

Evaluation of Barriers to National Storage Assessments



- Clean Energy Ministerial CCUS Action Group
- Survey co-funded by UK and South Korean Governments and conducted by the BGS

Objectives of the Study



A survey covering 25 countries to assess the main perceived barriers to undertaking a national storage assessment . The purpose of the survey:

- Explore the extent of high-level assessments of geological CO₂ storage capacity, achieved or desired.
- The potential barriers faced in trying to achieve assessments for potential storage options on a country-wide level.
- Learn how barriers have been overcome where national assessments have been successfully prepared.

Methodology

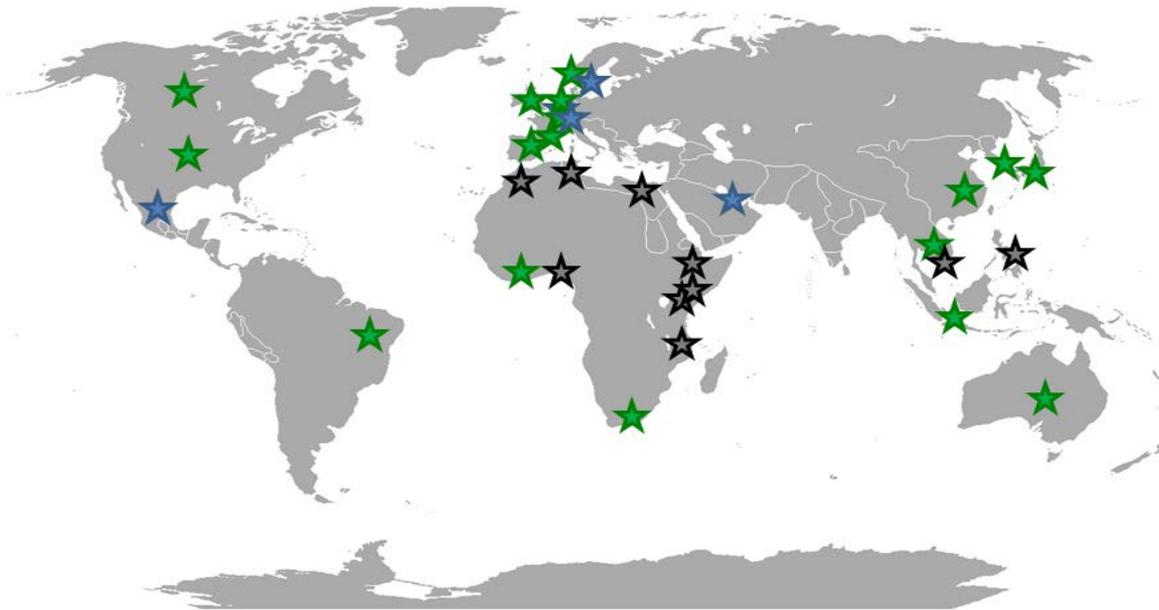


- An online survey was used to produce and distribute a questionnaire. The participants were given an overview of the reasons for the study and a description of storage assessment categories based on (CSLF, 2007). These covered a number of topics including:
 - Level of national storage assessment
 - Discussion of major perceived barriers (technical, financial and regulatory).
 - Identification of funding routes for storage assessments.
 - Description of the methodologies used.
 - Future aspirations for national assessment.

Response to the survey



- The questionnaire received 29 responses from 15 countries
- Most respondents had direct experience of undertaking storage capacity assessments.
- All respondents claimed that some level of storage assessment had been undertaken in their country.

