Feasibility of storing carbon dioxide on a tectonically active margin: New Zealand

Title	Feasibility of storing carbon dioxide on a tectonically active margin: New Zealand
Author(s)	Field, B.D.;Lawrence, M.J.;Nicol, A.;McNamara, David D.;Arnot, M.J.;Coyle, F.;Higgs, K.E.;Mountain, B.;Gerstenberger, M.;Daniel, R.;Bunch, M.A.;Barton, B.
Publication Date	2015-09-13
Publisher	American Association of Petroleum Geologists

Feasibility of Storing Carbon Dioxide on a Tectonically Active Margin: New Zealand

Brad Field[1], Mark J. Lawrence[1], Andy Nicol[1], David McNamara[2], Malcolm J. Arnot[2], Fiona Coyle[1], Karen E. Higgs[1], Bruce Mountain[1], Matt Gerstenberger[1], Ric Daniel[3], Mark A. Bunch[3] and Barry Barton[4]

[1]CO2CRC at GNS Science, Lower Hutt, New Zealand.
[2]GNS Science, Wellington, New Zealand.
[3]CO2CRC at Australian School of Petroleum, University of Adelaide, Adelaide, SA, Australia.
[4]Faculty of Law, University of Waikato, Hamilton, New Zealand.

September 15, 2015 Tuesday 1:45 P.M. International Conference & Exhibition, Melbourne, Australia

Abstract

Screening of New Zealand's sedimentary basins indicates several gigatonnes of carbon dioxide storage capacity might be available. However, carbon dioxide storage is currently untested in New Zealand and it is likely that most theoretical storage capacity will be discounted once detailed assessments are made. New Zealand's position on an active Neogene plate boundary raises additional key factors that will affect final site selection. Issues specific to New Zealand's setting include 1) rapid facies changes, syndeposition and post-depositional structural events, particularly in regions close to the plate boundary; 2) rapid subsidence and high sedimentation rates leading to overpressured reservoirs and strong water drive in some structures, which will potentially result in injectivity issues, particularly in depleted fields; 3) mineralogically immature reservoir rocks requiring assessment of injected gas-rock reactions; 4) common occurrence of faults of various scales, requiring assessments of their sealing capacity and present stress fields; and 5) distinguishing induced seismicity from common natural seismicity. Some of these risk factors will also influence the relationship between social acceptance and the design of regulations. Despite the risks, hydrocarbon producing fields in Taranaki indicate that viable reservoir-seal pairs are likely to be present. Additionally, injection of small volumes of produced water and significant natural gas storage at the depleted Ahuroa Field, have not led to noticeable induced seismicity, though large volumes expected from a carbon dioxide injection project would likely require careful site assessment for seismic risk in some areas. Natural analogue and laboratory fluid rock experiments are investigating the effects of carbon dioxide injection on reservoir mineralogy and some effects can now be anticipated. Currently produced gas from New Zealand locally contains significant carbon dioxide (up to 44% carbon dioxide in the Taranaki region and up to 30% in the Canterbury Basin) and if new discoveries also have a high carbon dioxide content they may require processing before use, with disposal of carbon dioxide. Such a large gas discovery anywhere in New Zealand could therefore stimulate rapid deployment of CCS. It is highly likely viable storage sites exist, particularly away from the current plate boundary, though the site-specific nature of site assessment is particularly important in New Zealand's geological context.

AAPG Datapages/Search and Discovery Article #90217 © 2015 International Conference & Exhibition, Melbourne, Australia, September 13-16, 2015