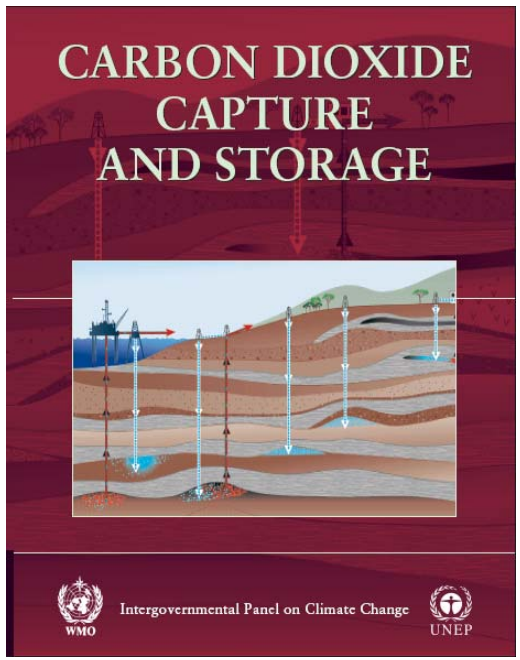
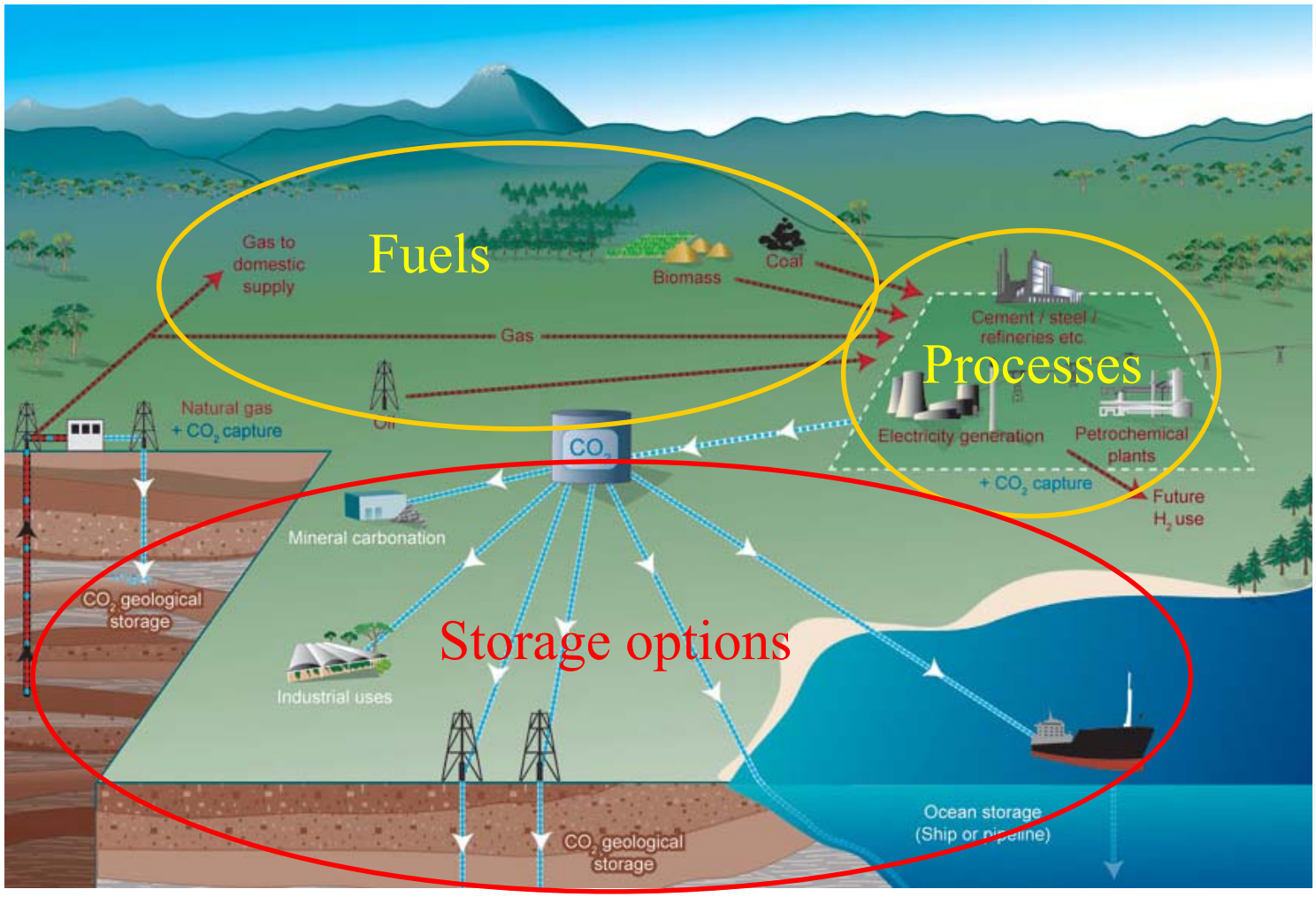
The main findings of the IPCC Special Report on Carbon Dioxide Capture and Storage



