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Editorial: The impact of global industrial manufacturing and the development strategy of new energy and new technologies under the action of carbon reduction

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Editorial on the Research Topic
The impact of global industrial manufacturing and the development strategy of new energy and new technologies under the action of carbon reduction

Introduction

In 2023, the Conference of the Parties (COP28) of the United Nations Framework Convention on Climate Change (UNFCCC) will continue to discuss the issue of carbon emission reduction. The international community expects all parties to effectively fulfill their commitments to reduce carbon emissions and take joint actions to respond effectively to the crisis and challenges posed by climate change. Carbon dioxide will cause the global average temperature to warm up year by year.

The significant factors contributing to global warming are the use of coal, oil, and natural gas, the reduction of plants due to deforestation, and the emission of exhaust gases. Under this circumstance, various countries have joined the carbon emission reduction initiatives one after another. As shown in Figure 1, the carbon emissions of the European Union and the United States have shown a specific downward trend. Japan and Russia have maintained lower carbon emissions, and India's carbon emissions have grown relatively more, yet China has shown a relatively significant increase.

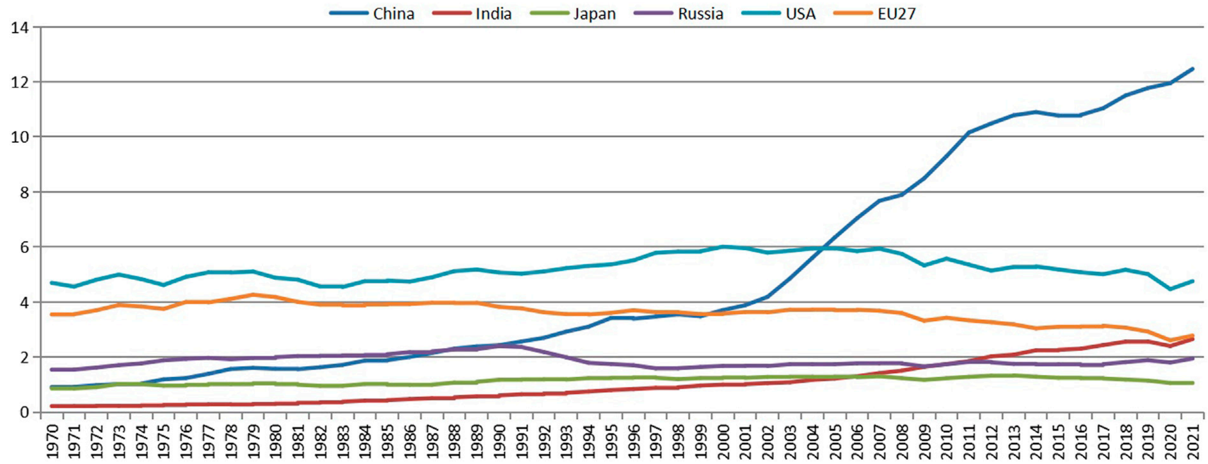

FIGURE 1
World carbon emission trends by country, source: (JRC, 2022).

Main body

Rising temperatures will lead to other changes that will cause sea levels to rise, inundating land and eroding coasts, leaving coastal countries devastated. Moreover, coastal cities and countries are the most economically and socially developed areas of the countries and have a higher concentration of population, which has the most severe impact on the economy and society. A study by Kaur et al. (2023) found a positive correlation between carbon dioxide, methane, and greenhouse gas emissions and the financial expenditures needed to implement climate change mitigation strategies. A study by Liu et al. (2017) showed that China is expected to reach peak carbon emissions around 2030 and reduce per unit of GDP carbon dioxide emissions by 60%–65% compared to 2005. Semenov (2023) analyzed the similarities and differences between the modern long-term trends of atmospheric CO2, CH4, and N2O concentrations and the intra-annual (inter-monthly) fluctuations.

