NOC - Open Day 2018 Marine Geosciences Group

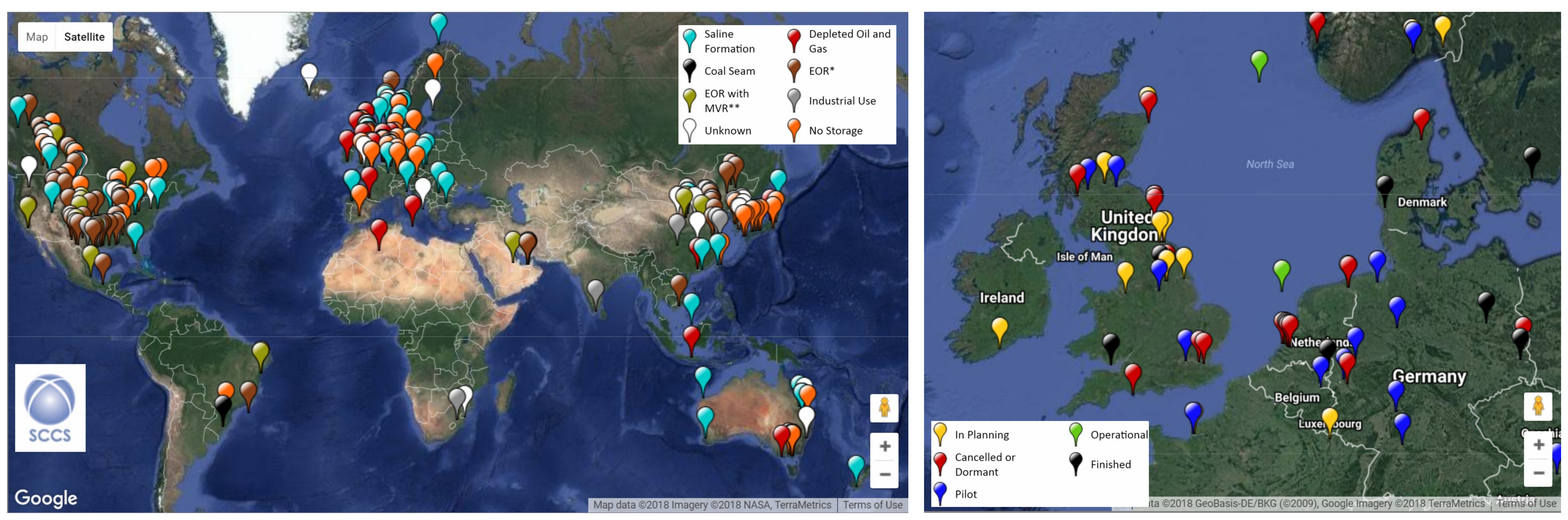
National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

