# $CO_2$ at depth

- $CO_2$ is stored at depths >800m to ensure that $CO_2$ is in a dense form
- This is also important for storage security, because storage seals become more effective with depth
- $CO_2$ properties are highly variable, f(P,T)

At standard conditions (ISA) (1.013 Bar & 15°C)

- 1 $m^3$ of $CO_2$ has a mass of 1.87 kg
- 1bscf = 28.32 x$10^6$ $m^3$
- Mass of 1bscf = 52959.5 tonnes
- Mass of 1MMscf = 52.96 tonnes
- So a single well injecting 20 MMscf per day is injecting about 1000 tonnes of $CO_2$ per day

scf - standard-cubic feet
1 MMscf $10^6$ scf
1 Bscf - $10^9$ scf
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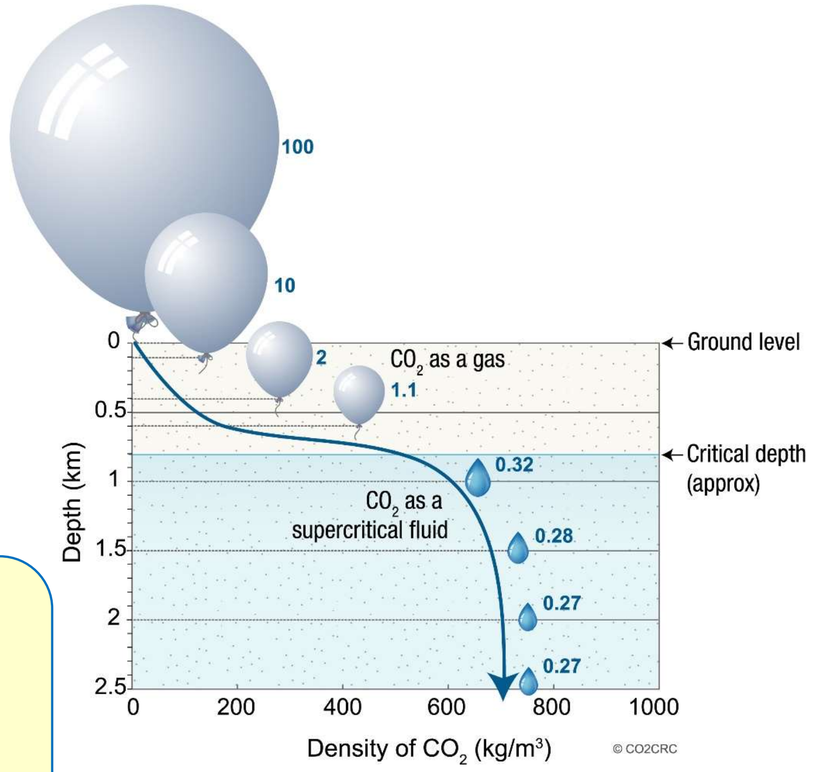


**Simplified $CO_2$ density versus depth diagram** (from CO2CRC)

NB. Gas engineers tend to work in standard cubic feet (scf) while $CO_2$ projects prefer to report mass



http://www.uigi.com/co2_quantity_convert.html

from Philip Ringrose

# Stratigraphic sequence

## representative North Sea basin

Illustrates

- how a deeper CO2 storage target formation overlain by a mudstone sequence could constitute a CO2 storage system.
- The actual properties of sealing units should be determined via site investigation and appraisal studies.
- Having established the basic concepts defining the storage target —deep and porous rock formations with sealing potential—we can begin to address the specific questions for identifying suitable storage sites.

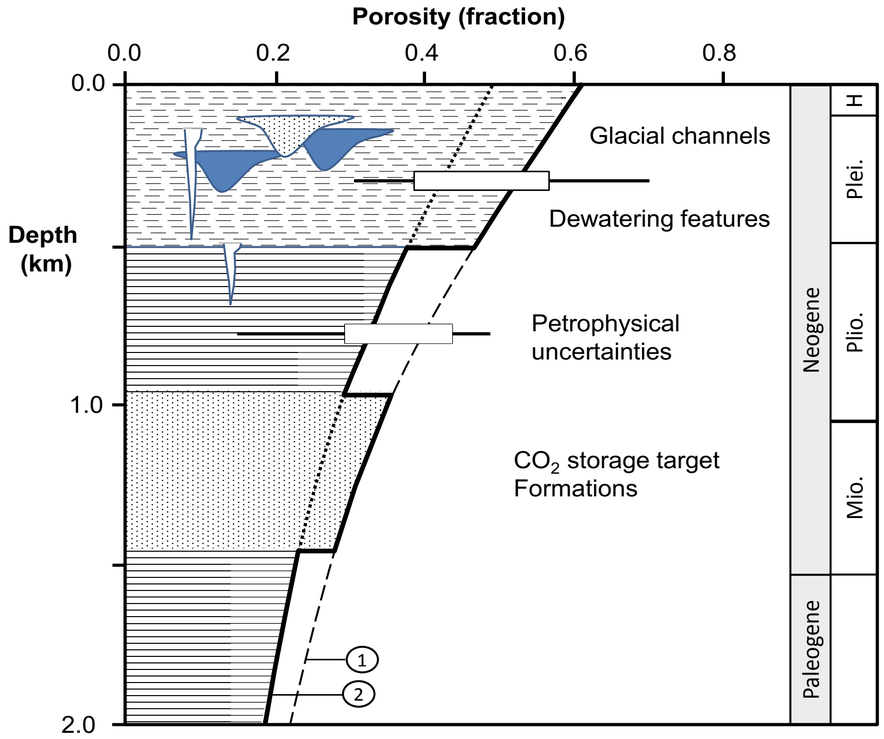


**Fig. 2.2** Conceptual sketch showing a shallow stratigraphic sequence representative of the North Sea basin. Typically, a Miocene $CO_2$ storage target formation would be capped by Pliocene mudstone sequences forming the main containment system. The role of shallow glacial channel and dewatering features in the overlying Pleistocene sequence may be a key issue for assuring storage containment. Reference porosity curves are shown based on (1) Sclater and Christie (1980), and (2) Marcussen et al. (2010). The actual porosity and permeability of the shallow basin sequence (<1000 m) is variable and uncertain and would need to be determined via site investigation studies

from Philip Ringrose