

Transport and Storage

Transport and storage research

Carbon study could help reduce harmful emissions

Injecting CO₂ into natural geological traps is the safest and most economic means to store CO₂ captured from industrial sources.

However, it is extremely difficult to predict or assess the long term effects of increasing the CO₂ concentration in the subsurface from short term observations from existing engineered sites.

Research conducted at the University of Manchester and ongoing work at the University of Edinburgh has revealed that storing carbon dioxide beneath the earth may be a safer and longer term method of reducing emissions in the atmosphere than previously thought.

This work has been recently published in the *Geochemistry Journal Geochimica et Cosmochimica Acta*.

The researchers collected CO₂ samples from five natural gas fields located in the Colorado Plateau and Rocky Mountain regions of the USA and measured their noble gases. Their findings allowed them to 'fingerprint' the Colorado CO₂ for the first time.

Dr Stuart Gilfillan, the researcher running the project said, "We know that oil and gas have been stored safely in oil and gas fields over millions of years, but when it comes to CO₂ our knowledge is limited."

"This is because there are several different ways that CO₂ is produced within the Earth. Unless we know how the stored gas formed, it's difficult to be sure how long it has been underground."

"There are two main sources of CO₂ in the high concentrations found in these gas fields: 'degassing' from magma (lava which doesn't reach the surface), and the breakdown of carbonate rocks (e.g. limestones) through heating."

"The ratio of heavy and light carbon atoms (isotopes ¹³C and ¹²C) within the gas can usually tell these two origins apart. However whilst both sources have a distinct range of values, their ranges overlap slightly, so the method doesn't work in this case."

"A better test is to use helium, one of the noble gases, renowned for being unreactive, or inert. This inertness makes it suitable for tracing the origins of underground CO₂."

"The isotope ³He only comes from deep within the Earth, and is transported within magma. So if a lot is mixed into the CO₂, then the gas came from magma. If there is only a small amount, then the CO₂ came from carbonates."

"Our results show that the gas in the fields has been released from molten magma within the Earth's crust. In all of these fields, the last time the magma melted and CO₂ was released was more than eight thousand years ago."

"In three of the fields, it last occurred over a million years ago, and in one it was at least 40 million years ago. This proves that the CO₂ has been stored naturally and safely in the earth for periods between eight thousand years and 40 million years."

"We hope this study will pave the way for selection of similar safe sites for storage



Prof. Chris Ballentine and Dr. Greg Holland of the University of Manchester collecting CO₂ samples from Sheep Mountain gas field, Colorado

of CO₂ from power plants in both the UK and abroad. A suitable storage place for the UK could be in the North Sea, where similar rocks to those in the US gas fields can be found."

The paper, 'The noble gas geochemistry of natural CO₂ gas reservoirs from the Colorado Plateau and Rocky Mountain provinces, USA', appears in *Geochimica et Cosmochimica Acta*, 15 February 2008, Vol 72, No. 4, p1174-1198.

Dr Stuart Gilfillan is a Geochemist who gained his first degree in Earth Science from the University of Glasgow and his PhD in Geology from the School of Earth, Atmosphere & Environmental Science at The University of Manchester in 2006. He is now a Research Fellow at the University of Edinburgh.

Ohio - \$1m carbon sequestration study

www.reviewonline.com

\$1m of US Federal government funds are being invested into a study into suitable carbon storage sites in Wellsville, Ohio, according to local newspaper The Review of East Liverpool, Ohio.

A proposal is on the table to add carbon sequestration to a proposed new coal gasification plant in Wellsville, with carbon storage starting in 2009.

The announcement was made by Congressman Charlie Wilson and Baard Energy President/CEO John Baardson.

In the proposed plant, 85 per cent of the carbon dioxide from the coal gasification process will be captured and injected into oil reservoirs in North East Ohio, and used in 'enhanced oil recovery'.

The total CO₂ lifecycle reduction, from mining the fuel to burning it in an engine, is anticipated to be over 46 per cent.

The study will also look at engineering issues and modelling the effect of the CO₂.

The funding is part of \$1.5m in total to support economic development in Mahoning and Columbiana counties, which is part of \$6.3m total federal investment in Ohio's sixth district, which is part of George Bush's \$555bn Omnibus Spending bill.

Coolimba and CO2CRC in major CO2 storage study

www.coolimbapower.com.au

Coolimba Power has commissioned the Cooperative Research Centre for Greenhouse Gas Technologies (CO₂CRC) to undertake a study to assess the potential for the underground storage of CO₂ in Western Australia's Mid West region.

On behalf of Coolimba, an Aviva Corporation initiative, CO₂CRC is investigating sites for the potential sequestration of CO₂ as part of its proposed power station near

Eneabba, in the Mid West.

The Coolimba Power Project is a one billion dollar investment based on a 400MW coal fired power station 20km south of Eneabba, designed to be capture ready.

Dominion supports Virginia Tech storage research

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Dominion has donated \$500,000 to the Virginia Center for Coal & Energy Research at Virginia Tech to study CO₂ storage.

The Virginia Tech center is planning a full-scale storage demonstration project in Southwest Virginia.

The additional funding will make it possible for the research program to qualify for funding from the U.S. Department of Energy.

Dominion is one of the nation's largest producers of energy in the US and is investing widely in CCS research.