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# Sustainability of Solar Electricity: The Role of Endogenous Resource Substitution and Cross-Sectoral Responses\*

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## Abstract

This study seeks to understand how materials scarcity and competition from alternative uses affects the potential for widespread deployment of solar electricity in the long run, in light of related technology and policy uncertainties. Simulation results of a computable partial equilibrium model show that materials scarcities constrain the expansion of solar generation. Solar photovoltaics expand with higher energy demand, squeezing consumption in industries that compete for scarce minerals. Stringent climate policies hamper growth in intermittent solar photovoltaics backed by fossil fuel powered plants, which is not compensated by small increases in non-intermittent concentrated solar power capacity. These findings underscore the significance of developing cost-effective alternatives to critical materials and low-cost electricity storage for economically sustainable climate change mitigation.

Keywords: Endogenous Resource Substitution, Grade Selection, Indium, Solar Electricity

JEL Classification: Q32, Q42

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