



# CCS IN DEVELOPING COUNTRIES

In order for CCS to play its role in reducing global carbon dioxide (CO<sub>2</sub>) emissions on a significant scale, it will need to be deployed in developed and developing countries.

In the coming decades, it is expected that all of the world's net fossil fuel growth and associated CO<sub>2</sub> emissions will be in developing countries<sup>1</sup>. Accordingly, the International Energy Agency estimates that 70% of CCS deployment will need to happen in non-OECD countries by 2050 to achieve global emission reduction targets.

A major challenge facing many developing countries is how to increase access to energy in a sustainable, climate-friendly way. Numerous developing countries are also interested in continuing to utilise their local fossil fuel resources to ensure energy security and maintain the associated economic benefits. CCS enables these dual objectives to be achieved.

CCS applied to a power station requires power to capture and compress the CO<sub>2</sub> – this is known as an 'energy penalty'. Lowering this energy penalty is a key issue for developing countries applying CCS, who are also interested in maximising the energy output from the power station and increasing their citizens' access to energy. It is important to remember that CCS has the potential to enable large-scale abatement associated with increasing energy demand from fossil fuel power stations. In addition, along with energy efficiency measures, CCS is the only large-scale abatement option for various industrial plants (such as iron and steel, cement, ammonia and hydrogen production etc).

Governments and organisations are contributing hundreds of millions of dollars to activities to support CCS capacity and project development in developing countries. These include the Australian, Norwegian, United Kingdom, United States and European Union governments, as well as organisations like the World Bank and Asian Development Bank.

Key deployment challenges in CCS which are of particular interest to developing countries include its cost, access to energy and permanence of storage. This underlies the importance of capacity development and knowledge sharing on these issues. These challenges can prompt a 'wait and see' approach by some developing countries.

However, if countries identify that CCS is a relevant technology for their low-emission strategies, it is important they start undertaking the relevant enabling, pre-investment and

<sup>1</sup> For the purpose of this fact sheet, developing countries refer to non-Annex I countries under the UNFCCC, with the exception of Korea.

demonstration activities now. This will put them in a position to benefit from emissions reductions from CCS in the coming decades. Many of the enabling and pre-investment activities will need to address specific country requirements. Some of these activities can take years to develop, such as storage characterisation and legal and regulatory development.

There is a growing awareness of CCS as a potential mitigation technology within developing countries, especially by those relying heavily on fossil fuel-based energy and industries. This growing awareness can be attributed in part to the inclusion of CCS in the UN Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism.

## STATUS OF CCS IN DEVELOPING COUNTRIES

There are at least 24 developing countries engaged in CCS activities such as capacity development, pre-investment, and planning activities and project operation or development. Most are at the early stage of scoping out the opportunities and potential for CCS. A further 7 countries have shown 'early interest', e.g. through identification of CCS in their technology needs assessments under the UNFCCC.

