Gas 'fingerprinting' could help energy industry manage carbon dioxide storage

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A new technique for monitoring carbon dioxide could help the energy industry's efforts to reduce future greenhouse gas emissions, scientists have found.

In a new paper published in the *International Journal of Greenhouse Gas Control*, researchers describe how they have used the unique signature from traces of the noble gases (helium, neon and argon) to monitor the fate of carbon dioxide stored underground.

Carbon dioxide emissions from energy generation, in particular coal burning, contribute to the increasing pace of global climate change. Carbon capture and storage (CCS) techniques aim to store carbon dioxide in depleted oil and gas fields or deep aquifers, preventing it from reaching the atmosphere. Widespread use of CCS in the future could help to reduce global carbon emissions, helping to slow global temperature rise.

The paper's authors, from the Scottish Universities Environmental Research Centre (SUERC), collected gas samples in 2009 and 2012 from wells at the Cranfield CO2-enhanced oil recovery field in Mississippi, USA.

Co-author Professor Finlay Stuart of SUERC (University of Glasgow) said: "We have shown for the first time that the naturally occurring helium, neon and argon in the injected gas is a unique 'fingerprint' that can be used to monitor the movement of the CO2, and determine how it is stored.

"Before CCS can become widely adopted as a method of CO_2 mitigation we need to know how effective the gas can be stored underground. The noble gases are chemically inert so they are not affected by interactions with rocks or water in the way that carbon dioxide is, so they can be used to identify the physical processes that have affected the gas. They provide a cheap way to fingerprint injected gases in future large-scale carbon storage projects, and have the potential to provide a unique way to track the presence of deep shale gas and coal bed-derived methane in shallow aquifers during and after extraction."

More information: "Tracing injected CO_2 in the Cranfield enhanced oil recovery field (MS, USA) using He, Ne and Ar isotopes." *International Journal of Greenhouse Gas Control*, Volume 42, November 2015, Pages 554-561, ISSN 1750-5836, dx.doi.org/10.1016/j.ijggc.2015.09.009

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