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"Gheorghe Asachi" Technical University of Iasi, Romania

ENERGY TRANSITION POLICY AND URBAN CARBON LOCK-IN: NEW INSIGHTS FROM CHINA'S NEW ENERGY DEMONSTRATION CITY

Chaobo Zhou[1,2]

[1]College of International Economics and Trade, Ningbo University of Finance and Economics, Ningbo, 315175, China
[2]Climate Change and Energy Economics Study Center, Economics and Management School of Wuhan University, Wuhan, 430072, China
E-mail: zhouchaobo@whu.edu.cn

Abstract

Energy transition policies play a decisive role in restructuring energy supply and demand systems and addressing climate change challenges. A key obstacle to this transition is carbon lock-in (CLI), which embeds economies and societies into carbon-intensive development paths. Overcoming CLI is critical for advancing energy substitution and achieving sustainable growth. This study employs a difference-in-differences (DID) model with panel data from 260 prefecture-level cities in China spanning 2009–2020 to evaluate the impact of the New Energy Demonstration City (NEDC) initiative on CLI. The findings demonstrate three major outcomes. First, the establishment of NEDCs significantly reduces the degree of CLI in pilot cities. Second, the effect is primarily realized through two interlinked mechanisms: the promotion of low-carbon technology innovation (LCTI) and the acceleration of industrial upgrading (IU), both of which reshape urban development trajectories. Third, heterogeneity analysis reveals that the inhibitory effect of NEDC policies is more pronounced in central and western regions, in non-old industrial cities, and in cities with stronger human capital bases. By uncovering these dynamics, the study clarifies the internal logic through which NEDC policies weaken CLI, thereby offering valuable insights into the pathways of urban decarbonization. The results provide practical evidence that demonstration city policies not only facilitate structural energy transformation but also foster green innovation, enhance regional competitiveness, and guide differentiated strategies tailored to local conditions. Overall, this research contributes to the theoretical and empirical understanding of how targeted policy interventions can unlock entrenched carbon dependencies, offering a replicable framework for promoting comprehensive green transitions in other urban contexts.

Key words: carbon lock-in, industrial upgrading, low-carbon technology innovation, new energy demonstration city

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