Underground geological storage

Malcolm Wilson (Canada)

Energy INet (www.energyinet.com)

Joint SBSTA/IPCC side-event

COP11, Montreal, November 29th

Technology and potential

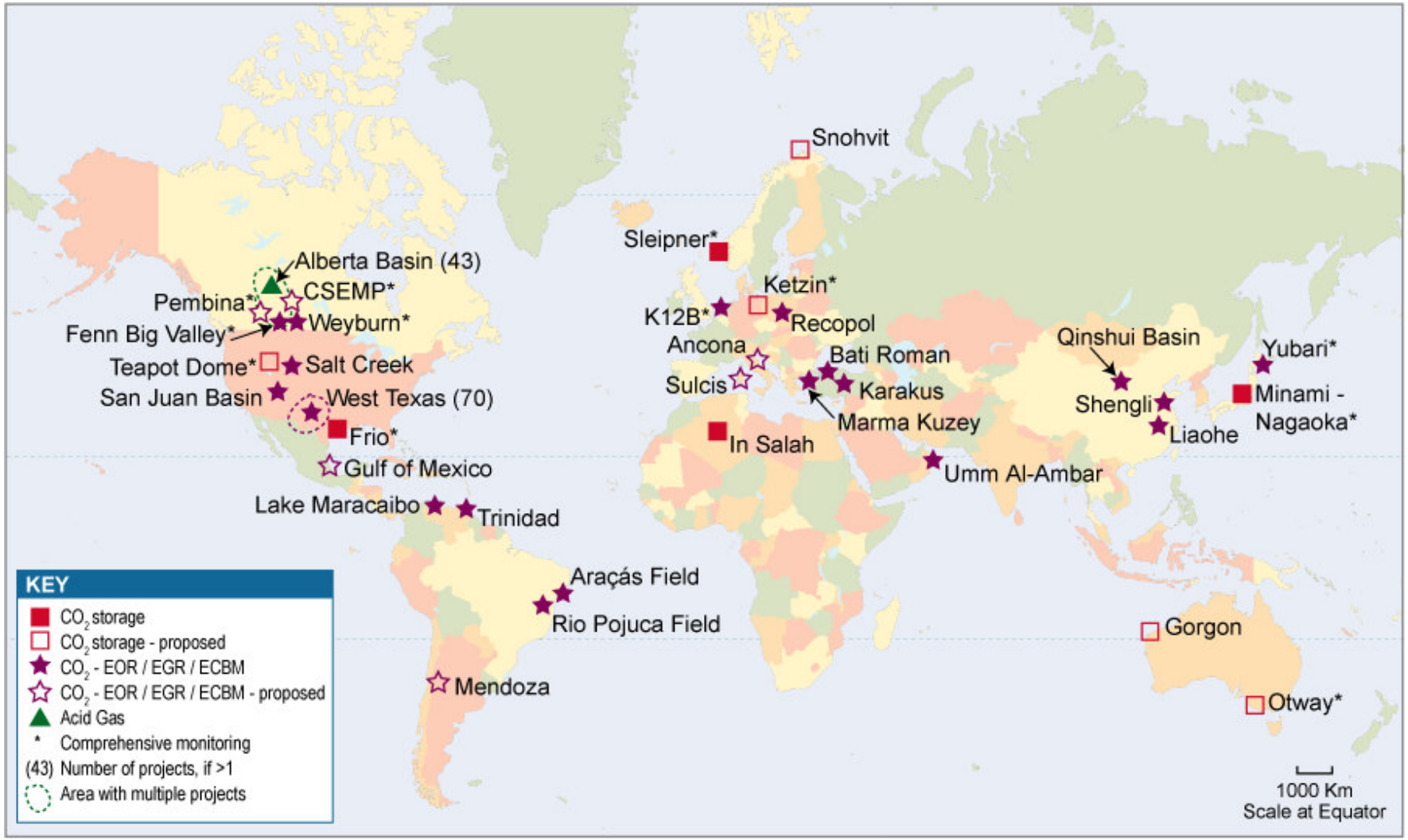
- Geological storage capacity likely to be at least 2,000 $GtCO_2$, mainly in oil and gas fields, and in formations bearing saline water
- Upper limit uncertain; especially in saline formations
- Specific site characteristics need closer investigation
  - site characterization methods are not yet broadly deployed
- CO_2 injection and reservoir engineering technology for depleted oil & gas fields and saline formations is mature and available
- Monitoring of subsurface movement of CO_2 is being successfully conducted at several sites

