

How to manage the high emission industries and promote the carbon peak in Guangdong

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Introduction

- Due the rise of energy prices and the impact of COVID-19, energy shortage has led to the unsafe power supply.
- High emission industries which account for more than 58% of the carbon emissions of Guangdong Province have played an important role in achieving the carbon peak goal, alleviating social energy shortage and promoting economic growth.
- Controlling high emissions industries will help to adjust the industrial structure and increase renewable energy investment.

Methods

Features of a two-region CGE model for ICEEH-GD

- General equilibrium model representing 33 economic sectors, two regions: The Guangdong Province and Rest of China.
- Providing the trajectory of economic development, population , energy demand and supply structure, investment, carbon emissions.
- Assessing the economic impacts of restrictions on the high emissions industries.

Scenarios

	Scenario description
Energy Security Scenario (ES)	1. Adopt more coal and gas power to Ensure the safety of power supply, and meet the new power consumption demand; 2. Adopt moderate carbon restrictions on traditional high carbon emission sectors to achieve the goal of reaching the peak of carbon emissions in the whole society by 2029.
Restrict High Carbon Emission Sector Scenario (RHS)	1. On the premise of ensuring power supply, vigorously develop renewable energy to replace coal and gas power. 2. Adopt strict carbon restrictions on traditional high carbon emission sectors, reaching the carbon peak in 2027.
Comprehensive Policy scenario (CP)	1. On the premise of ensuring power supply, vigorously develop renewable energy to replace coal and gas power. 2. Adopt stricter carbon emission limits for the whole society, reaching the carbon peak in 2025. 3. Adopt the carbon Emission trading market for the whole society,

Results

1. As shown in Fig. 1, the high emission industries show different structural proportions, which are driven by different development scenarios. Power sector accounts for the highest proportion of carbon emissions, followed by cement, and the carbon peak will be achieved by 2030 compared with ES.