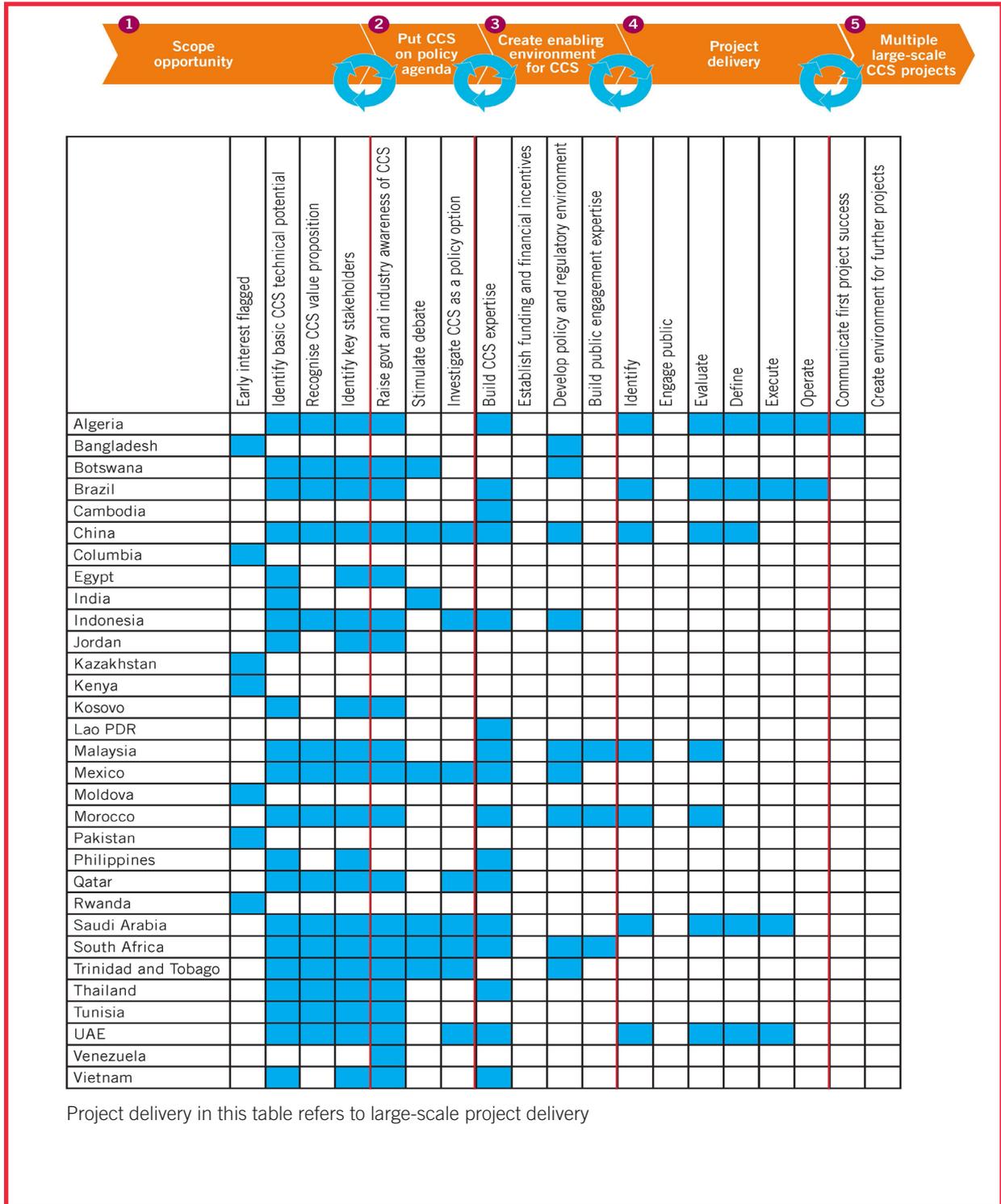
However, there are several large-scale projects, including:

- one is an operational industrial (gas processing) project in Brazil
- one is an operational industrial (gas processing) project in Algeria (injection is currently suspended)
- 11 are in the planning stage in China – 5 are power generation projects and six industrial projects.

The CCS Development Lifecycle (over page) is a tool developed by the Global CCS Institute to help identify 'at a glance' where activity is in some developing countries. The Lifecycle comprises five major stages. The rotating circles indicate that movement through the different stages is an iterative process that is not necessarily linear. The diagram is based on an Institute assessment of activity. A blue box signifies that some activity has been undertaken in the relevant space; it does not mean that activity has been concluded in this space.

Countries that are further advanced along the CCS Lifecycle are developing or have already implemented a CCS pilot or demonstration project. Pilot and demonstration projects are key drivers for 'learning-by-doing'. Projects provide a catalyst or focus for other associated capacity development, enabling and pre-investment activities.

FIGURE 1: The CCS Development Lifecycle



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