Technology maturity

Capture option	Research	Demon-stration	Economically feasible under specific conditions	Mature market
Oil and gas fields			X	
Enhanced Oil Recovery				X[1]
Saline formations			X	
Enhanced Coal Bed Methane recovery	X			

[1]Economically feasible under specific conditions if used for CO_2 storage

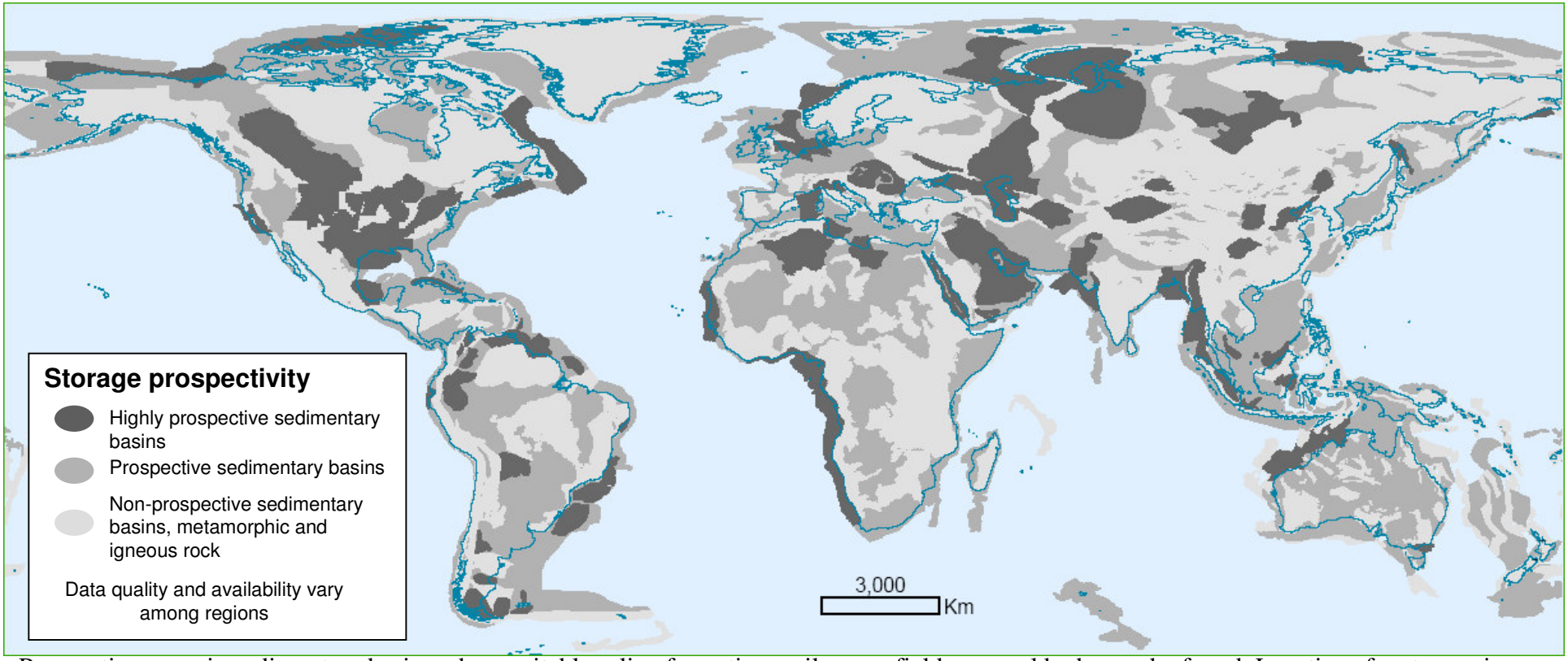
Figure 5.1. Location of sites where activities relevant to CO_2 storage are planned or underway



