

POWER SYSTEM DECARBONISATION AND UNEQUAL LABOUR REALLOCATION IN CHINA

[Siqi Zhao](#), Ze Wang, Dequn Zhou, Qunwei Wang
Nanjing University of Aeronautics and Astronautics, Nanjing, China

Extended Abstract

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Abstract Summary

The energy transition is driving profound employment restructuring, as emerging technologies exhibit markedly different labour requirements compared to conventional ones. However, previous studies have underestimated the associated cross-sectoral employment impacts, because of inadequate modelling of energy technologies and absence of employment induced by household consumption. This research applies the Python for Power System Analysis China (PyPSA-China) framework with full hourly resolution, to identify optimised investments in energy technologies. A partially closed, multi-regional input-output model is then developed to quantify technology-specific employment impacts, including direct, indirect, and household consumption-induced effects. The study finds that early decarbonisation of China's power system prevents unemployment resulting from stranded assets and better aligns with industrial upgrades. Early decarbonisation is projected to sustain around 11 million jobs by 2060, with household consumption-induced employment contributes one-third of the total. However, employment opportunities and challenges are unequally reallocated across regions and demographics. The rising Gini coefficient, which assesses regional value-added distribution based on employment shares, indicates an increasing concentration of stable, high-value-added jobs in a few developed eastern coastal regions such as Jiangsu. Fossil-fuel dependent regions with inadequate renewable energy industry foundations and limited household consumption affordability face heightened vulnerability; examples include Shanxi and Guizhou. Decarbonisation promotes middle-income expansion, but disadvantages certain groups, including females, middle-aged workers, and those with limited education. These findings underscore the need for immediate and proactive policy interventions to capture the economic benefits of early decarbonisation, enhance domestic demand, and implement targeted supports for vulnerable regions and populations, thereby ensuring the achievement of sustainable and just transition.

Presenting Author Biography

Siqi Zhao is a PhD candidate in Management Science and Engineering at Nanjing University of Aeronautics and Astronautics (NUAA), China. Currently, she is undertaking a visiting research stay at the Basque Centre for Climate Change (BC3), Spain. Her research centers on Energy-Environmental-Economic (E3) modeling, including Computable General Equilibrium (CGE), Python for Power System Analysis (PyPSA), and Multi-Regional Input-Output (MRIO) models. Her work has been published in journals such as Energy Economics, Energy Policy, Energy, and Computers and Industrial Engineering. These publications address key topics, including sustainable transition planning, energy policy evaluation, and energy poverty governance.