

Capacity and supply potentials of CO₂ aquifer sequestration in Japan

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The concept of CO₂ aquifer sequestration has been confirmed in a general sense. However, Japan need confine the concept based on its particular natural and industrial situations. This should be done in the coming years to fulfill the obligations in Kyoto Protocol. The confinement of the concept depends on the extent to which we can answer the questions such as: 1) how much, 2) where, 3) in what way, 4) at what cost, and 5) how safe CO₂ can be sequestrated in Japan.

In order to find the answers for the former three questions, this study ranks the potential sites in terms of their respective capacity potential and CO₂ supply potential, both of which have a significant effect on storage economics. Here, the supply potential wi

th respect to a sequestration site is characterized by the annual amount of the emissions and the site-source distance, i.e., how much and from how far away CO₂ is available. Totally 69 sites and 113 fossil fuel fired power plants are examined. Based on capacity criterion and supply criterion, the sites are graded into 3 ranks. As a result, a site-ranking map is worked out. The 11 sites in rank 1 are recommended as near-future candidate sites. These sites have a comparatively large capacity and can obtain a reasonable amount of CO₂ supply from nearby sources almost without main pipeline, leading to a significant cost-down. Our investigations suggest that:

1) Japan have a huge and economical sequestration potential, in term of transportation cost, which may host the CO₂ emitted from nearby sources in this century, even beyond.

2) In the near future, the annual amount of sequestration, with a low transportation cost, may be around 100Mtonnes, larger than Kyoto Protocol goal of about 70Mtonnes/yr (6% of the emission in 1990 in Japan). The near-future sequestration amount may be even larger if taking into the other stationary emission sources, such as cement plants and steel mills, into considerations. To further increase the amount, it is required to take the sites in rank 2 into considerations or seek new sites in the other regions, especially those surrounding Shikoku.

3) The sites in rank 1 contribute in Niigata-Toyama region and Joban-Kanto region and southwestern Hokkaido.