IPCC SRCCS
Carbon Dioxide Sources and Capture

H-Holger Rogner
h.h.rogner@iaea.org

Joint SBSTA/IPCC side-event
Montreal
November 30, 2005

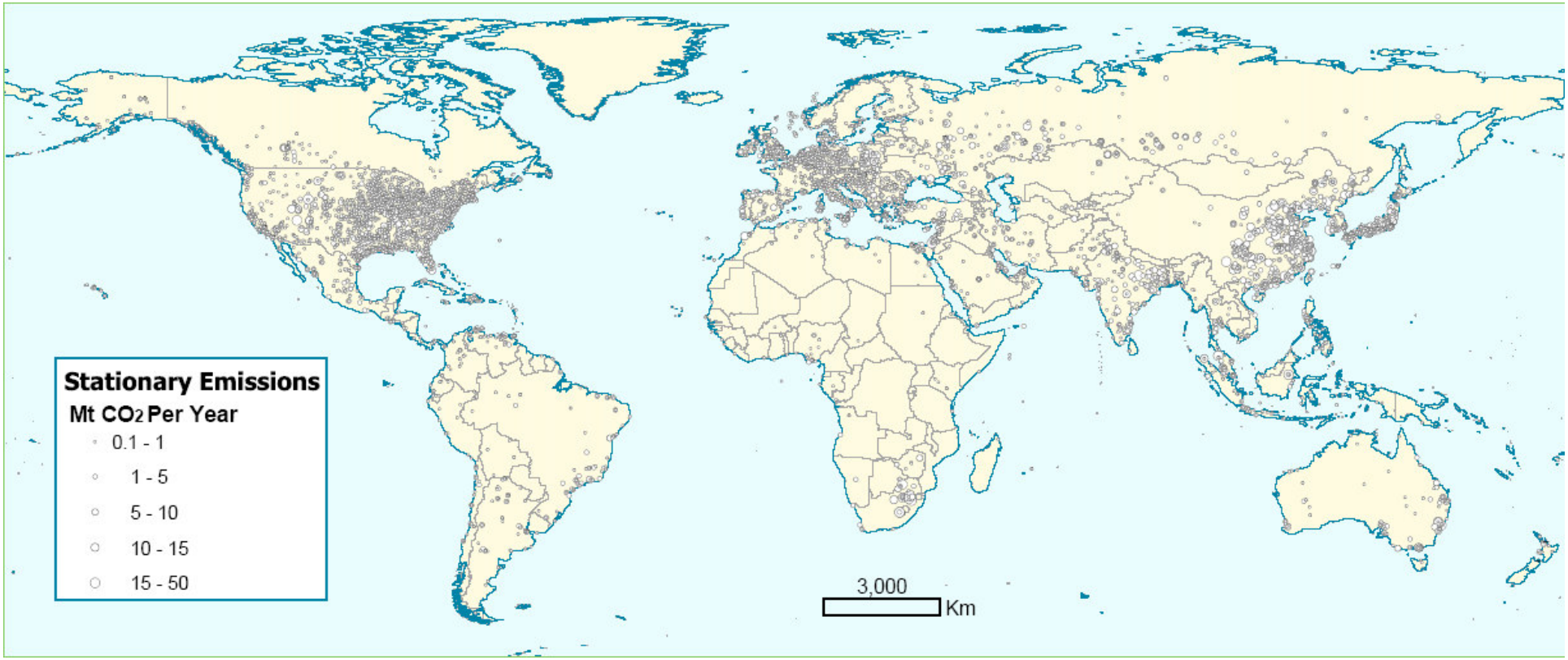
Suitable CO_2 sources for capture

- Large stationary point source
- High CO_2 concentration in the waste, flue gas or by-product stream (purity)
- Pressure of CO_2 stream
- Distance from suitable storage sites

Global large stationary CO_2 sources with emissions of more than 0.1 $MtCO_2$ / year

