

Is shale gas a good bridge to renewables? An application to Europe

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Abstract:

This paper explores whether climate policy justifies developing more shale gas and addresses the question of a potential arbitrage between shale gas development and the transition to clean energy. We construct a Hotelling-like model where electricity may be produced by three perfectly substitutable sources: an abundant dirty resource (coal), a non-renewable less polluting resource (shale gas), and an abundant clean resource (solar). The resources differ by their carbon contents and their unit costs. Shale gas extraction's technology (fracking) generates local damages. Fixed costs must be paid to develop shale gas and to obtain the drastic innovation allowing to deploy the clean resource on a large scale. Climate policy takes the form of a carbon budget. We show that, at the optimum, a more stringent climate policy does not always go together with an increase of the quantity of shale gas extracted, and that banning shale gas extraction most often leads to bring forward the development of the clean resource, but not always. We calibrate the model for Europe in order to determine whether shale gas should be extracted and in which amount, and to evaluate the effects of a moratorium on shale gas use.

Keywords: shale gas, global warming, non-renewable resources, energy transition.

JEL codes: H50, Q31, Q35, Q41, Q42, Q54.