Bert Metz and Ogunlade Davidson, co-chairs IPCC Working Group II

SBSTA CCS Workshop, Bonn, May 20th, 2006

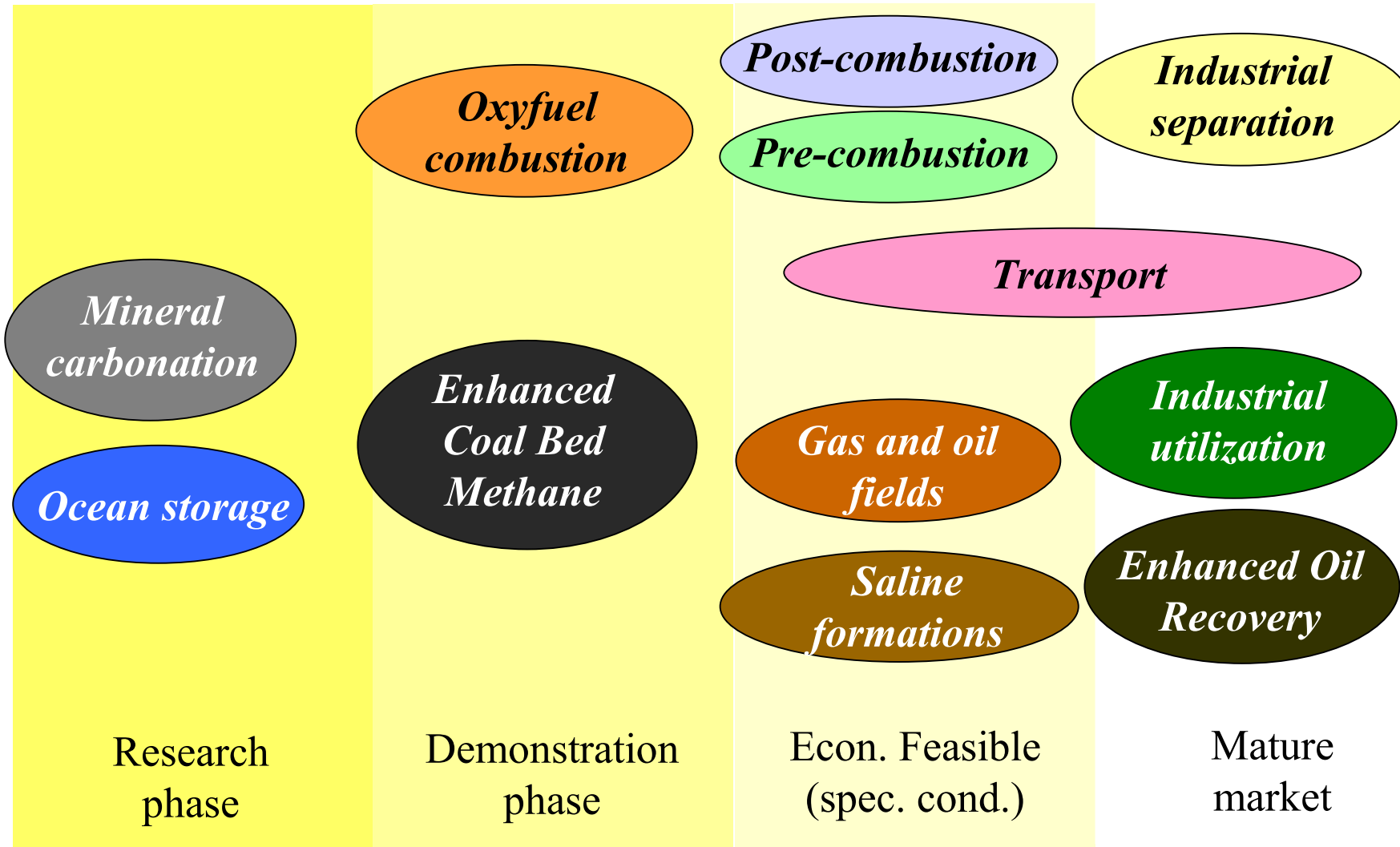
CO_2 capture and storage system



How could CCS play a role in mitigating climate change?

- Part of a portfolio of mitigation options
- Reduce overall mitigation costs
- Increase flexibility in achieving greenhouse gas emission reductions
- Application in developing countries important
- Energy requirements point of attention

