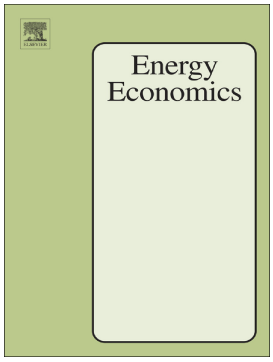

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Jian-Lei Mo, Joachim Schleich, Ying Fan

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Getting ready for future carbon abatement under uncertainty – key factors driving investment with policy implications

Jian-Lei Mo[1,2], Joachim Schleich[3,4,5], Ying Fan[6 *]

[1]Center for Energy and Environmental Policy research, Institutes of Science and Development, Chinese Academy of Sciences, Beijing, China

[2]Grantham Research Institute on Climate Change and the Environment, London School of Economics, London WC2A 2AZ, UK

[3]Grenoble Ecole de Management, Grenoble, France

[4]Fraunhofer Institute for Systems and Innovation Research Karlsruhe, Germany

[5]Virginia Polytechnic Institute & State University, Blacksburg, Virginia, USA

[6]School of Economics & Management, Beihang University, Beijing 100191, China

[*]Corresponding author. yfan1123@buaa.edu.cn, ying_fan@263.net.

Abstract

Carbon capture and storage (CCS) is considered a key technology option for abating CO_2 emissions in carbon-intensive sectors, e.g. the power sector. However, high investment costs and risk hinder the diffusion of CCS. To avoid stranded assets or high future costs for retrofitting, new plants can be made carbon capture ready (CCR) to enable them to accommodate future CCS retrofitting at low additional costs. Current CCR investment decisions are closely related to future CCS retrofitting and CCS operation decisions in subsequent stages, all of which would be affected by uncertainties. We develop a three-stage CCR investment decision model under multiple uncertainties which allows for investment and especially operating flexibilities. Applying this model to China shows that CCS operating flexibility under the carbon-pricing scheme may actually lower the probability of investing in a CCR plant, and neglecting it may overestimate the propensity for investing in CCR. Moreover, learning effects, which reduce the costs of future CCS