policy brief

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Determining the Success of Carbon Capture and Storage Projects

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CARBON Carbon dioxide (CO2) emissions can be captured from large point sources, transported to geological sites, and sequestered indefinitely using a variety of carbon capture and storage (CCS) technologies. Regarded as the most important technological approach to mitigating climate change, CCS has had some success being deployed in the oil and gas industry, but deployment in the power sector has only occurred with pilot plants. While a number of CCS projects have been successfully deployed over the last decade, over a quarter of CCS projects around the globe have been postponed, put on hold, or cancelled altogether.

This paper analyzes the factors leading to operational success and failure of CCS projects. Using data on planned, cancelled, and operational CCS projects to date, the authors use a statistical model to analyze projects in five different stages of development: planning, under construction, operational, on hold, and cancelled. This unique dataset contains project information on all CCS projects attempted globally, irrespective of sector, size, or project outcome. The model determines the technical, economic, and policy factors exhibiting a positive or negative impact on successful project completion.

The authors find significant effects for a number of project characteristics. Firstly, having a CO2 storage site selected during project planning is correlated with the likelihood of project success, however projects with saline reservoirs are negatively linked to project success. This is likely due to a lack of commercial benefit in storing CO2 in saline. Secondly, capture technologies using post- and oxyfuel combustion are less likely to succeed than technologies using pre-combustion, natural gas processing, or industrial separation capture processes. Thirdly, CCS projects located in areas with an explicit carbon price are negatively correlated with project success. While carbon prices could encourage the development of CCS projects, in practice the existence of a carbon price may encourage more cost-effective carbon reduction options (like fuel switching and improved efficiency). Lastly, public funding and previous experience by the project developer are not positively related to likelihood of project success. One possible explanation is that private investors fund the CCS projects that are most likely to be profitable, while governments may look for CCS projects just short of profitability, which may increase the risk to governments that invest in CCS.

When developing and deploying a CCS project, many factors contribute to the success or failure of the project. While each project has unique challenges, the authors believe this analysis offers useful insights for policymakers seeking to encourage CCS deployment. Firstly, CCS projects without a definite storage site should be reviewed carefully. Secondly, public funding is either non-significant or may have a negative effect on the likelihood of project success, so financial support of a large-scale CCS demonstration alone is likely not sufficient for project success.