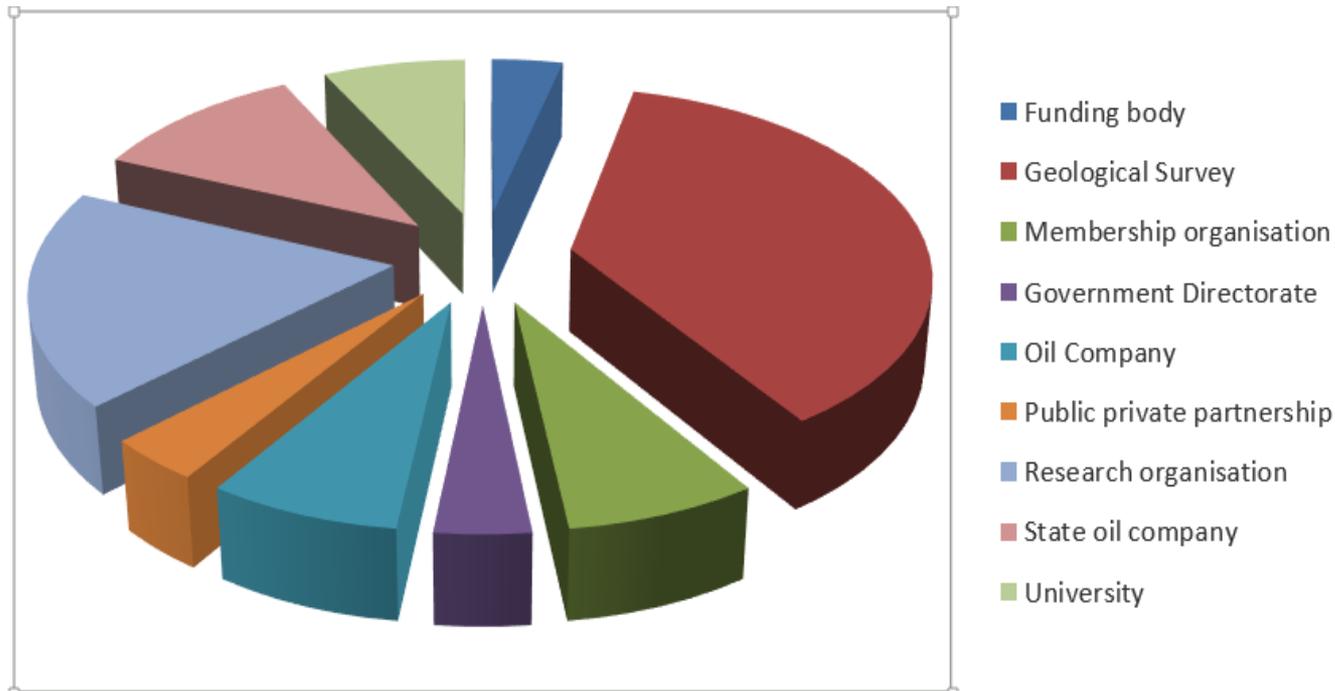


Level of Resource Assessment



Country	Status as per GCCSI Storage Readiness Assessment
Australia	Well advanced
Brazil	Prepared
Canada	Prepared
China	Well advanced
France	Making progress
Germany	Well advanced
Japan	Making progress
Netherlands	Well advanced
Norway	Prepared
South Korea	Making progress
South Africa	Making progress
Spain	Making progress
Thailand	Making progress
UK	Well advanced
USA	Prepared

Organisations that responded



- Majority of respondents had senior scientist role
- Minority programme director related to geo-resources
- >50% have experience in storage capacity assessments or developing methodologies



Level of Resource Assessment

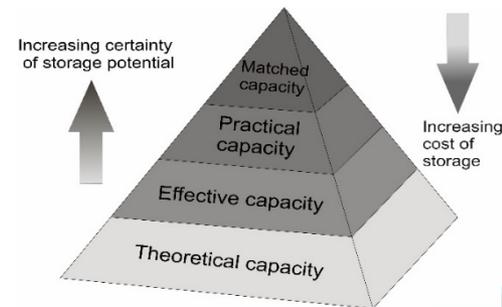


Country	Onshore	Offshore	Sed Basin	Site-specific
Australia			✓	✓*
Brazil	✓	✓		
Canada	✓		✓	
China	✓			✓
France	✓		✓	
Germany	✓	✓		
Japan		✓		
Netherlands	✓	✓		✓
Norway		✓	✓	✓*
South Korea			✓	✓
South Africa	✓	✓		
Spain	✓	✓	✓	✓
Thailand			✓	
UK		✓		✓*
USA	✓			✓*

Rate of Progress



- National assessments to the level of ‘effective’ capacities can take 2 years but more typically take 5-10 years.
- Extending these assessments to ‘practical’ capacities and some site-specific ‘matched’ capacity estimates takes at least 5 years.
- National assessments most rapidly completed and are most mature undertaken by national or regional geological survey organisations, with access to available data, of sufficient quality
- Supported from national bodies whose remit includes CCS development and leading factor.



