

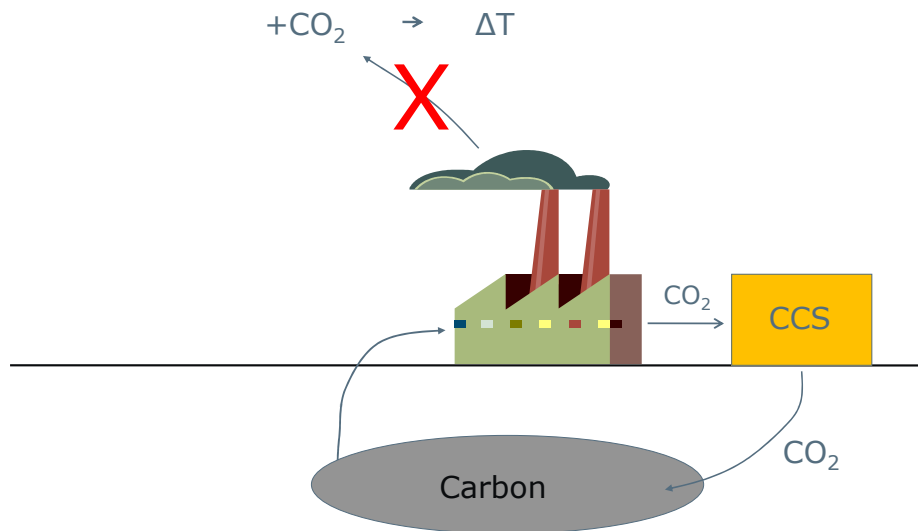
Large-scale carbon capture and storage for coal-fired power: Effect on carbon dioxide emissions and global warming

Summary of a report prepared by
Center for International Climate and
Environmental Research – Oslo (CICERO)
for Sargas AS, April 2008

Background, assumptions and method; I

- Carbon capture and storage in geological formations (CCS) may become a major alternative to reduce man-made global warming
- In this study the potential effect of CCS scenarios on global CO₂ emissions and global warming is explored
- Global CCS scenario: all new coal-power is equipped with capture facilities from 2015; all captured CO₂ is stored in geological formations
- The capture rate is either 90% or 95%

