CO_2 Capture and Storage (CCS): Costs and Economic Potential

Howard Herzog

MIT

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Capture and compression costs

In most CCS systems, the cost of capture (including compression) is the largest cost component

Capture Source	Capture Cost (US$/tCO$_2$ net captured)
Power Plant	15 – 75
Industry (high purity) H_2, NH_3, gas processing	5 – 55
Industry - other	25 - 115

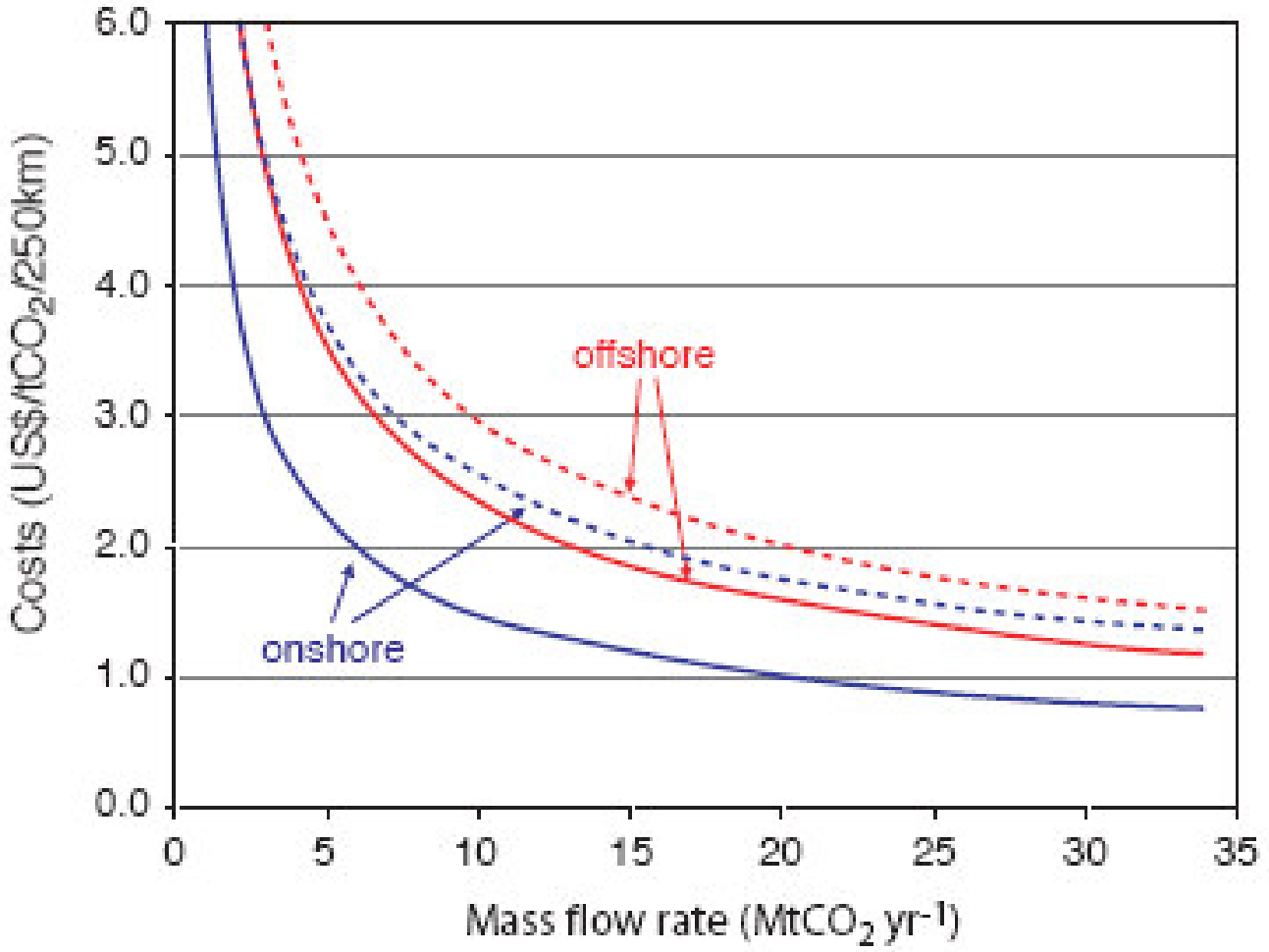
Summary of CO_2 capture costs for new power plants