Level of Storage Assessment



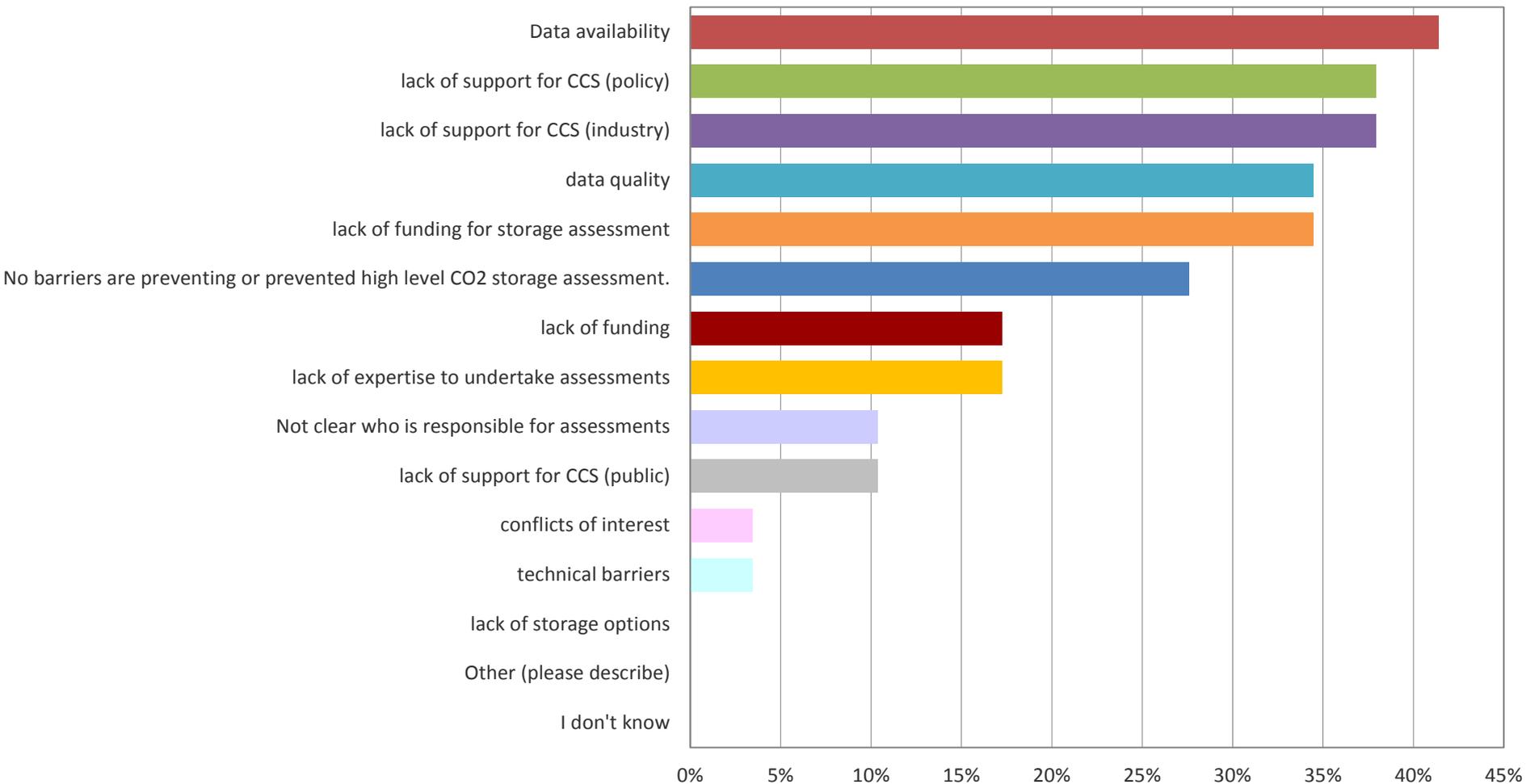
Country	Theoretical	Effective	Practical	Matched
Australia	✓	✓		✓*
Brazil	✓			
Canada	✓			✓*
China	✓	✓	✓	✓
France	✓	✓	✓	
Germany	✓	✓		
Japan	✓			
Netherlands	✓	✓	✓	✓
Norway	✓	✓	✓	✓*
South Korea	✓	✓		✓
South Africa	✓	✓		
Spain	✓	✓	✓	
Thailand	✓			
UK	✓	✓	✓	✓
USA	✓	✓	✓	✓

Future ambition



- 9 countries want to progress to sedimentary basin level.
- 6 offshore only
- 3 onshore only
- 3 aiming to progress to site-specific assessments
- All national assessments will require a strategic prioritisation of sites.

