



BRIEFING PAPER

The development of low-carbon technologies plays a vital role in the fight against global climate change. Carbon Capture and Storage (CCS) is one such technology that could be very effective in reducing carbon dioxide (CO₂) emissions, particularly from the burning of fossil fuels to generate electricity.

CCS involves storing CO₂ underground instead of it being released into the atmosphere. The CO₂ is captured from power stations and other industrial installations and liquefied, and then channelled through pipelines into saline aquifers, coal beds or depleted gas and oil fields for indefinite isolation from the atmosphere. It is estimated that CCS can reduce the CO₂ released from coal-fired power stations by up to ninety percent and therefore it could play a major role in reducing the climate impact of the power sector. However, the CCS process is complex and its acceptance widely debated, particularly because of its high cost.

Nevertheless, CCS is gaining more support because of the scale of the reduction of carbon dioxide emissions that it provides and also because of its potential long-term cost effectiveness when compared to other options for decarbonising the power sector.

In this briefing paper, drawn from the Chinese report, CCS: Towards Market Transformation in China, The Climate Group examines different CCS implementation strategies, with a particular focus on China. We discuss current policies, regulation and financing, within China and also internationally. In the preparation of the report we interviewed a wide range of Chinese stakeholders, to gain an insight into the benefits and challenges of CCS.

We found that the growth of the CCS industry is dependent on several factors, including: the cost of the process, the demand for the technology, effective regulation and also private sector and local and international government support.

THE KEY FINDINGS

CCS could provide the most cost-effective path to large scale, long-term emission reductions.

Along with halting tropical deforestation, energy efficiency improvement, the deployment of alternative energy resources (such as renewables and nuclear energy), CCS is considered to be one of the most important available emissions reduction methods. According to the International Energy Agency (IEA), in a 450ppm stabilization scenario energy efficiency will constitute 65%, 57% and 54% respectively of the total global emissions abatement in the energy sector by 2020, 2030 and 2050. However, with the challenges of meeting growing energy demand and scaling up alternative energy resources to achieve this, the contribution of CCS has to grow from 3% of the global abatement portfolio in 2020 to 10% in 2030 and finally reach 19% in 2050, when it will become the largest single emissions abatement technology in the portfolio.

Furthermore, according to an IEA study on the costs of various emissions abatement technologies, implementing CCS at a significant scale will lead to an important reduction in the overall cost of emissions abatement. Achieving the 450ppm scenario without CCS would make the total cost of emissions abatement by 2050 70% higher.

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CCS is an opportunity for China to gain a larger share in the global low-carbon technology market.

CCS is gaining international popularity, and developed countries including the US, Australia, UK and Norway are already building government-funded CCS demonstration plants. Many experts believe that China has the potential to become an important provider of CCS globally due to its strong position as an efficient and large scale manufacturer of products and technologies.

Integrating CCS with coal chemical engineering is potentially a unique aspect of China's CCS development.

CCS development in China still faces various obstacles in the areas of technology, financing, health and safety and the development of sound international and multi-industry collaborations, which will need to be overcome before it can achieve significant scale. The recommendations that follow – drawn from interviews with key stakeholders in China – lay out policy interventions that would boost CCS development.

RECOMMENDATIONS FOR CCS DEVELOPMENT IN CHINA

01 Develop an integrated and safe CCS technology.

Some of the main challenges associated with CCS technology are high energy penalties, high costs and the safety risks due to potential CO₂ leakage. CCS is the combination of three separate technologies that are relatively mature but that have not yet been integrated at a commercial scale. For example, CO₂ is captured in the chemical processing industry, transported via pipelines for Enhanced Oil Recovery (a method that increases the amount of oil that is recovered from an underground reservoir and which permits the depleted reservoir to be used as a storage site for the CO₂.) However, the safety of CO₂ storage due to the lack of integration of individual technologies is often cited as a key challenge for CCS development.

02 Accelerate the implementation of more demonstration projects to identify the best combination of CCS technologies.

As CCS is the combination of capture, transport and storage, there are many possible combinations of separate technologies that can be called CCS. Demonstration projects will help in selecting the most effective and safe CCS technology combination. However, without public/policy support, individual companies will not be able to do this.

03 Build clear financing mechanisms that increase public sector financing and attract private sector investment.

There is large investment demand globally for CCS development, yet there is no clear financing mechanism to address the problem and under the current circumstances, demonstration projects are not economically viable without government support. Increasing public sector financing, allowances and tax cuts, public funds and joint public-private ownership is essential for CCS demonstrations and will speed up the demonstration phase. Once demonstrated, CCS projects can be driven and financed through a combination of carbon pricing, emission caps and performance standards, the auction of emissions credits, higher electricity prices, taxes and tariffs. In the meantime, however, public support will continue to be essential.

04 Make effective CCS safety regulations with clear clarification of responsibilities.

The gaps in CCS safety regulations increase the potential risks involved with CCS demonstration projects. The Chinese government needs to act rapidly to make clear CCS safety regulations, including but not restricted to clarification of responsibilities, project approval procedures, and monitoring and reporting procedures. Regulations will help to limit potential HSE risks associated with CCS demonstration projects, increase public awareness and support, address industry concerns and therefore foster the development of CCS.

05 Build efficient international collaboration mechanisms.

The complexity of the technology and the huge demand for funding means CCS development will be slow to advance in China without international support. A broad range of collaborations, including but not limited to joint R&D, joint demonstration projects and direct international funding are critical factors for China's CCS development.

06 Define a clear CCS industry development strategy and improve industry involvement in policymaking.

CCS development is partly dependent on a clear national policy. If industries are encouraged to contribute to policymaking, it could help shape an efficient policy that serves the best interests of various stakeholders. Industries involvement in policymaking will speed up CCS technology and project development.

07 Promote industry collaboration.

CCS involves multiple industries, including but not limited to coal mining, power generation, oil and gas, transportation and chemical engineering. In China, CCS development involves and is highly dependent on several large state-owned companies, which have different views and strategies for CCS. There is a need for better and more effective collaboration between companies for an effective, safe and timely development of CCS.

08 Conclude a legally binding global climate agreement.

Without a legally binding global climate agreement that creates a price for carbon and that accelerates low carbon investment, CCS is likely to develop slowly in China.

With the announcement in May that China's biggest coal producer, the Shenhua Group is planning to launch the first carbon capture and storage (CCS) project in Inner Mongolia by the end of this year, CCS is a technology that many leaders in China now recognize is economically viable.

The Climate Group supports the effective development of this technology worldwide to significantly achieve the reduction of global CO₂ emissions.