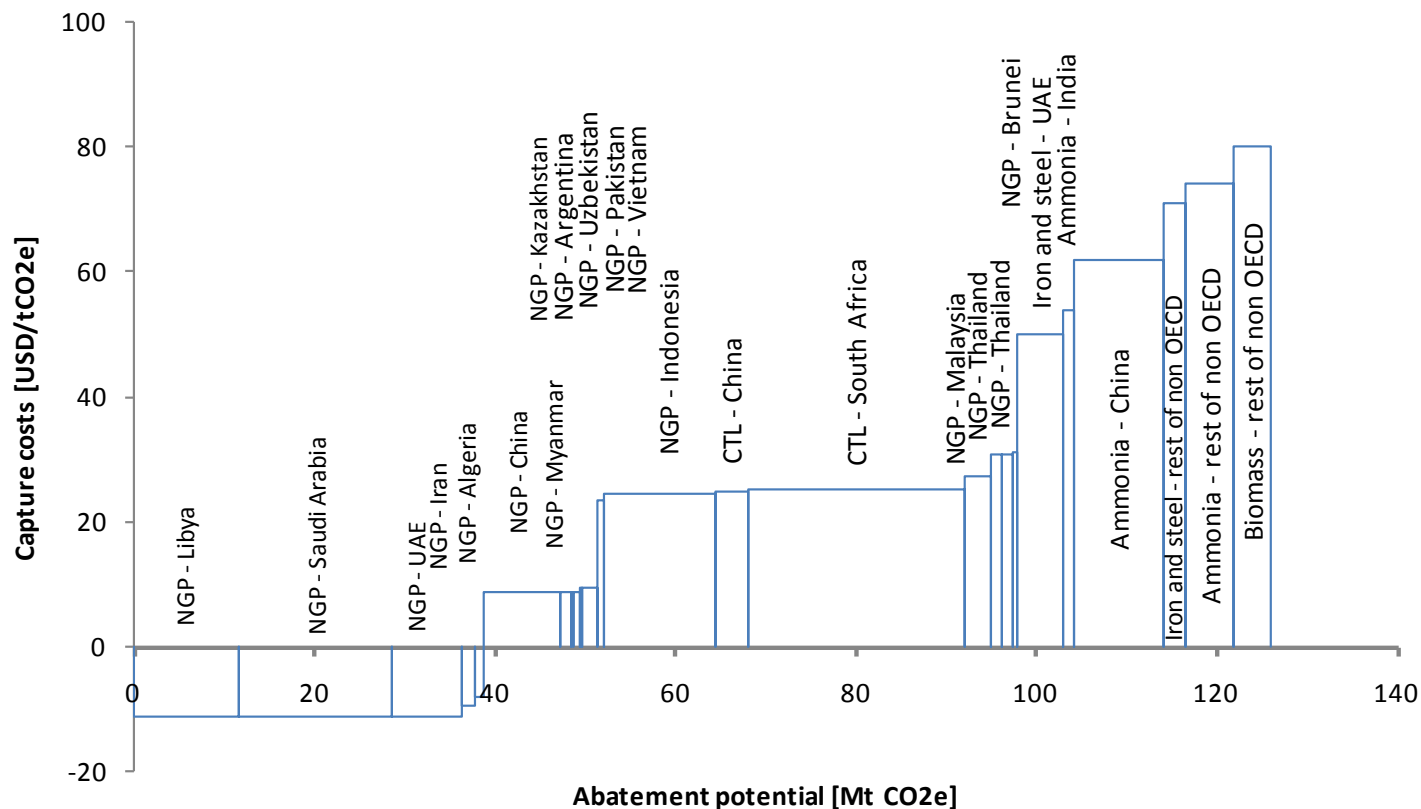
CCS promotion

System competitiveness:



CCS promotion

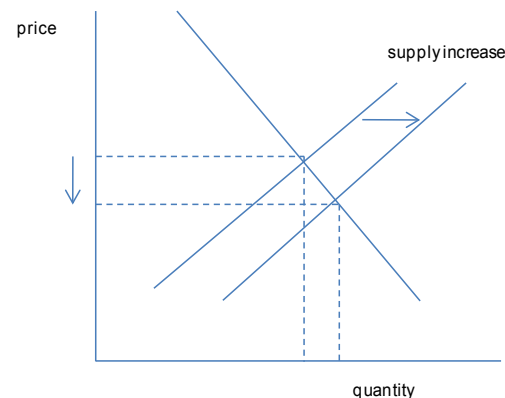
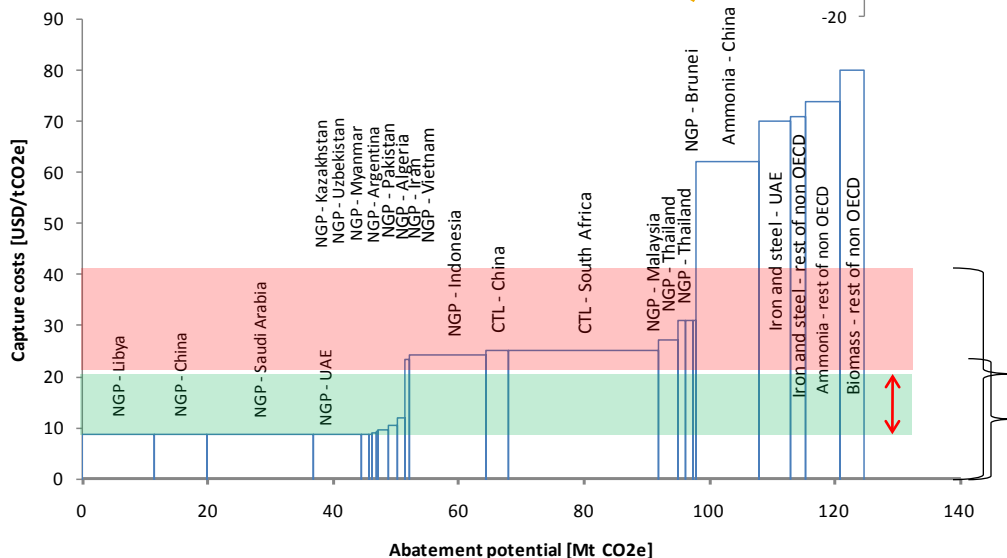
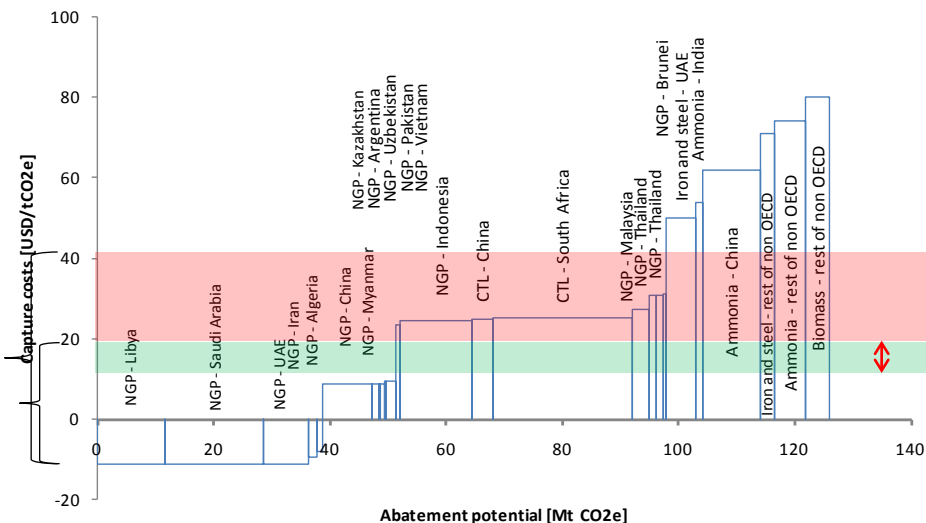
Enhanced Oil Recovery



CCS promotion

CDM

To be negotiated!



Conclusions

CCS projects in the Oil & Gas sector are promising opportunities for the early commercial deployment of this technology.

For certain industrial sectors, viable business models exist for CCS in development countries, specially under mechanisms such as CDM

For power generation, there are insufficient incentives for CCS

Thank you!

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