Research Centre for Gas Innovation

Lead institution	**Universidade de São Paulo**
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Co-supervisor: To be appointed	**Co-supervisor department: To be decided**
Co-supervisor email	
Recipient: PhD student	**For PhDs - type**: Full at USP with co-supervision of an academic member of staff of Imperial

Project title
Geological and lithological characterization to CO_2 storage in Santos Basin salt caverns.

Research theme area: CO_2 storage / lithological characterization. (Delete as appropriate).

Aims
The aim of this PhD project is to develop a novel, integrated and efficient approach that fully characterises the petrophysical and geological properties of the salt formation and the chemical reactions between different components from the CO2 injection in a salt rock formation by using analytical simulation.

Objectives
The world has huge reserves of fossil fuels, that provide over 80% of the world's energy and yet analysis suggests that we will need to make radical reductions in CO_2 emissions over the next 50 years to mitigate climate change. The CO_2 injection underground is a common technology in the oil industry as part of routine oil-field operations. The major application of CO_2 injection is for enhanced oil recovery (EOR). CO_2 at high temperatures and pressures will dissolve in oil. This helps remove oil from the rock and boosts recovery. The most of this CO_2 flows through the reservoir and is produced with the additional oil. This is good for oil production, but not useful for permanent storage. The salt rocks in the Santos basin with 2000 m thick, present a great mechanical behaviour for storage of CO_2 , like: low porosity, which guarantees excellent impermeability to most fluids and gases even under high pressures; self healing effect, be able to host very large caverns under high variation of internal pressure, low cost for opening large caverns by solution mining and maintenance, storage of very large volume of natural gas under high pressure and higher level of safety in comparison with conventional methods of storage.

Using these topics as a starting point, the proposed PhD will :
- Discuss and propose analytical methods or appropriate systematic to underground storage of CO2 in salt caverns;
- Determinate the rock salt mechanical properties using analogous geological outcrops and drilling rock analysis;
- Provide an geological analysis to the structural behaviour of the caverns, based on indirect data interpretation;
- Suggest strategy recommendations and publish the research results.