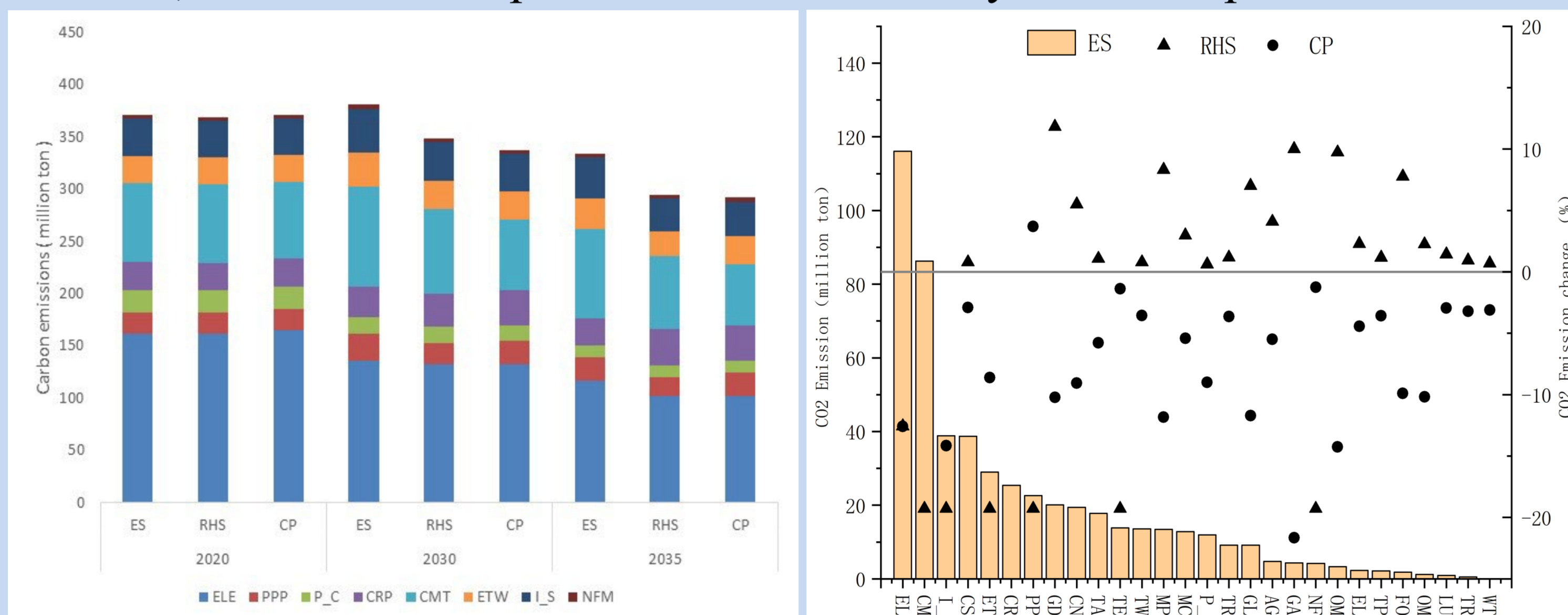


Fig.1 High emission Industries Carbon Emission

Fig.2 Sector emission reduction for three scenario

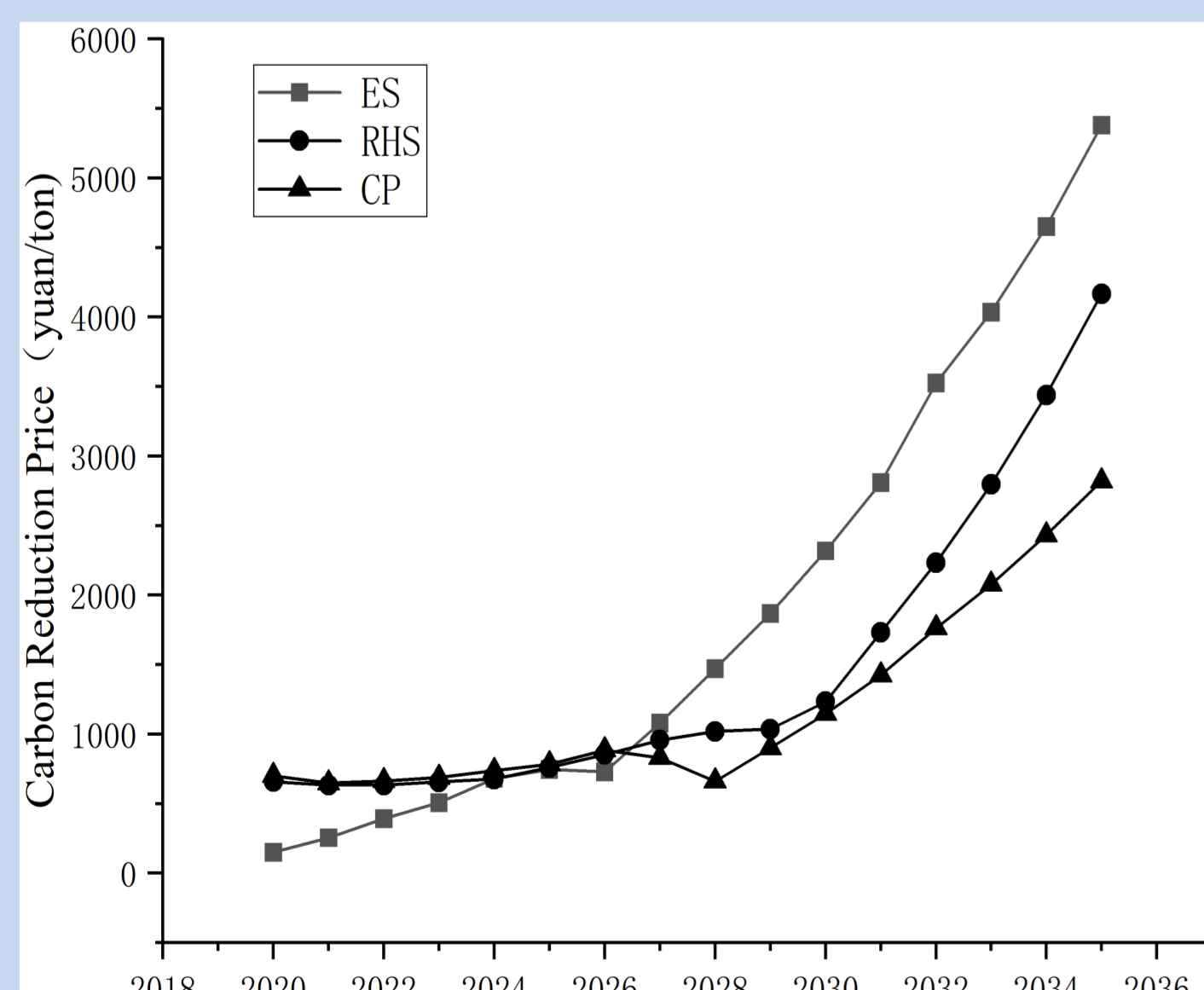


Fig.3 Carbon price for three scenario

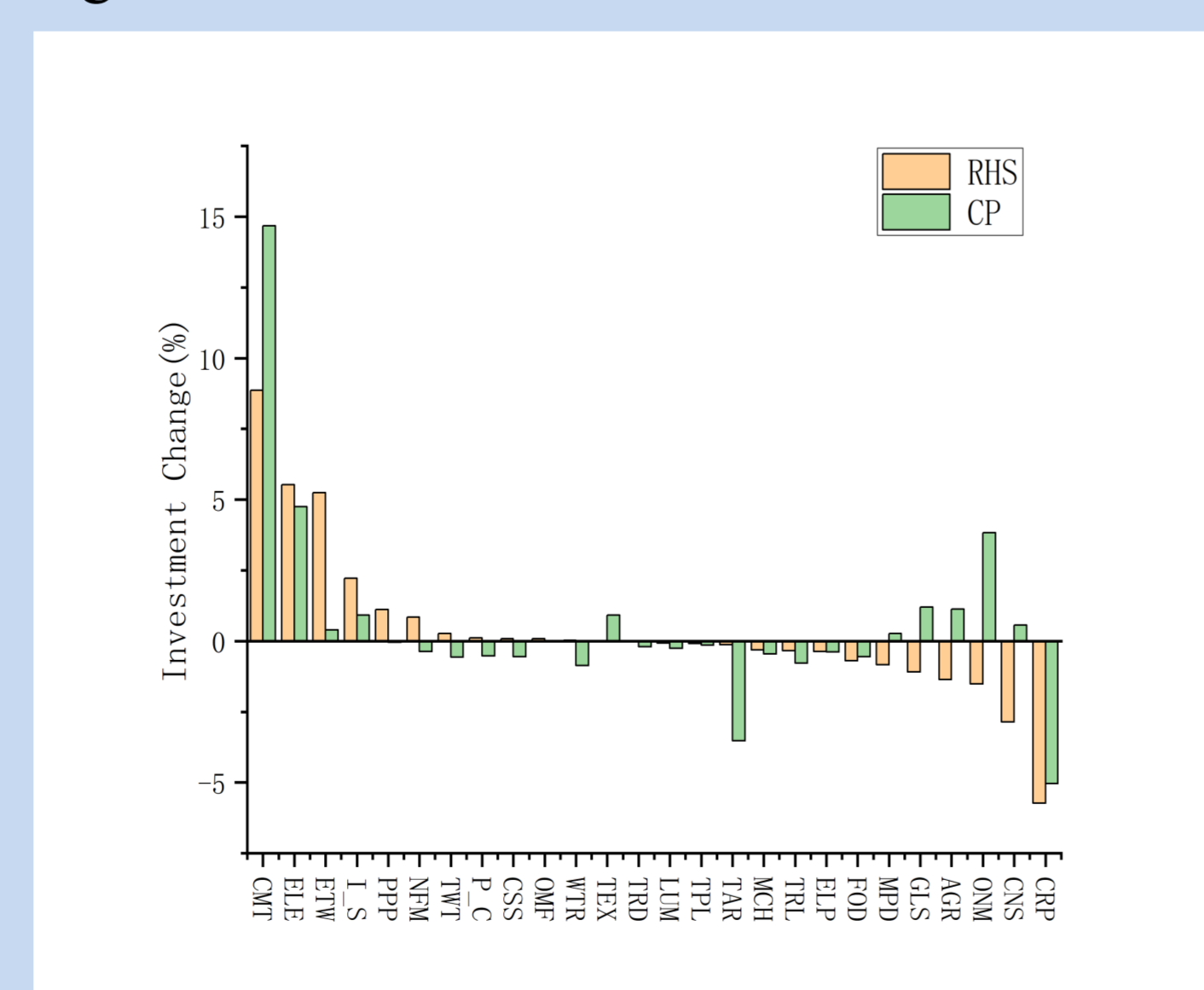


Fig.4 Investment transfer for policy scenario

2. In the RHS scenario, the sectors with the largest reduction in carbon emissions will be the power, paper industry, textiles, cement, steel and ceramics in Fig. 2.
3. In the CP scenario, the transportation and service industries will participate in carbon, which reducing the carbon cost of the whole society by more than 48% in Fig. 3.

