EGU2020-12740, updated on 01 Jul 2022
https://doi.org/10.5194/egusphere-egu2020-12740
EGU General Assembly 2020

Assessing China's Digital Economy and Environmental Sustainability: A Regional Low-Carbon Perspective

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Digital economy is becoming a new engine of China's economic transformation, leading a new path of green and low-carbon development. However, the positive and negative effects of the digital economy on the environment have also been widely debated. The energy consumption of China's digital economy industry is still increasing, but it has received little attention. This paper studies the emerging links between digital economy and low-carbon sustainable development. Understanding the impact of the digital economy on carbon emissions is critical to addressing the challenges of climate change in the digital age.

By integrating input-output methods, this paper establishes a comprehensive framework to evaluate China's digital economy and environmental sustainable development. It can not only evaluate the carbon emissions in various sub-industries of the digital economy, but also reveal its formation and change mechanism by determining its source industries, transfer paths and economic drivers. Using STIRPAT model and provincial panel data from 2001 to 2016, this paper investigates the impact of the digital economy industry on carbon emissions at the national and regional levels. In addition, assess the carbon footprint of the entire digital industry, including the relative contribution of major infrastructure, core and integration components of the digital economy to carbon emissions. The results show that the digital economy helps reduce China's carbon emissions. The digital economy in the central region has a greater impact on carbon emissions than the eastern region, while the western region has unconspicuous impact. With the emergence of the digital economy in the energy system, energy consumption can be reduced and energy efficiency can be improved, which can help reduce carbon emissions in the energy sector, and contribute to the sector's carbon emission reduction goal of about 3%. The positive and negative impacts of the digital economy on the environment have resulted in an inverted U-shaped relationship between the digital economy and carbon emissions. The inflection point of the digital economy is slightly higher than the medium level, which means that carbon emissions may increase further with the development of the digital economy at this stage. Without control, the relative contribution of the digital economy to carbon emissions may exceed 10% by 2030. These findings not only help to advance the existing literature, but also deserve special attention from policy makers.