The problem of calculating the enhancement of the anthropogenic greenhouse effect with modern spectral data using a one-dimensional horizontally homogeneous radiation model is discussed. It is shown that the estimation of the greenhouse effect by CO2, CH4, and N2O obtained using the radiative model is different. Mikhaylov et al. (2020) used the energy balance method to simulate the projected trends in greenhouse gas emissions by industries up to 2030. Using sensitivity analyses, we found that reducing anthropogenic CO2 emissions from humans (cars and households) would mitigate the consequences of significant climate change.

To respond effectively to the challenges of global climate change, countries are working together to achieve carbon peaking and carbon neutrality and accelerate the green development of industrial carbon reduction. So far, carbon emissions have peaked in 54 countries around the world. The primary source of carbon emissions in the United States is energy activities. The carbon emissions from the industrial production process is only 5.32%, and after the carbon emissions peaked in 2007, the carbon emissions showed a declining trend in the proportion. When the EU peaked in 1990, the proportion of its industrial production process was 9.24%. From 1990 to 2018, the carbon emissions from the EU's industrial production decreased relatively. Japan's carbon emissions peaked in 2013, with *per capita* carbon emissions below the EU *per capita* level of 8.66 per cent, and the UK had already achieved peak carbon as early as 1991, with a decline of 42.26 per cent in 2018 compared to 1991. Sikarwar et al. (2021) used a model based on input-output table data that includes energy consumption and related industrial production to analyse anthropogenic carbon emissions and their drivers.

The United States, the 28 member states of the European Union (EU), China, and India, which contribute nearly 60 per cent of total anthropogenic carbon emissions, are considered benchmarks for assessing global impacts, from which corresponding trends are derived. Wang et al. (2023) find that, under a formal environmental management system, the impact of foreign direct investment (FDI) on industrial carbon emissions in China is not apparent. This implies that individual cities' standard environmental management systems could be more efficient in formulating or implementing policies. Li et al. (2019) found that energy intensity, economic output effect, and energy consumption structure are the main influencing factors through regression analysis of the factors affecting carbon emissions from electricity and heat supply industries. In various scenarios, we also predicted the carbon emissions of the power and heat supply industry and estimated their reduction possibilities. Xu et al. (2017) argued that the only way to achieve carbon emissions in the region is by adjusting the industrial structure and the energy structure, reducing energy consumption, and optimizing the industrial structure.

Contribution of the study

This Research Topic main contribution is exploring the business transition to low carbon after COP26. In particular, it is hoped that the paper will focus on the unique national circumstances of each country and examine how to optimize each country's own industrial manufacturing, transport, agricultural production, and renewable energy application efforts and business to reduce carbon emissions in the context of multilateral cooperation between governments. Xie points out that businesses are wasting a lot of energy in their production and operations and producing a large amount of CO. The large amount of emissions is different from the economic benefits of the enterprise. Therefore, the immediate task of the enterprise is to use energy scientifically and reasonably and significantly improve the energy efficiency of the enterprise rate, thus reducing the excessive consumption of energy by the firms. Jiang selects firms from the financial point of view. Performance indicators were analyzed to help enterprises save energy in a low-carbon economy.

Wan and Yu used ten financial warning indicators to construct a risk prediction model from four aspects: financing risk, investment risk, capital operation risk, and growth risk and included "low carbon" in the financial risk warning indicator system, which is expected to provide reference and reference to the financial risks faced by the low-carbon economy. Zhu et al. proposed that the fuzzy control evaluation algorithm of a regional economy based on the SDM model can better predict the economic growth of Beijing-Tianjin-Hebei. They proposed the low-carbon development strategy of Beijing-Tianjin-Hebei, and the economic integration further promotes the integration of the development of Beijing-Tianjin-Hebei and promotes China's economy to optimize its structure. These papers are of contribution and reference value in analyzing the impact of carbon emission reduction on industrial production and economic development from different perspectives.

Author contributions

W-TP: Conceptualization, Formal Analysis, Supervision, Writing–original draft, Writing–review and editing.

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