

Long-term Perspectives for Carbon Capture in Power Plants: A Scenario for the 21st Century

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This paper examines the role of fossil-fired power plants equipped with carbon capture systems in a long-term scenario of the global energy system. Within this framework, the impacts of a technology policy is illustrated that requires over time an increasing fraction of fossil-fired power generation to incorporate carbon capture technologies leading in the long run to a virtually carbon-free electricity sector. We examine the potential contribution that such a policy could offer in reducing global energy-related carbon dioxide emissions and highlight some of the technologies that may play a key role in doing so. The analysis is carried out with the energy-systems optimization MESSAGE model considering endogenous technological learning for carbon capture technologies, such that they experience cost reductions as a function of accumulated capacity installations. In the context of a world where fossil-based power systems face pressure to evolve into cleaner configurations in the long term, coal-fired Integrated Gasification Combined-Cycle (IGCC) plants and gas-fired Combined-Cycle (NGCC) turbines emerge as flexible, complementary technology choices that, while being attractive for electricity generation, could allow an efficient and cost-effective capture of carbon.

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