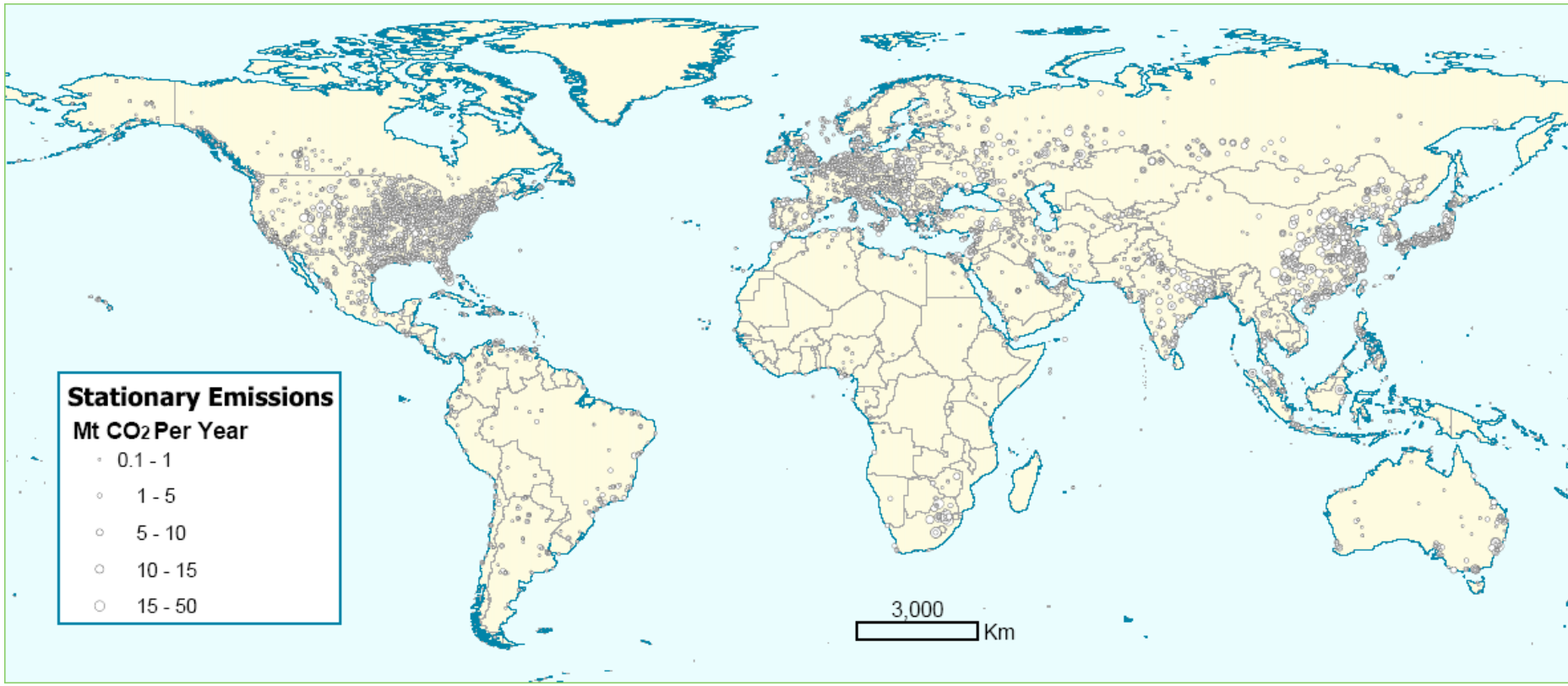
"Maturity" of CCS technology



Current locations of geological storage

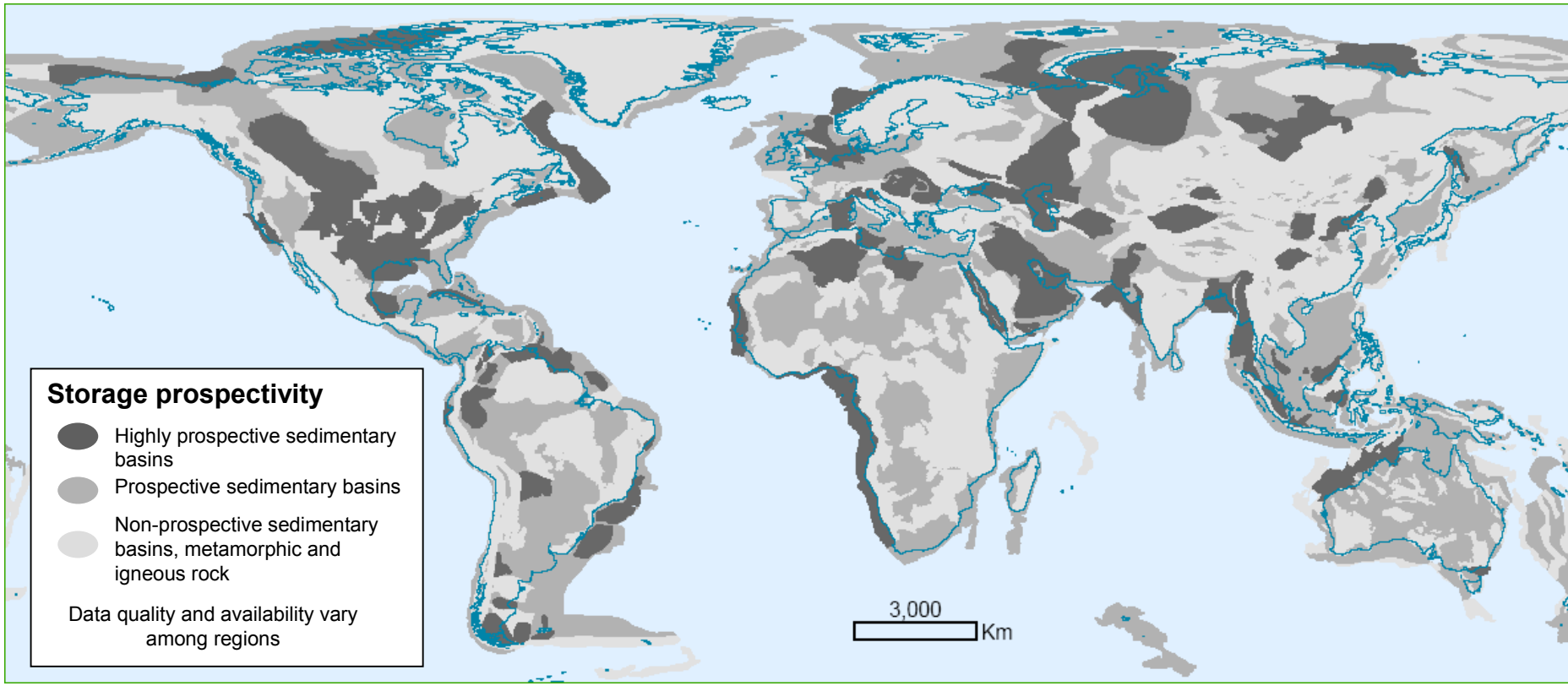
Project name	Country	Injection start	Daily injection (tCO_2/day)	Total planned storage (tCO_2)	Reservoir type
Weyburn	Canada	2000	3,000 - 5,000	20,000,000	EOR
In Salah	Algeria	2004	3,000 - 4,000	17,000,000	Gas field
Sleipner	Norway	1996	3,000	20,000,000	Saline formation
K12B	Netherlands	2004	100	8,000,000	EGR
Frio	United States	2004	177	1,600	Saline formation

