

Moving toward Commercialization of CO₂ Storage in Japan

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The IPCC published a special report on Carbon dioxide Capture and Storage(CCS) in 2005, stating that CCS is one of the promising options for mitigating carbon dioxide emissions into the atmosphere. Among several CO₂ storage options, storing CO₂ in saline aquifers is the most promising because of the large storage potential, estimated at from about 2,000 Gt CO₂ to more than 10,000 Gt CO₂. Some CCS technologies are already in practical use in several countries and are economically viable. Close attention has been paid recently to deep saline aquifer storage, which is expected to have a large storage potential of about 2,000 Gt CO₂ throughout the world. First of all this presentation describes current global trends of CCS technology development and national policies. Then this presentation focuses on the mechanisms of deep saline aquifer CO₂ storage. In deep saline aquifer storage, chemical reactions in the water-rock-CO₂ system play important roles for trapping CO₂ in the aquifer formation, as well as physical trapping by overburden impermeable cap rocks and residual gas trapping mechanisms. The presentation will also stress the importance of the long-term monitoring of the storage aquifer because CO₂ would be trapped stably in the formation for a long time. It is thus important to develop effective monitoring techniques for the behavior of CO₂ in the aquifer. Physical as well as chemical monitoring techniques should be used for storage aquifer monitoring. Finally the presentation conclude with discussions about storage potential in Japan and some important issues related to deep saline aquifers. Deep saline formations are distributed widely in Japan, and have the potential for the geological storage of 146 Gt of CO₂. It is therefore economically feasible to use deep saline formations near large emission sources such as coal-fired power plants and integrated steel works. To realize CCS in Japan, it is important to make further advances in studies on the basic physical and chemical trapping mechanisms of water-rock-CO₂ system, and in studies on the geological characteristics of aquifer formations.

Keywords: CO₂, CCS, monitoring, trapping mechanisms, storage potential, commercialization