Building Foundations for First CCS Project in Africa

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Abstract

Carbon dioxide Capture and Storage (CCS) is one of the measures that the UN Intergovernmental Panel on Climate Change recommends for keeping global warming limited to 1.5 degrees Celsius. The International Energy Agency states that there is a need to store billions of tons of CO_2 every year if we want to reduce global warming. The goal is to reduce the CO_2 footprint of Egypt in the order of millions of tons of CO_2 per annum, to initiate discussions with different stakeholders to create a legal, environmental, social and infrastructure framework within international guidelines under which similar projects can be managed in the future. We aimed to review the suitability of Nile Delta deposits for CO_2 storage and to identify favorable areas within the shallow waters offshore Nile Delta, where CO_2 can be safely and securely stored. The study is divided into a non-technical and a technical work element. First, we identified anthropogenically-produced CO_2 sources within reasonable distances and linked them to potential storage sites that have the capacity to contain and securely store equivalent quantities of emitted CO_2. The technical tasks included i) a petrophysical evaluation of well data for lithology identification and reservoir properties estimation, ii) seismic interpretation to determine regional stratigraphic and structural trends, including mapping of faults and identified facies, iii) top and fault seal assessment to evaluate fault activity and fault juxtaposition, and iv) regional pressure-temperature and hydrodynamics modeling to predict reservoir conditions, seal quality and water flow. Based on the results of the above tasks, potential storage sites have been mapped and their CO_2 storage capacity estimated. Using the risking scheme outlined by the Norwegian Petroleum Directorate (2014), the sites are risked and ranked. Four potential storage sites have been identified in the Abu Madi and Lower Pliocene sediments. These sites are predominantly stratigraphic traps. Their areal extent is small and controlled by facies variation and fault boundaries with relatively minor estimated CO_2 effective storage masses compared to analogues from other areas worldwide. The project has highlighted the gap in the legislative, environmental, and social framework for CO_2 projects in Egypt. It also provided insight to the lack of CO_2 emission data in Egypt and highlights the need of incentivizing the creation of a transparent guideline for reporting CO_2 emissions data. It highlights the need for more collaboration on CO_2 capture, transport, and storage projects in Egypt as a gateway to similar activities in Africa and is a vital milestone step in Egypt's pathway to energy transition.