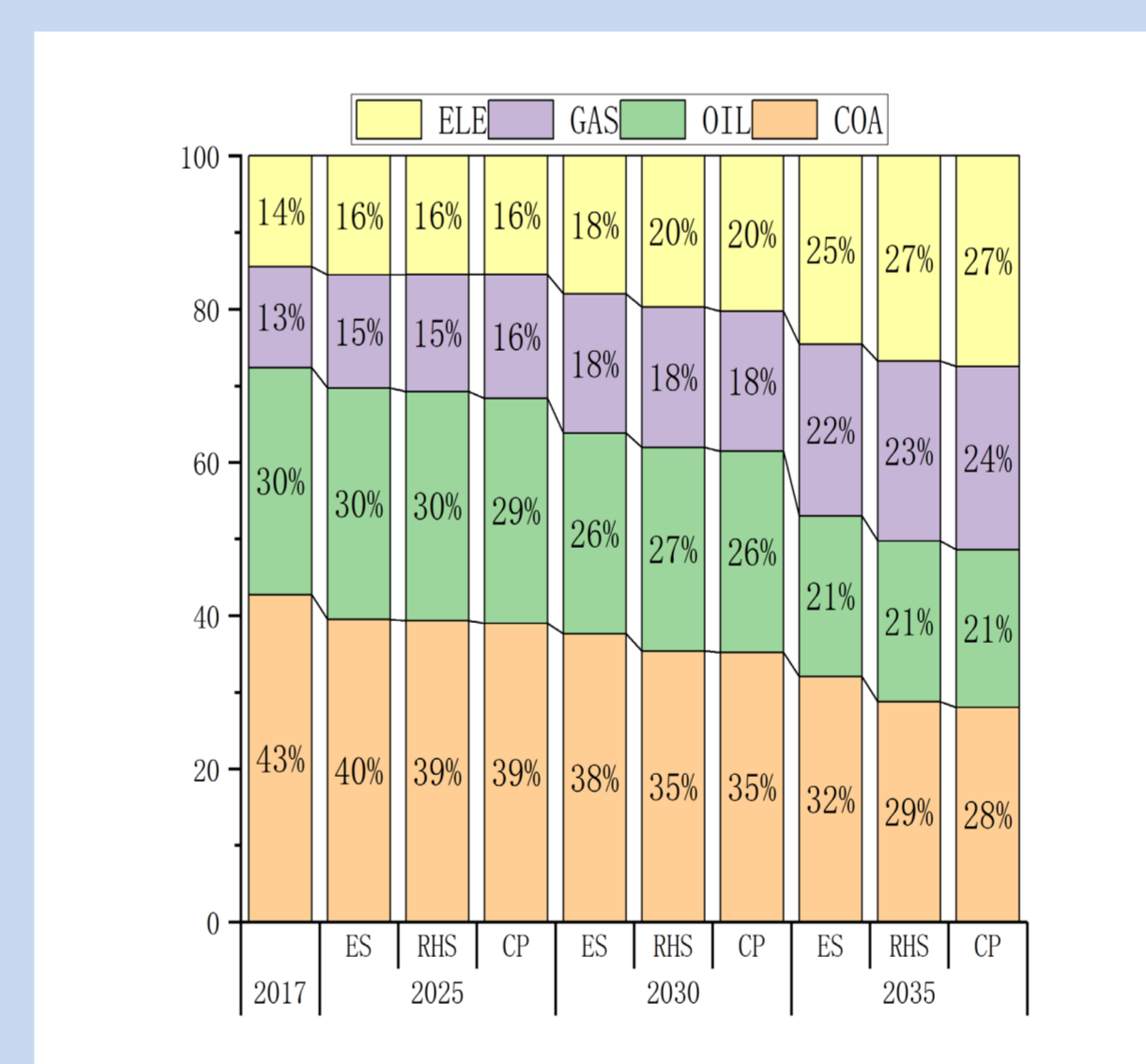


Fig.5 Energy structure for three scenario

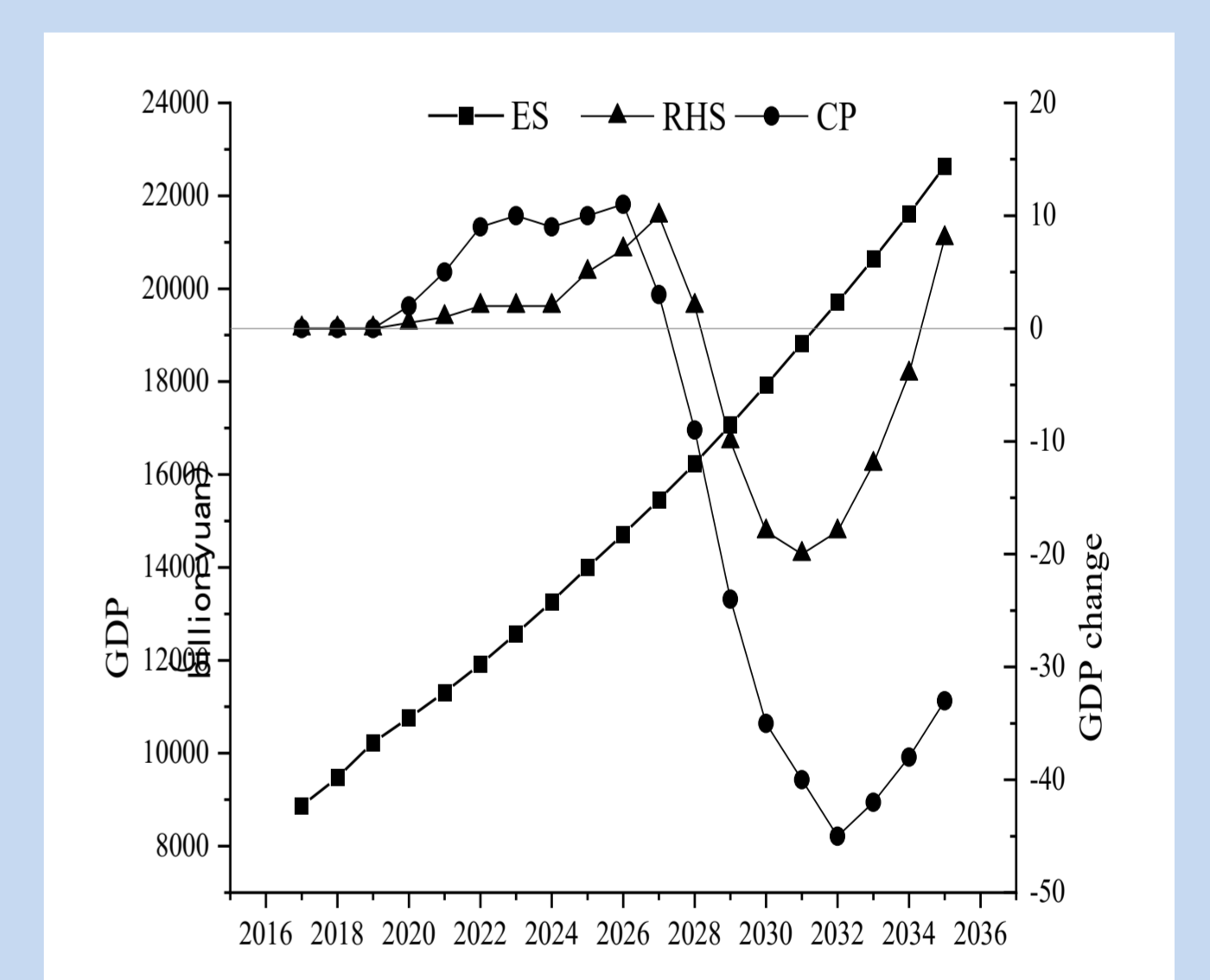


Fig.6 GDP change for policy scenario

4. In the RHS scenario, investment will be more shifted to cement, electricity, ceramics, steel, paper and other sectors with high emissions per unit of added value, while the investment in chemical industry, construction industry and agriculture will be reduced in Fig.4.
5. By 2035, the proportion of coal consumption will decrease from 32% in ES scenario to 29% and 28% respectively, and the proportion of power consumption will increase from 25% to 27% in Fig 5.
6. By 2030, the GDP of the whole society will increase to 17900 billion yuan, and by 2035, it will increase to 22600 billion yuan in Fig. 6.

Conclusion

1. Through the restriction on high carbon emission sectors, the industrial structure has been adjusted. Although there is a certain loss in GDP from 2028 to 2034, the GDP of the whole society will increase by 8 billion yuan compared with the ES scenario by 2035.
2. Restricting high emission industries, the investment will flow from chemical industry and other industries to power, cement, steel industries, which will be used for the replacement of energy consumption with capital, so as to reduce carbon emissions and the cost of carbon emission.
3. Although the carbon emission per unit value added of the power sector is relatively high, it involves energy security. Therefore, the green transformation of the power sector should be carried out on the premise of meeting energy security.
4. Development of renewable energy can promote the increase of investment in the power sector, promote cleaner energy supply, attracting more investment from high emission industry.