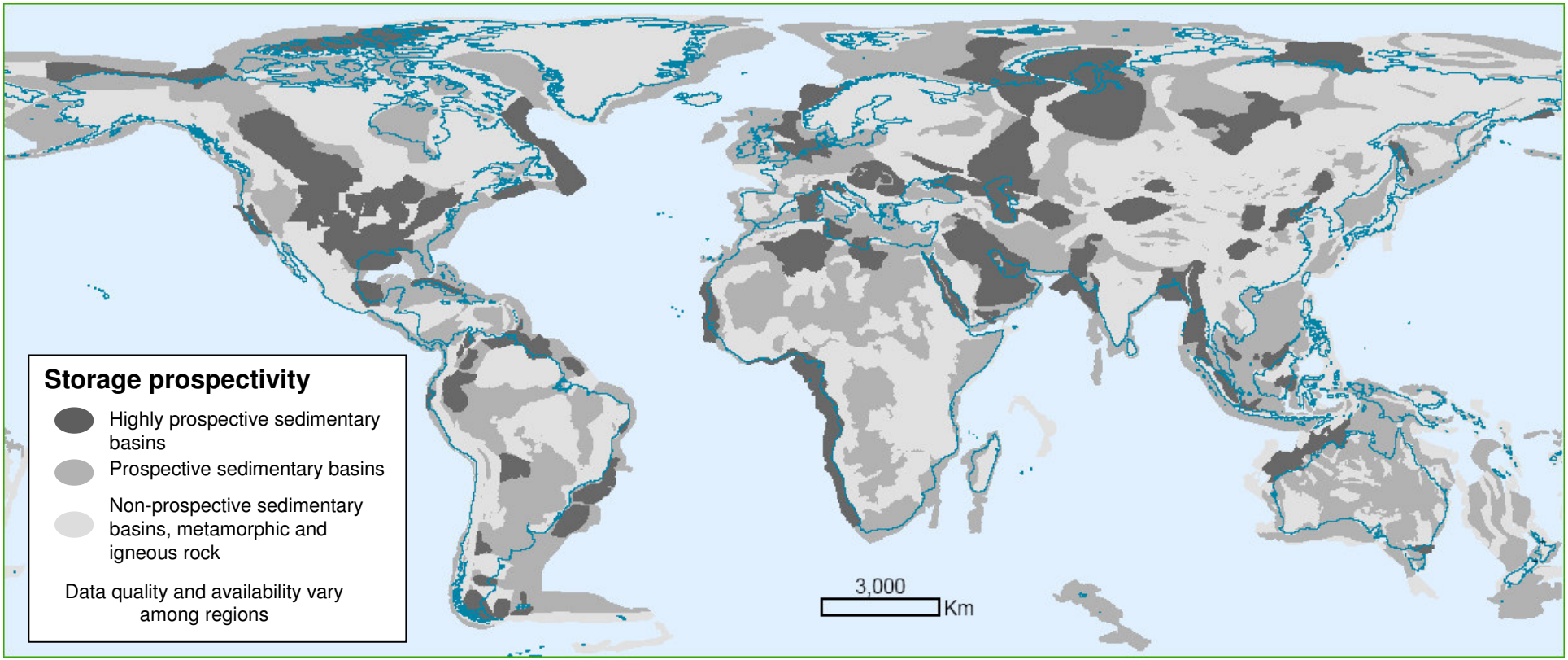
Process	No. of sources	Emissions ($MtCO_2$/yr)
Fossil Fuels		
Power (coal, gas, oil and others)	4,942	10,539
Cement production	1,175	932
Refineries	638	798
Iron and steel industry	269	646
Petrochemical industry	470	379
Oil and gas processing	N/A	50
Other sources	90	33
Biomass		
Bioethanol and bioenergy	303	91
Total	**7,887**	**13,466**

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, IEA GHG 2002)

