

# Papers On Chinas Energy Potential

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## The Potential Estimation for CO<sub>2</sub> Saline Aquifer Storage in Chinese Main Basins

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**Abstract.** CO<sub>2</sub> saline aquifer storage has large potentials, which is one of the promising options for mitigating carbon dioxide emissions into the atmosphere. Chinese storage potential assessment is in its infancy. This paper reviews the research of the storage potential evaluation in China. Based on the two mechanisms of structure trapping and solubility trapping, the formula is analyzed and obtained to calculate the storage potential. We select 23 main continental basins and 9 main sea basins in China, then calculate that saline aquifer storage potential is 1914.79 Gt in Chinese main basins, among which the continental storage potential is 1341.07 Gt and the off-shore storage potential is 573.72 Gt. This research provides basic data for the implementation of the saline aquifer storage in China.

### Introduction

CO<sub>2</sub> geological storage is to inject high-pressure CO<sub>2</sub> into underground geological structure, and to store CO<sub>2</sub> in the pores of the rock so as to achieve the goal of greenhouse gas reduction. At present geological storage is one of the most economic methods of large scale CO<sub>2</sub> storage, and is also the CCS storage method vigorously promoted in the world. In various storage methods, saline aquifer storage has the largest storage potential, perhaps 99% of the total geological storage potential [1]. If CCS can play an important role in CO<sub>2</sub> emission reduction, saline aquifer storage will be the main geological storage option.

Saline aquifers usually refer to the closed aquifer 800 meters below the ground which is formed by sandstone and limestone and filled with brine in high concentration. This structure exists widely on earth, and has a very large CO<sub>2</sub> storage capacity, which can meet the demand of the whole world for centuries. Saline aquifer storage usually chooses the depth of below 1000 meters, and the injected CO<sub>2</sub> exists in the form of liquid or supercritical state. CO<sub>2</sub> first exists in stratum pore structure. Then CO<sub>2</sub> gradually moves up with the injection and finally is sealed by cap rocks. Through physical and chemical changes, CO<sub>2</sub> is stored in the saline aquifer permanently after the processes of structure trapping, solubility trapping, mineralization trapping, etc.

### CO<sub>2</sub> saline aquifer storage potential research status in China

Before the large-scale implementation of CCS, we should evaluate the storage potential as accurately as possible. The overall size of storage potential directly determines CO<sub>2</sub> emission reductions that CCS can realize. The comparison relationship among various types of reservoirs (onshore/offshore, oil and gas fields/saline aquifer/coal mine) storage potential will also affect the research direction of storage technology and the overall estimation of storage cost.

Saline aquifer storage in China is still in its infancy. Chinese scholars have done some research work on saline aquifer storage potential. X Li, et al. [2] put Chinese 24 large scale basins into 70 storage parts with similar area. Considering various factors, the storage depth was selected for 1-3 km. They calculated that Chinese CO<sub>2</sub> saline aquifer storage potential was about 1.43505\*10<sup>11</sup> t using solubility method. The continental storage potential was about 773.8\*10<sup>9</sup> t, which accounted for 53.92% of the total capacity; the off-shore storage potential was about 661.25\*10<sup>9</sup> t, which accounted

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