# Carbon Capture and Storage (CCS) - GASRIP, STEMM-CCS, CHIMNEY

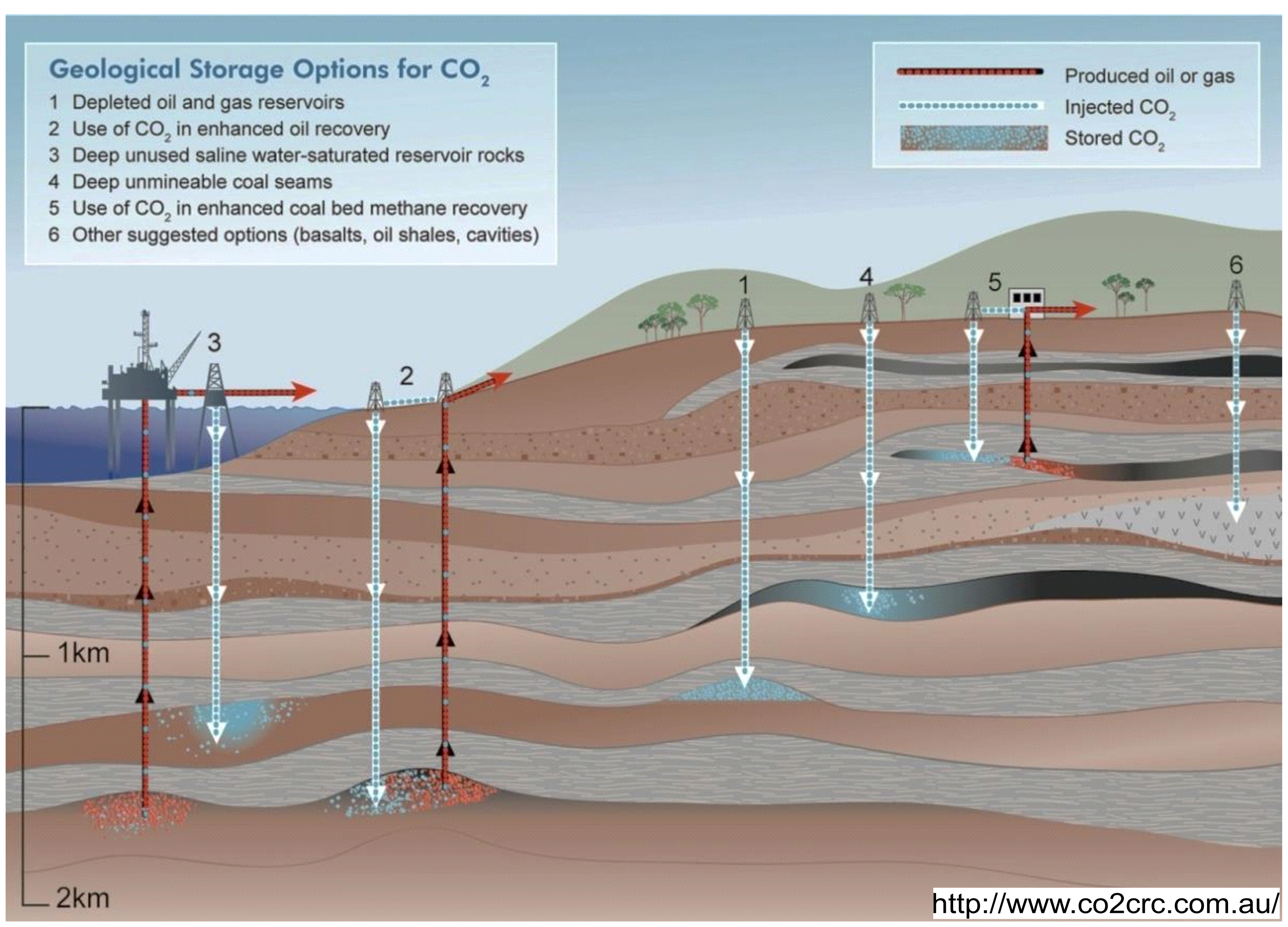
GASRIP STEMM-CCS CHIMNEY

## Context

Injecting carbon dioxide ($CO_2$) into deep geological formations is recognized worldwide as the only realistic mitigation technology that can reduce current anthropogenic $CO_2$ emissions to meet national targets by 2050. European countries, including the UK, have considered depleted oil and gas fields and saline aquifers for $CO_2$ storage (e.g. Sleipner field, North Sea), while a number of projects in the United States have focused on $CO_2$ injection for enhanced oil recovery (EOR) in depleted or unconventional hydrocarbon reservoirs.