Geographical relationship between sources and storage opportunities

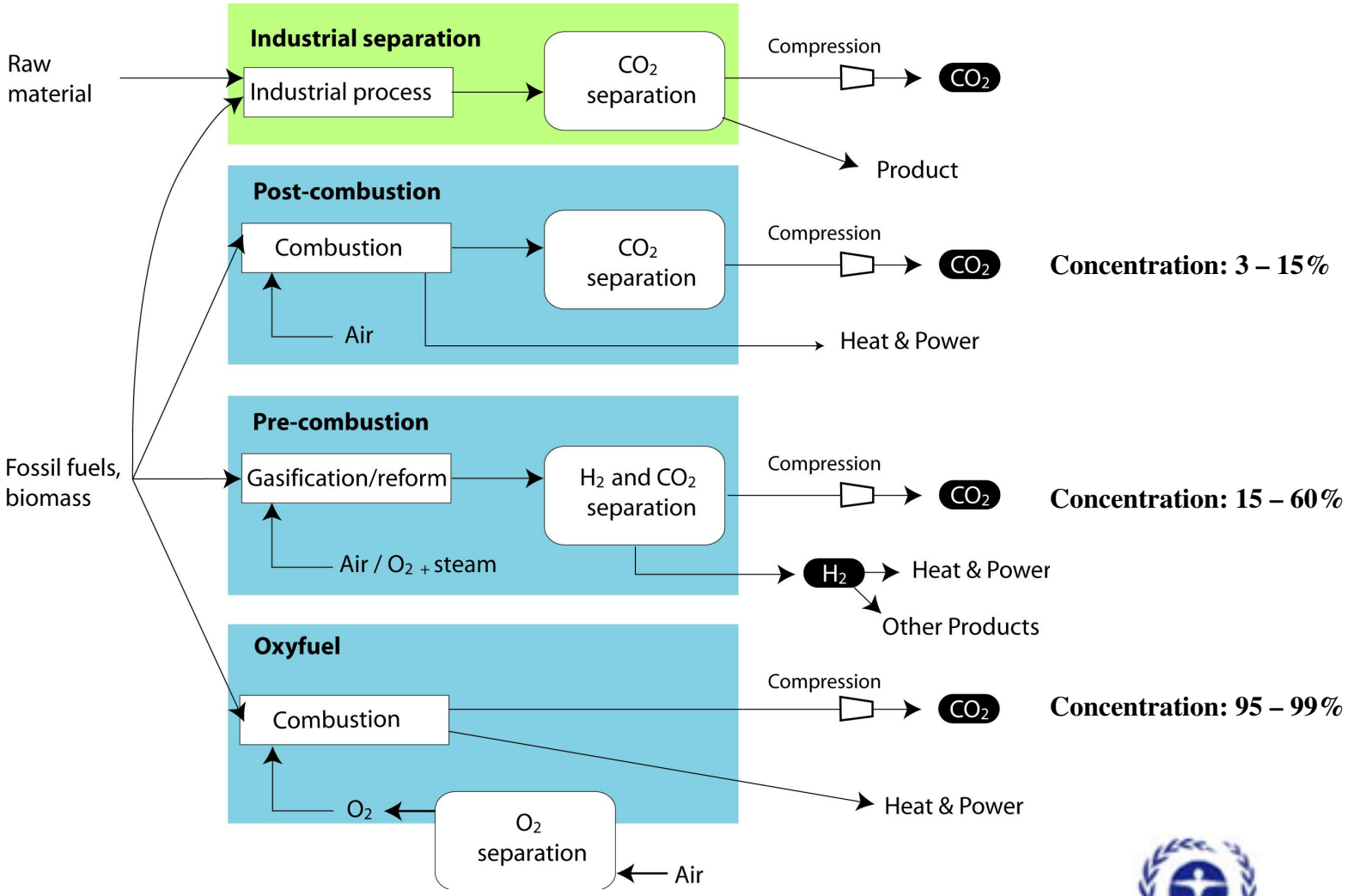


Prospective areas in sedimentary basins where suitable saline formations, oil or gas fields, or coal beds may be found. Locations for storage in coal beds are only partly included. Prospectivity is a qualitative assessment of the likelihood that a suitable storage location is present in a given area 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 may vary from region to region, and which may change over time and with new information (Courtesy of Geoscience Australia).

Future CO_2 sources

- Global carbon dioxide emissions are on the rise and are projected to range from
  - 2020: 29 to 44 $GtCO_2$
  - 2050: 23 to 84 $GtCO_2$
- The technical potential of CO_2 capture has been estimated at
  - 2020: 2.6 to 4.9 $GtCO_2$ or around 10%
  - 2050: 4.7 to 37.5 $GtCO_2$ or 20–40%
- These emission and capture ranges reflect the inherent uncertainties of scenario and modelling analyses.