Geographical relationship between sources and storage opportunities



Global distribution of large stationary sources of CO_2 (Based on a compilation of publicly available information on global emission sources, IE GHG 2002)

Geographical relationship between sources and storage opportunities



Prospective areas in sedimentary basins where suitable saline formations, oil or gas fields, or coal beds may be found. Locations for storage in coal beds are only partly included. Prospectivity is a qualitative assessment of the likelihood that a suitable storage location is present in a give area based on the available information. This figure should be taken as a guide only, because it is based on partial data, the quality of which ma vary from region to region, and which may change over time and with new information (Courtesy of Geoscience Australia).

Costs

Two ways of expressing costs:

- Additional electricity costs
  - Energy policy community
- CO_2 avoidance costs
  - Climate policy community

Ranges found:

0.01 - 0.05 US$/kWh

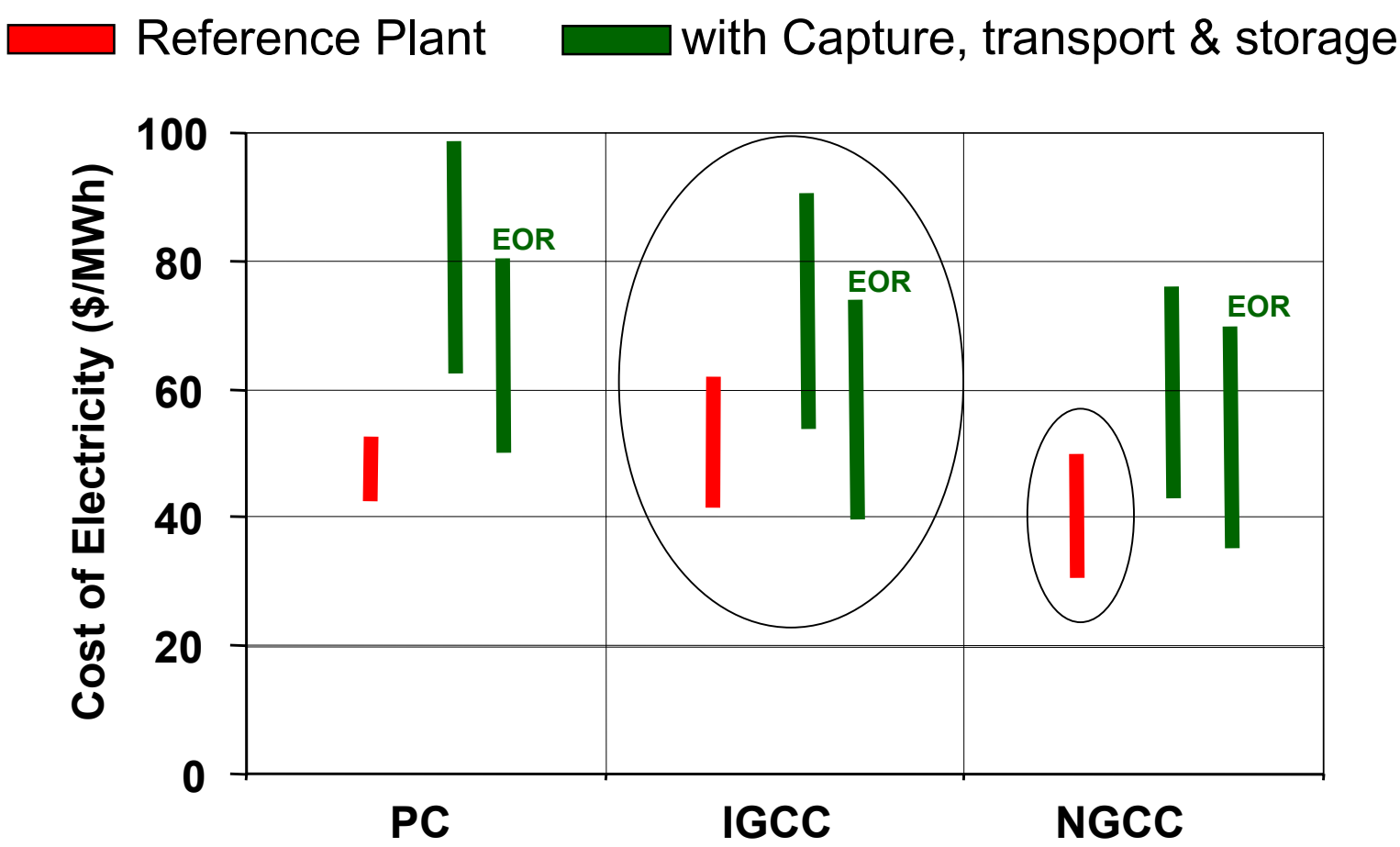
(with EOR: 0.00 – 0.03 US$/kWh)