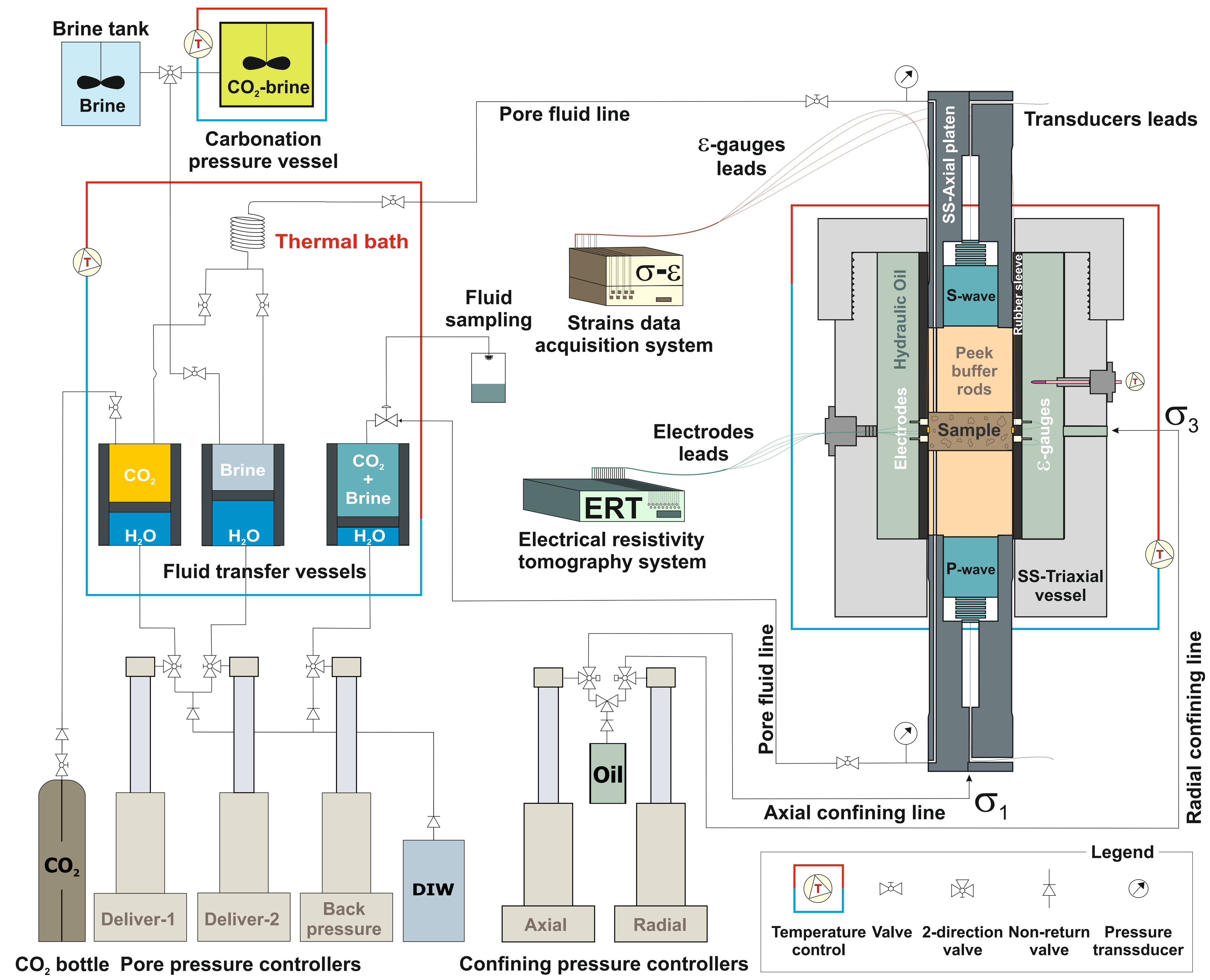
*Scottish CCS' interactive world map of carbon capture and storage projects (www.sccs.org.uk/map)*