	NGCC	PC	IGCC
CO_2 reduction per kWh with capture	83-88%	81-88%	81-91%
Increase in COE with capture (US¢/kWh)	1.2-2.4	1.8-3.4	0.9-2.2
Increase in COE with capture	37-69%	42-66%	20-55%
Cost of CO_2 net captured (US$/t$CO_2$)	37-74	29-51	13-37

Transport and storage costs

Component	Cost range (US/tCO_2 transported or stored)
Transportation (per 250 km)	1 - 8
Geological Storage	0.5 – 8
Ocean Storage	5 - 30
Mineral Carbonation	50 - 100

Cost of CO_2 pipeline transport



System costs

Application of CCS to electricity production, under 2002 conditions, is estimated to increase electricity generation costs by about 0.01 - 0.05 US dollars per kilowatt hour (US$/kWh), depending on the fuel, the specific technology, the location, and the national circumstances.

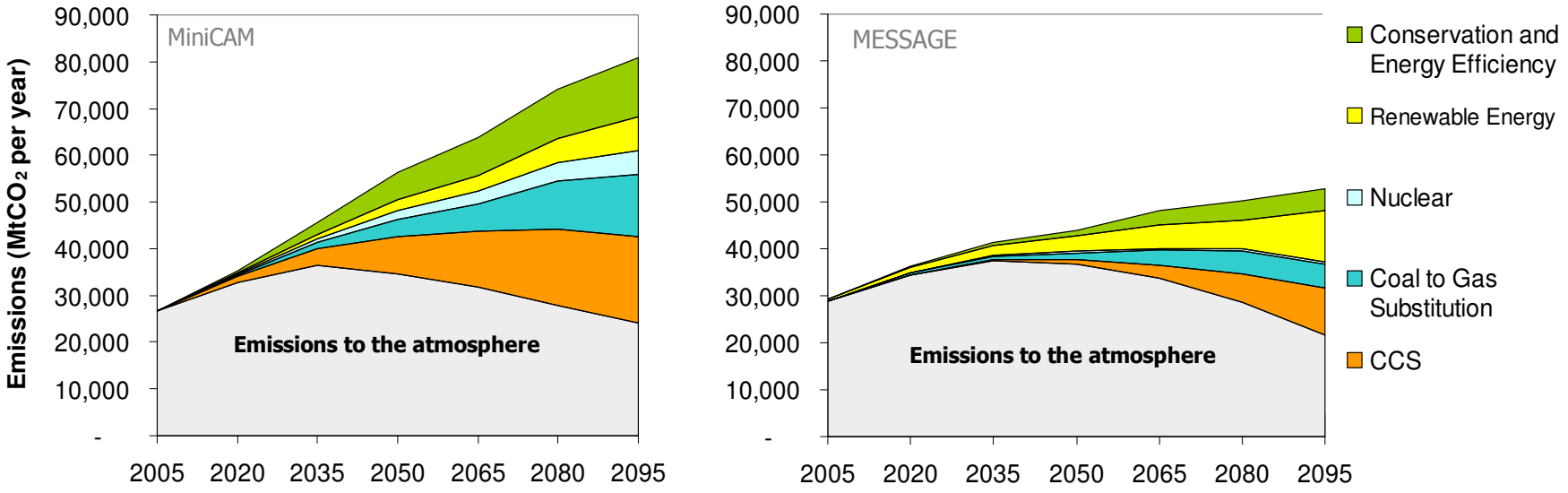
CCS costs for new power plants using current technology

	NGCC	PC	IGCC
COE (no capture) (¢/kWh)	3 - 5	4 - 5	4 - 6
COE increase with CCS+geo	1 - 3	2 - 5	1 - 3
Avoided cost CCS+geo	40-90	30-70	10-50
COE increase w/CCS+EOR	1 - 2	1 - 3	0 - 2
Avoided cost CCS+EOR	20-70	10-40	(-10)-30