20)* - 270 US$/$tCO_2$ avoided

(with EOR: 0)*– 240 US$/$tCO_2$ avoided)

)* low-end: capture-ready, low transport cost, revenues from storage: 360 $MtCO_2$/yr

Power Generation Cost with CCS



CCS component costs

CCS component	Cost range
Capture from a power plant	15 - 75 US$/$tCO_2$ net captured
Capture from gas processing or ammonia production	5 - 55 US$/$tCO_2$ net captured
Capture from other industrial sources	25 - 115 US$/$tCO_2$ net captured
Transportation	1 - 8 US$/$tCO_2$ transported per 250km
Geological storage	0.5 - 8 US$/$tCO_2$ injected
Ocean storage	5 - 30 US$/$tCO_2$ injected
Mineral carbonation	50 - 100 US$/$tCO_2$ net mineralized

Economic potential

- Different baseline scenarios, 450 - 750 ppmv stabilisation, cost assumptions
- 220 - 2,200 $GtCO_2$ cumulatively up to 2100
- 15 to 55% of the cumulative mitigation effort worldwide until 2100
- Cost reduction climate change mitigation: 30% or more
- Most scenario studies: role of CCS increases over the course of the century
- Substantial application above CO_2 price of 25-30 US$/$tCO_2$

Sufficient potential?

- Geological storage: likely at least about 2,000 $GtCO_2$ in geological formations

  "Likely" is a probability between 66 and 90%

- Likely: technical potential sufficient for high end of the economic potential range

- Not true for all regions

What are the risks?

- In general: lack of real data, so comparison with current operations
- Geological storage:
  - appropriate site selection, a monitoring program to detect problems, a regulatory system, remediation methods to stop or control CO_2 releases if they arise:
  - comparable to risks of current activities
  - natural gas storage, EOR, disposal of acid gas
- Ocean storage: pH change, mortality of ocean organisms, ecosystem consequences, chronic effects unknown

Will leakage compromise CCS as a climate change mitigation option?

- Fraction retained in appropriately selected and managed geological reservoirs is
  - very likely to exceed 99% over 100 years, and
  - is likely to exceed 99% over 1,000 years.

    "Likely" is a probability between 66 and 90%, "very likely" of 90 to 99%
- Release of CO_2 from ocean storage would be gradual over hundreds of years
- Sufficient?

Other issues

- Legal and regulatory barriers
- Implications for emissions inventories and accounting

Thank you

Report published by
Cambridge University Press

Summaries and full report available on
www.ipcc.ch

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