British Geological Survey

Carbon dioxide storage

RESEARCH PRIORITIES FOR INDIA

Carbon capture, utilisation and storage (CCUS) has been shown to be a viable technology for mitigating emissions from energy-intensive industries. CCUS is highlighted as a strategic priority in the 2030 Roadmap for India-UK future relations.

Despite considerable expansion of renewable energy, coal will remain important for power generation in India whilst also achieving net zero emissions by 2070. Furthermore, heavy industries such as refining, fertiliser, steel and cement are also vital for underpinning India's economy. CCUS will therefore be required to reduce resultant emissions from these industries and fossil-based power generation.

Following recent discussions with industrial, academic and policy stakeholders in India, we have identified research priorities to support the feasibility assessment of the geological storage of carbon dioxide.

Background

Although studies have identified that there is some potential for geological storage of carbon dioxide, India's storage potential is poorly understood at present. This lack of detailed information limits the extent to which carbon dioxide storage policies can be developed. Lack of clear policy direction is an impediment to industry engagement and investment decisions. At present, no carbon dioxide storage projects are operating in the country.

Fundamental research is required to:

- underpin future policy developments
- provide confidence to stakeholders, including the public
- prioritise storage options
- provide foundational knowledge to support pilot study development

Research priorities

Suitable geological storage locations should be identified by characterising subsurface rock formations in areas of interest. Development of a public national atlas or regional storage atlases would provide stakeholders with high-level information on potential storage opportunities and their distribution. This should include assessments in different settings, including oil and gas fields, saline aquifers, coal basins and basalt.

Protection of groundwater, soil and the surface environment is a key consideration in any carbon dioxide storage activity. Robust methodologies to understand, assess and manage risks

related to unexpected migration of carbon dioxide in the subsurface have been prepared for commercial projects worldwide. Demonstrating the applicability of such methods in India will be required to provide assurance that risks can be managed appropriately.

Fluid-injection activities can be associated with low levels of induced seismicity. Understanding the in situ stress conditions, baseline seismicity and seismic potential will be important for designing secure carbon dioxide storage projects and avoiding unwanted side effects.

Robust measurement, monitoring and verification (MMV) is required to ensure that carbon dioxide storage sites are operated safely. India does not currently have a specific regulatory framework for carbon dioxide storage, however future legislation is likely to require assurance that storage sites are well understood and that injected carbon dioxide remains securely trapped within the intended geological storage formations. Research is required to understand the applicability of MMV techniques in prospective Indian storage settings.

There is mounting evidence that understanding public attitudes towards technologies such as carbon dioxide storage is crucial to ensure effective implementation. Exploring societal attitudes to storage of carbon dioxide in India, including its perceived risks and benefits, will be essential to identifying potential societal barriers and designing future programmes to enhance social value through community agency and ownership.

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