Economic potential of CCS

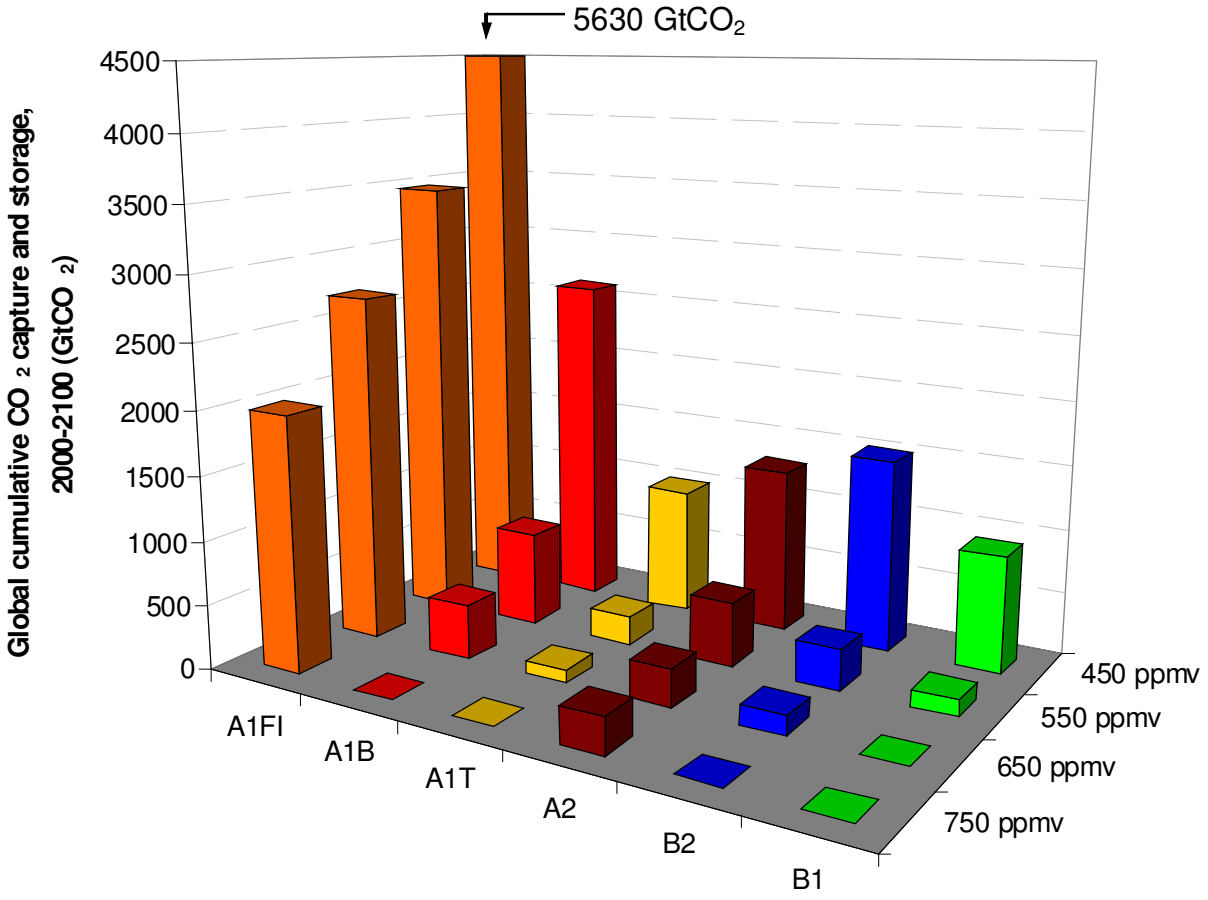
Most modelling as assessed in this report suggests that CCS systems begin to deploy at a significant level when CO_2 prices begin to reach approximately 25 - 30 US$/t$CO_2$.

CCS as part of a mitigation portfolio



Most scenario studies: role of CCS increases over the course of the century

Economic potential



Economic potential of CCS

- Different baseline scenarios, 450 - 750 ppmv stabilization, cost assumptions
- 220 - 2,200 $GtCO_2$ cumulatively up to 2100
- 15 to 55% of the cumulative mitigation effort worldwide until 2100
- Cost reduction of stabilization: 30% or more