Some current storage projects

Project name	Country	Injection start	Daily injection (tCO_2/day)	Total planned storage	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

Storage prospectivity



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).

Figure 5.3. Options for storing CO_2 in deep underground geological formations (after Cook, 1999)

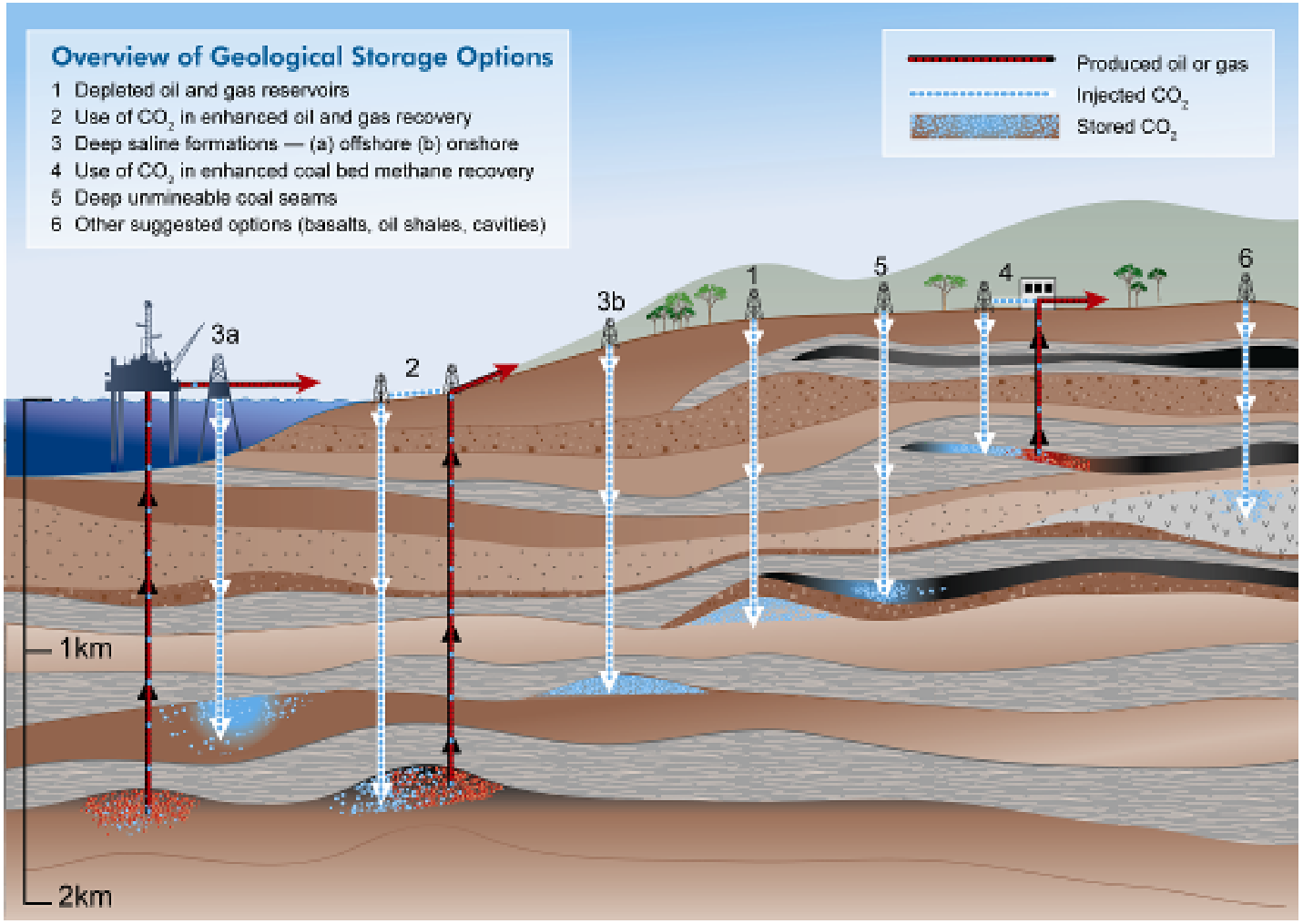
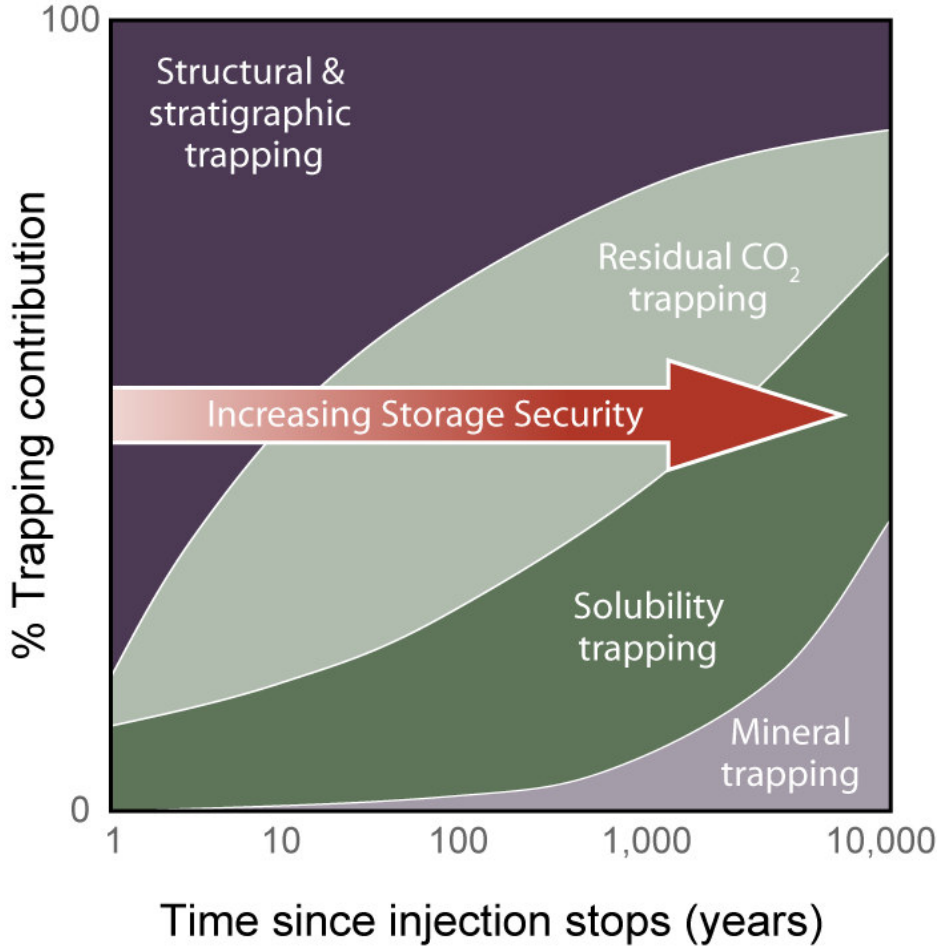
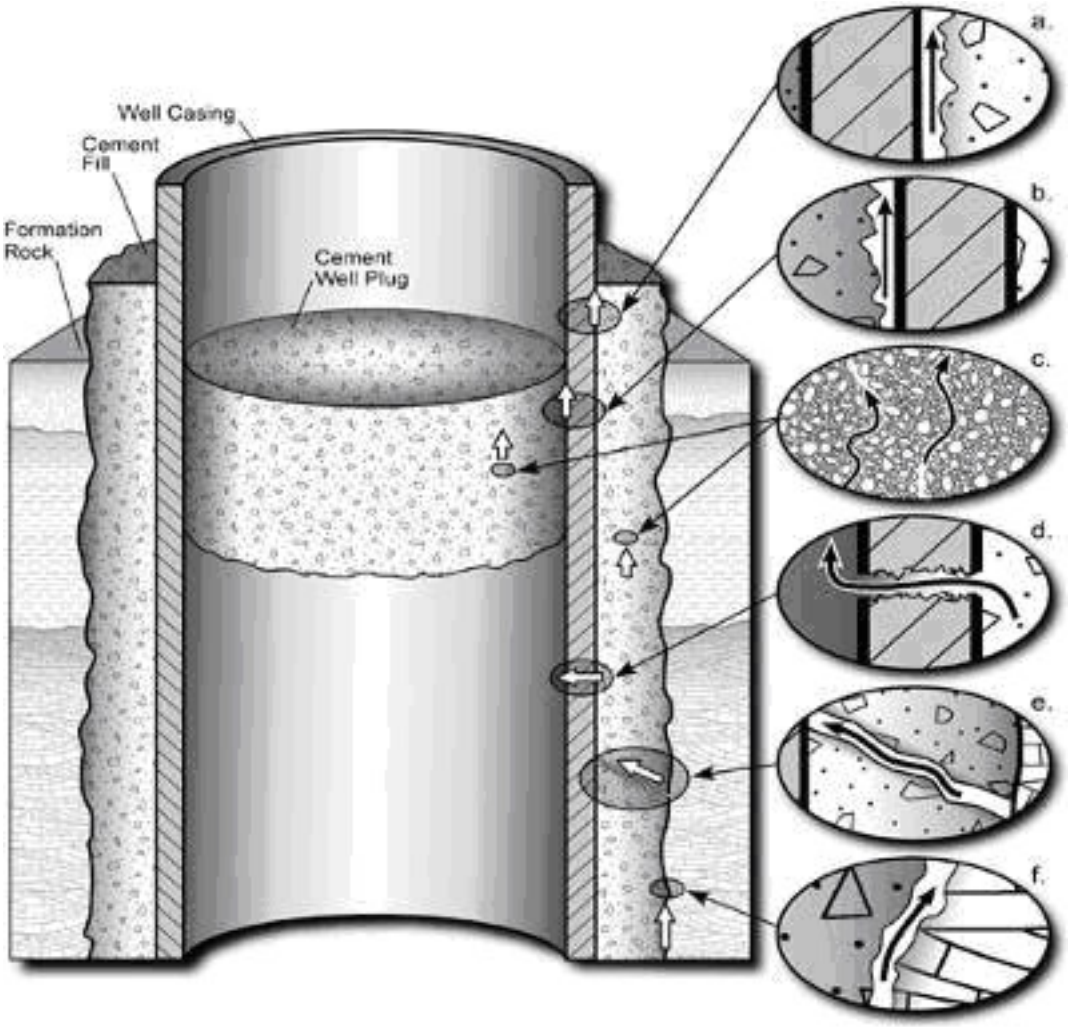


Figure 5.9. Storage security depends on a combination of physical and geochemical trapping. Over time, residual CO_2 trapping, solubility trapping and mineral trapping increase.



Design of a well



Monitoring technologies

- Time lapse seismic
- Remote sensing
  - Techniques for measuring ground heave
  - Remote surface gas analysis
- Geochemical monitoring
  - Subsurface geochemistry
  - Surface and near surface geochemistry
- Non-seismic geophysical techniques
  - Electromagnetic surveys
  - Gravity techniques
- Vegetational surveys (hyperspectral imagery etc)