Barriers to National Storage Assessments



Other barriers to assessments



- Other issues taking a higher priority in national policy.
- Prioritised interest in other low-carbon technologies.
- Need to develop energy infrastructure and enable electricity access in developing economies.
- Lack of desire to undertake CCS due to low legacy emissions or perceived ‘right to emit’ in developing economies.
- Potential protest from the public.
- Lack of detailed national regulations.
- Conflict with other industries, e.g. oil, gas, fisheries, shipping.
- Lack of acceptance of the reality of climatic change.

Level of Progress



- Follow-up interviews indicated that there was strong political interest in CCS in several countries where CCS is moving forward towards demonstration and deployment, e.g. South Africa, Japan, and South Korea.
- RCSPs in USA and large-scale demos despite some political opposition.
- Unless CCS is on the political agenda, it is very unlikely that a national storage assessment or implementation of CCS will move forward.
- The Asian Development Bank conducted national scoping study for CCS in Thailand, Viet Nam, Indonesia and the Philippines. A feasibility study for a small pilot project has been conducted in Indonesia although current status of CCS is unclear.

Data Access



- Data access can depend on whether there is a single or multiple database.
- Relationship between organisations can be straightforward but time consuming.
- Commercial confidentiality in the case of oil companies can restrain release.
- Data gaps evident in developing countries lacking an oil industry.
- Data quality an issue for older material eg seismic and wellbore.

Data compatibility



- A range of methodologies were used for storage assessment with the US DOE and CSLF pore volume/dynamic simulation methodologies ranked as the most used.
- Well integrity not used in one survey.
- National assessments would be greatly improved through the use of nationally agreed methodologies, standards and quality assurance systems.
- CO₂ capacity assessments have been carried out in many countries but vary widely in their methodologies and so may not provide comparative estimates.

Conclusions



- The 15 countries who responded to the questionnaire completed national ‘theoretical’ storage capacity
- 8 have completed ‘matched’ assessments
- The key barriers to progressing national assessments of CO₂ storage capacity were:
 - Data availability, either due to sparsity or absence of data
 - Data that is available but proprietary and so inaccessible.
 - Data quality, often due to the age of the available data.
 - Lack of industrial support.
 - Absence of political and regulatory support.

Conclusions



- Methodologies for estimating storage capacity varied widely in approach and showed continuous development in terms of sophistication and techniques.
- Developing countries, particularly where oil and gas resource development is still maturing, are more likely to have a greater problem finding the expertise to perform CO₂ storage assessments.
- An interest in international collaboration and knowledge sharing was evident so this barrier does not seem insurmountable

Recommendations for Data Management



- Population of a well-structured database with clarity on data source and accuracy is an essential underpinning activity that will support capacity assessments and future work.
- The raw data should be made available in tabulated format.
- A clear and comprehensive description of the capacity assessment methodology.
- Simple volumetric estimates are a first step in national storage assessments.
- Flow simulations providing dynamic capacity estimates are needed to fully understand the potential dynamic capacity of a potential storage site.
- A probabilistic approach allows extension of the storage estimate to regions where there are few data.

General Recommendations



- National storage assessments are typically undertaken via support from the State. Without state support, national assessments seem unlikely to be prepared.
- The assessments should be undertaken at increasing levels of detail in a step-wise manner, with appropriate decision points.
- Where storage potential exists, policy support should ensure that there is a long-term vision for reducing greenhouse gas emissions which may include deployment of CCS.
- A public organisation with a clear mandate from their national government will support efficient national assessments.
- Data access should be facilitated at national level.
- Detailed formation or site-specific assessments can be focused on 'sweet spots' identified by the first national assessment.
- Recent UK storage assessment useful example

Recommendations



- A Technical Guide should be produced for officials and organisations in developing countries on the implementation, structure and approach for compiling a CO₂ storage resource.





Thank you, any Questions?

