Carbon dioxide Capture and Storage (CCS) technology is considered as the most efficient option to reduce CO₂ emissions and could contribute to 19% of global carbon dioxide mitigation by 2050. CCS is particularly significant for China due to its abundant and rapidly rising emissions derived from fossil fuel. China government actively advocates low-carbon development including CCS. The primary step of large-scale CCS technologies deployment is to investigate the potential of CO₂ geological storage capacity. This study presents the outcome of assessment on the effective CO₂ storage in the Qiongdongnan Basin (QDNB), offshore Hainan. The QDNB is a Cenozoic sedimentary basin on the passive margin of the northern South China Sea, with an area of 88,000 km² and sediments of thickness larger than 12,000 m. Based on the published data, geological conditions and parameters for CO₂ storage are analyzed, volumes of potential formations are calculated on a GIS plateform, and the storage capacity is calculated according to CSLF and USDOE formulations. For the saline formations deeper than 800m below seafloor in the QDNB, the estimated effective capacity for CO₂ storage in the saline formations of the QDNB is 41 Gt; in which only 8.4 Gt resides in shallow areas. This capacity is large for storing the CO₂ emitted from the major point sources in the Hainan Island, and gas fields in the QDNB and the adjacent Yinggehai basin. The western portion of the area in the QDNB, including the Yacheng Uplift, South Yacheng Sag, and the South Yacheng Uplift is suggested the most promising area for the CO₂ storage and need further investigations.

**Key words:** Carbon dioxide Capture and Storage (CCS), CO₂ storage capacity, Qiongdongnan Basin, Hainan province, South China Sea