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Education:

1980
Cambridge University, England, Ph.D.
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Queens College, City University of New York, BA

Experience:

- 2005-present: Australian Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC). Manager, Storage and Education and Training Programs,
- 1998-present: University of Adelaide.
- 2005-present: Professor, Chair of Geosequestration and Chief Scientist, Cooperative Research Centre for Greenhouse GasTechnologies (CO2CRC)
- 2003-05: Head of School, Australian School of Petroleum (ASP)
- 1998 -2003: Director, National Centre for Petroleum Geology & Geophysics (NCPGG).
- 1997-98: VICO, Indonesia, Jakarta Indonesia; Chief Geologist;
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- 1987-91: ARCO Oil and Gas Co., Plano, Texas, USA; Senior Reservoir Geologist
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Carbon Capture and Geological Storage: What are the Big Issues and Opportunities?

Fossil fuels such as coal, oil and natural gas, currently supply around 85 per cent of the world's energy needs, and according to predictions by the International Energy Agency, will continue to do so for many years to come. However, the burning of fossil fuels is a major source of CO_2, the gas most blamed for the increased concentration of greenhouse gases (GHG) in the atmosphere. Such GHG build-ups are linked to rapid, human-induced climate change, leading to growing public demand for reduction of atmospheric GHG emissions. Most anthropogenic CO_2 is emitted by coal fired power plants, though significant additional CO_2 is emitted from production and separation of large CO_2 – rich oil and gas accumulations, cement and mineral processing plants. Carbon management planning will have to include not only the technical aspects of carbon capture, transportation and storage but also issues of public acceptance, environmental, regulatory and liability constraints and the economics associated with carbon management.

There are various suggested options for global GHG reductions, including improving the conservation and efficiency of energy use; utilising non-fossil energy forms such as renewables (solar, wind, tidal, nuclear) and increasing the uptake of Carbon Capture and Storage (CCS). Whilst no one technology will be the "silver bullet" solution to make the necessary reductions to GHG buildups, a portfolio comprising all the options will be the most likely response.

CCS technology exists today and can be deployed commercially to make significant cuts in GHG emissions. CCS (also known as "Geosequestration" involves the long-term storage of captured CO_2 emissions in subsurface geologic formations.

Commercial-scale CCS projects already exist in several places around the world. One has been in operation at Statoil's Sleipner Field in the Norwegian North Sea since 1996. Other fields of note include Algeria's In Salah Field (operated by BP, Statoil and Sonatrech) and Encana's Weyburn Field in Saskatchewan, Canada, which is using CO_2 for EOR operations. At present, a demonstration-scale geosequestration project (the CO_2CRC Otway Project) is in progress in Victoria, Australia where a total of 100,000 tonnes of CO_2 is being injected into a depleted gas field.

The storage of CO_2 involves keeping the CO_2 secured deep underground in an appropriate geologic formation. The main geological conditions for this include: a porous and permeable reservoir rock, a trap, and an impermeable caprock. Expertise in locating such formations is well established within the exploration side of the oil and gas business.

Depleted oil and natural gas fields, which generally have proven geologic traps, reservoirs and seals are ideal sites for storage of injected CO_2. While subsurface storage of CO_2 is not without risk, a systematic risk assessment for all geosequestration sites considers both the engineered and natural systems.

In conclusion, carbon capture and storage will usher in an entire new global business model. Successful deployment of CCS will require top quality science, appropriate regulation, clarity on liability issues and acceptance by the community. Individual storage sites will need to be well characterised with respect to the physical and chemical processes which will take place during and after injection. Similarly, all the technologies available for monitoring the stored CO_2 need to be evaluated and the most appropriate ones selected and the risks associated with all phases of the process must be identified and understood. These aspects of CCS will provide tremendous opportunities for appropriately skilled organisations and individuals.