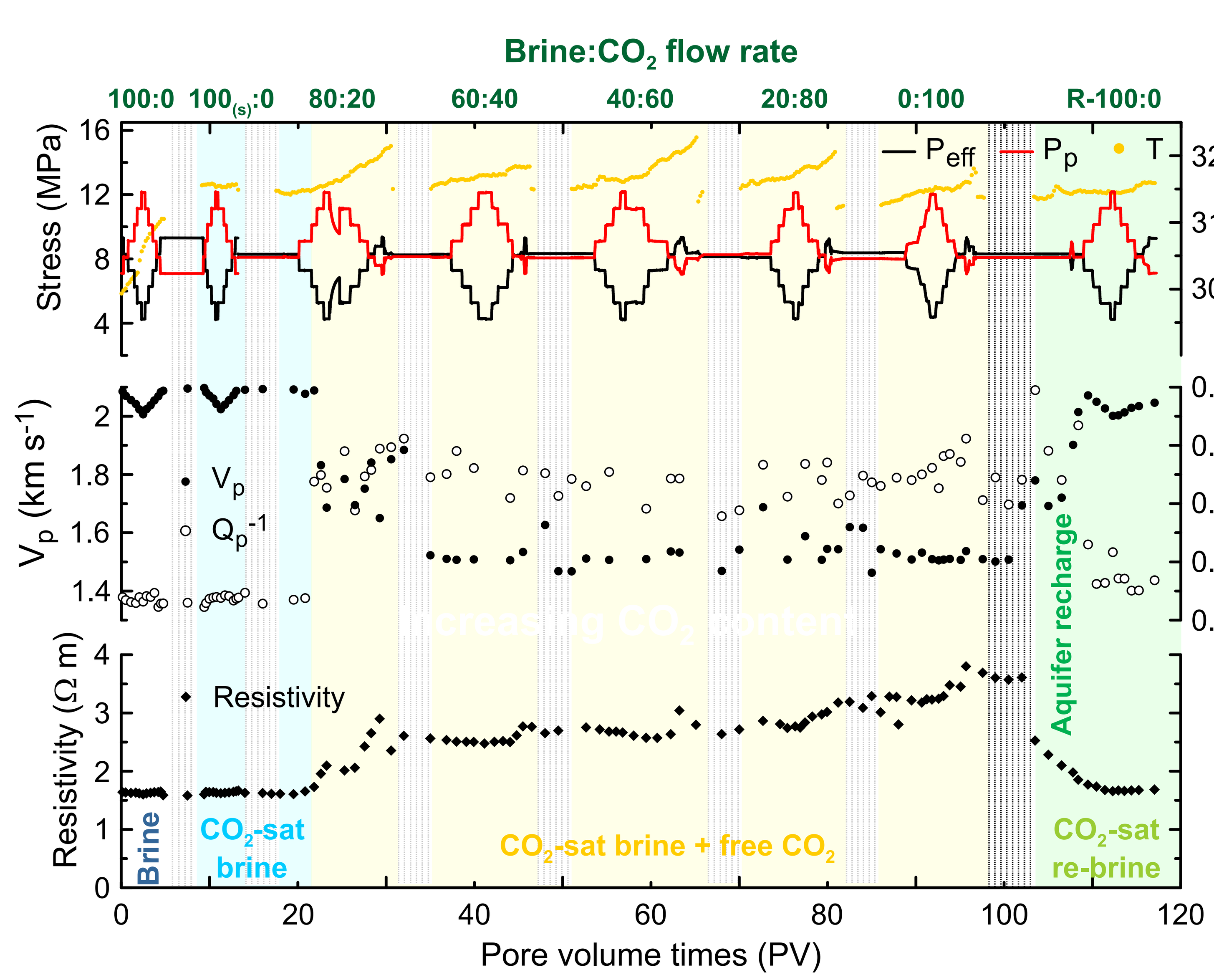



## Experimental setup

The experimental work will be carried out in the rig for $CO_2$ storage multi-flow tests at the **Rock Physics laboratory** in the **NOCS**. The setup is configured to measure simultaneously ultrasonic P- & S-wave velocities and attenuations, electrical resistivity, axial and radial strains, and permeability, during the co-injection of up to two pore fluids (under flow and pressure control). *See the experimental procedure in the video...*

Rig video




Example of our results: Brine-CO2 flow-through test on sandstone sample from Utsira. Pore pressure (Pp), effective pressure (Peff), temperature (T), ultrasonic P-wave velocity (Vp) and attenuation factor (Qp−1), and electrical resistivity for eight consecutive brine:CO2 fractional flows, covering seven drainage (the first, 100:0, using brine as pore fluid and the next six, from 100(s):0 to 0:100, using CO2 saturated brine) and a forced imbibition (R-100:0) episodes, plotted versus pore volume (PV). Dark striped bands are the interludes between two consecutive brine:CO2 episodes. Blue and yellow bands indicate drainage measurements, prior to and in the presence of free (non-dissolved) CO2, respectively (dark blue for brine; light blue for CO2 saturated brine), and green for imbibition.