Evaluation of barriers to national CO_2 geological storage assessments

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Abstract

Decision-makers need to understand their national carbon dioxide (CO_2) storage resource to assess the potential contribution that deployment of CO_2 Capture and Storage (CCS) could make to national targets for emissions reduction. The first step in assessing national CO_2 storage potential is commonly the preparation of a country-level inventory of potential storage options and large sources of CO_2 emissions.

A study to support the work of the Carbon Sequestration Leadership Forum (CSLF) assessed barriers to undertaking high-level geological CO_2 storage assessments. Perceived barriers were identified from responses to a targeted online questionnaire and telephone interviews. Key stakeholders were contacted representing more than 15 countries where some CCS interest was known or where CCS could potentially be implemented in the future. Representatives of government departments and other expert authorities who were expected to have a good overview of CCS or CO_2 storage at a national level and representatives of international funding bodies with an interest in CCS were contacted.

The most frequently reported barriers to progressing national assessments of CO_2 storage capacity (Figure 1) are: data availability, either due to sparsity, absence, or data that is available but inaccessible; data quality, often due to the age of the available data; lack of industrial support; differing methodologies for storage assessment; and absence of political and regulatory support. All the questionnaire respondents indicated achievement of some level of national assessment regardless of the reported issues with data quality and accessibility. Other commonly perceived barriers included lack of funding for undertaking assessments, insufficient regulatory or public support, no identified agency responsible for storage assessments and conflicts of interest. Around 17% of questionnaire respondents indicated there were no barriers to high-level national storage assessments.

All of the fifteen countries that responded to the questionnaire had completed national CSLF-methodology ‘theoretical’ storage capacity assessments. Eight of the countries had achieved assessments in which storage capacities were ‘matched’ to potential emissions sources. In many cases, the initial estimates were sufficient to allow policymakers to make informed decisions about priorities for follow-up actions although the identified barriers prevented further ‘maturation’ of the theoretical storage capacity estimates.

A number of commonalities were identified that had enabled assessments of national storage potential. These included regulatory and political support, accessible national datasets, existence of an organisation (often a geological survey or government department) with access to national

datasets to undertake an assessment, presence of a public organisation with a clear mandate to manage and coordinate access to relevant data and data access facilitated at a national level.

Several strategic factors which have supported the advancement of a national CO_2 storage assessment were also identified: a step-wise approach with increasing levels of detail and appropriate decision points, as the potential role of CCS becomes clearer, seems an efficient approach to move towards demonstration and deployment. Where storage potential exists, policy support should ensure there is a long-term vision for reducing greenhouse gas emissions which may include deployment of CCS. Development of a strategy to prioritise sites for detailed assessments is a crucial step in developing a targeted and efficient approach to storage assessments. A national-level database of potential sites is a good stepping-stone towards detailed site investigation. The time required to develop a storage site from initial appraisal to injection needs to be considered in strategic planning.

It was clear that a good understanding of the uncertainties and constraints in the underlying data remains critical throughout all stages of assessment. A clear and comprehensive description of the capacity assessment methodology used is also essential, so that the limitations of the different approaches are understood, as there is no agreed uniform methodology.

The great value of knowledge sharing between forerunner and follower countries was also evident, as this had enabled national storage assessments in countries where CCS-specific expertise is not yet available. Developing countries, particularly where oil and gas resource development is absent or still maturing, are more likely to have greater difficulty sourcing the expertise needed to perform CO_2 storage assessments. However, generally, there was an interest in international collaboration and knowledge sharing so this barrier does not seem insurmountable.

Flow simulations providing dynamic capacity estimates (including the impact of site-specific dynamic factors such as injection rate, timing of injection, pressure effects at site-specific and regional scales) are needed to fully understand the potential CO_2 storage capacity following on from national storage assessments. Depending on the existing level of data available for capacity assessment, new data will almost certainly be required to meet this increased level of understanding, particularly for dynamic capacity estimates.

The authors acknowledge the UK Department of Energy and Climate Change and the Korean Clean Energy Ministry for their support of this study. The authors also wish to thank the project manager, James Craig of the IEA Greenhouse Gas Research and Development Programme.

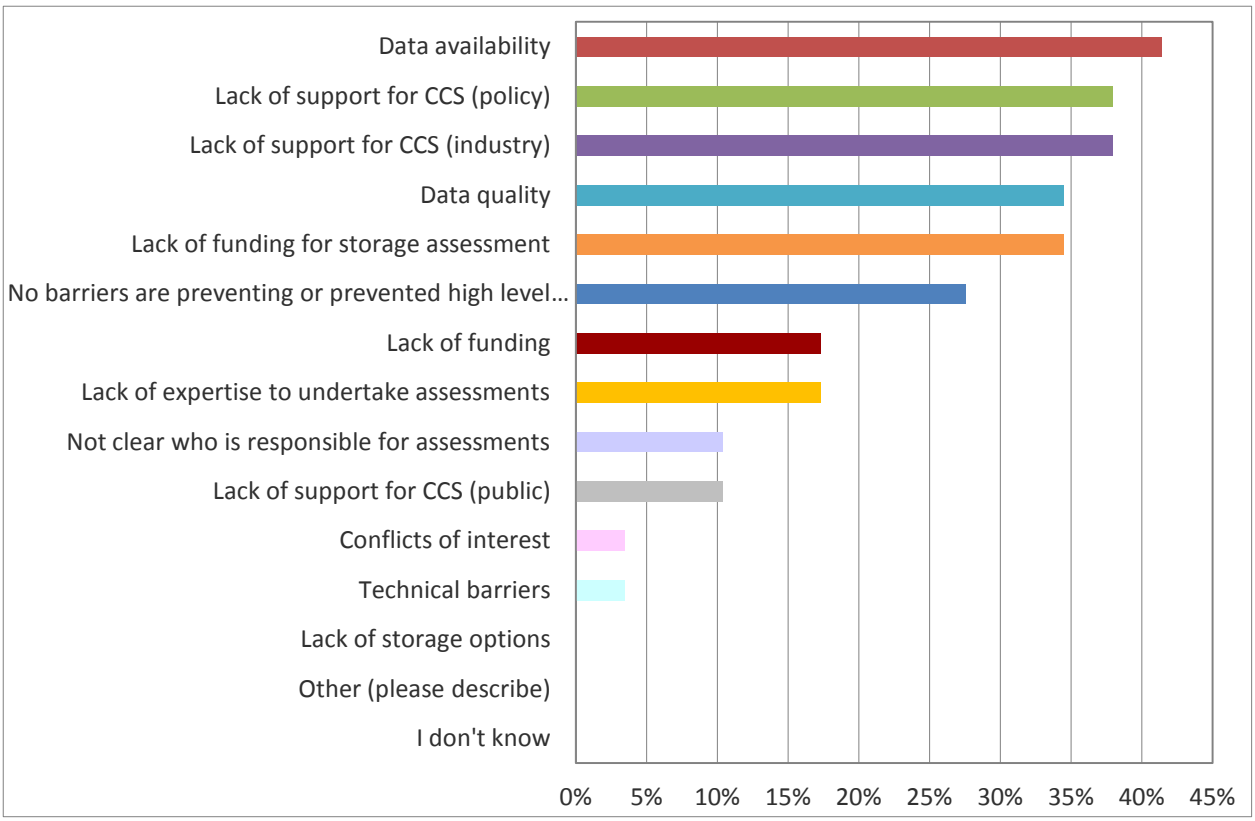

Figure 1: Barriers faced when planning or conducting storage assessments from questionnaire responses (responses in the 'other' category have been assigned to the existing categories based on detail provided by the respondent).