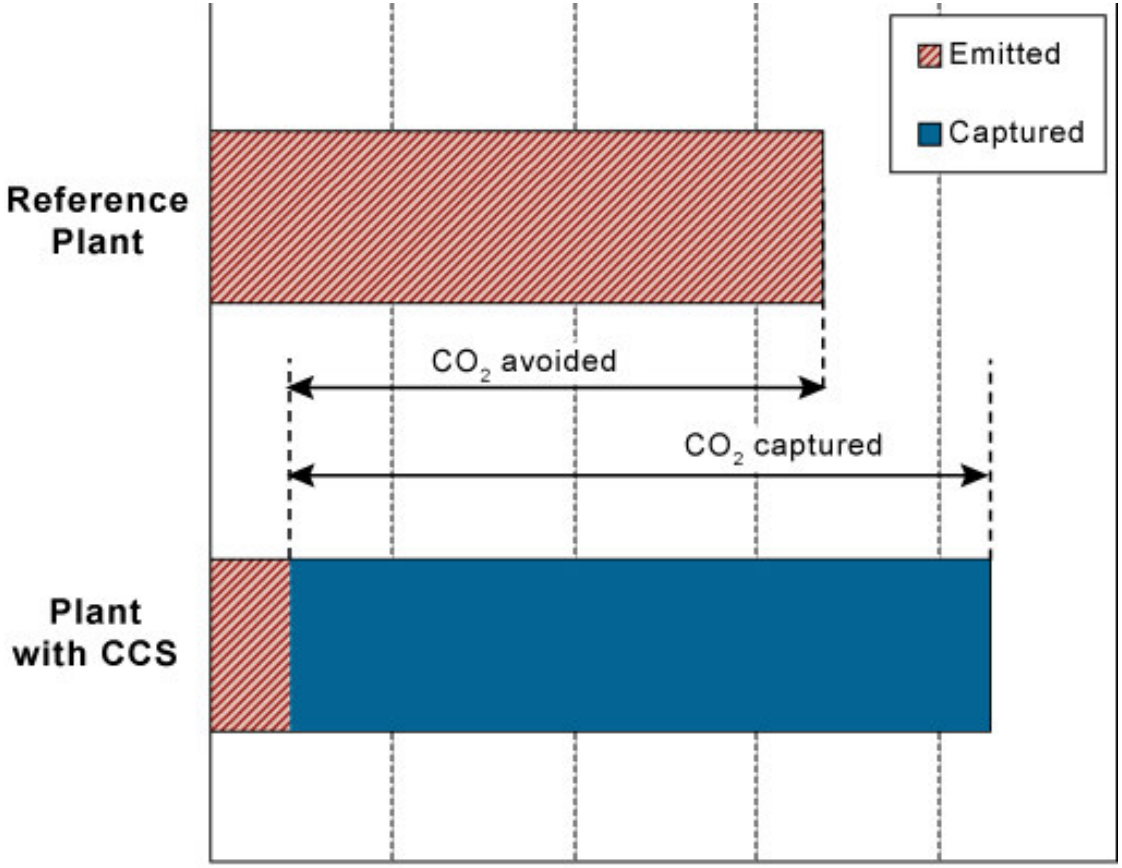
CO_2 capture processes and systems



Maturity of capture technology

Capture option	Research	Demon-stration	Economically feasible under specific conditions	Mature market
Post-combustion			X	
Pre-combustion			X	
Oxyfuel combustion		X		
Industrial separation (natural gas processing, ammonia production)				X

Difference between CO_2 captured and CO_2 emissions avoided



CO_2 capture from biofuel and synthetic fuel production

- CCS from biomass conversion could lead to negative emissions
  - Post-combustion capture
  - Pre-combustion capture
- Steam methane reforming (hydrogen production) already generates a CO_2 stream usable for CCS

Outlook

- CO_2 capture integration in advanced designs could reduce future CO_2 capture costs and energy penalties
- Future cost reductions will depend on deployment in the marketplace (technology learning) as well as sustained R&D
- CO_2 capture is the first step along the CCS chain

Real CO_2 capture installations