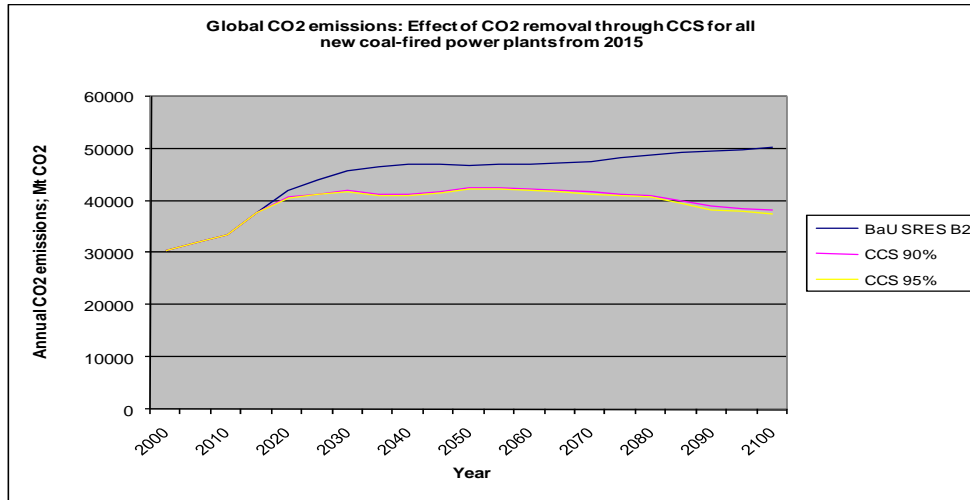
The CCS principle



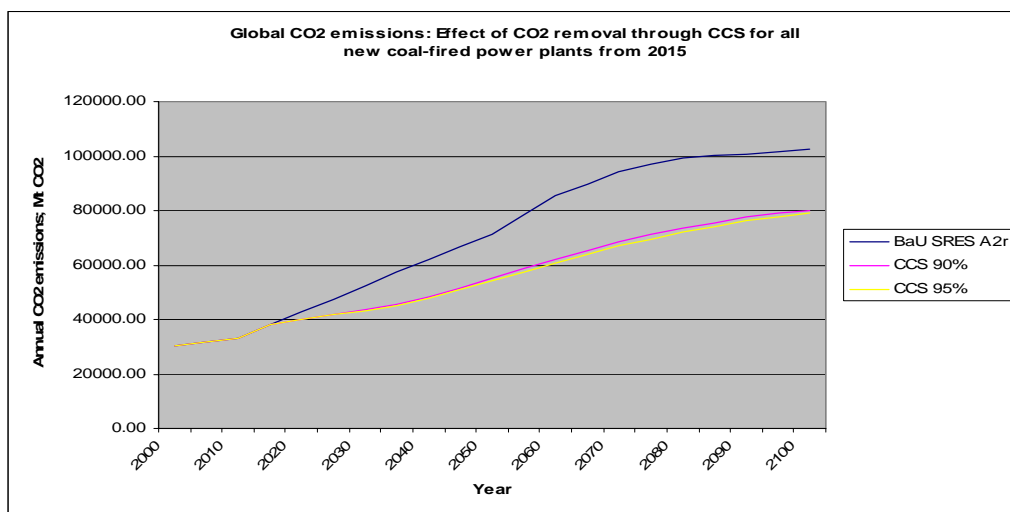
Background, assumptions and method; II

- Old coal power is linearly phased out in the period 2015-2050
- Two reference scenarios for CO₂ emissions and coal power are used; these have been applied by IPCC
- In the main reference scenario (A2r) annual growth of CO₂ emissions is 1.2%, whereas the growth rate of coal-based power production is 1.6%
- The temperature response from reduced net CO₂ emissions is calculated with the help of CICERO's Simple Climate Model

Global CO₂ emissions: The effect of CCS scenarios compared to the lower-growth reference scenario



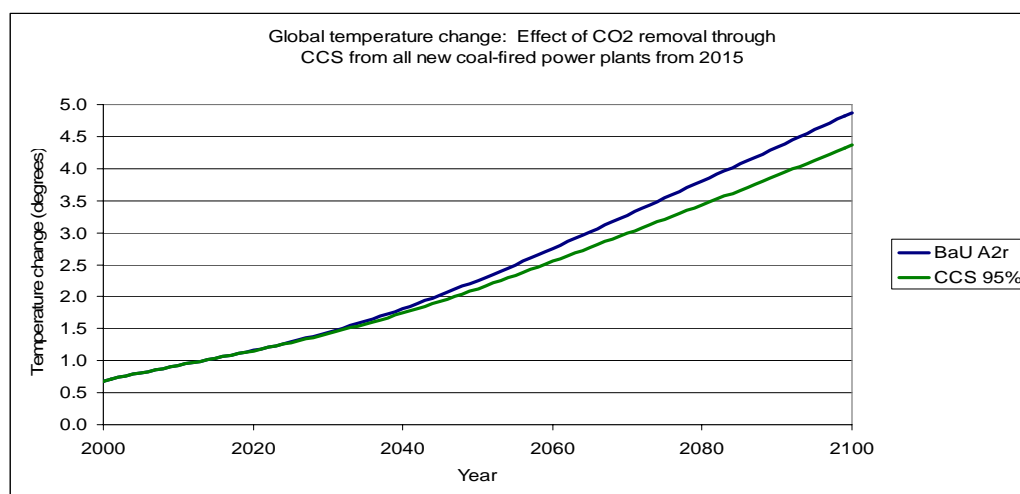
Global CO₂ emissions: The effect of CCS scenarios compared to the higher-growth reference scenario



Emission reductions in CCS scenarios compared to reference scenarios in 2030 and 2100

BaU scenario	Year	2030		2100	
		CCS scenario capture rate; %	Reduction in emissions; Gt CO ₂	%	Reduction in emissions; Gt CO ₂
B2	90	3.7	8.2	11.9	23.8
	95	3.9	8.6	12.6	25.1
A2r	90	8.7	16.6	22.5	21.9
	95	9.2	17.5	23.8	23.2

Temperature effect of 95% CO₂ capture rate for all new coal-power from 2015 compared to the reference scenario (A2r)



In summary

- Effect of CCS on global emissions and warming dependent on scenario choice and assumptions, e.g. climate sensitivity
- The cost of the CCS scenarios has not been assessed
- Global CO₂ emissions reduced by 8-18% by 2030, and 22-25% by 2100
- Global warming reduced by 0.5 °C by 2100, equivalent to about 10% reduction in man-induced warming since pre-industrial time