Research Report on How Jiangsu Province Reduces Coal Consumption

(Executive Summary)

Gesellschaft fur Internationale Zusammenarbeit

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On behalf of:

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With the peoples across the world joining hands to cope with global climate change, most countries have released positive energy policies by which to optimize and transform the energy structure with clean, low-carbon and environmentally friendly energy as the goal, and have vigorously stepped up the development of clean energy and renewable energy.

China, the second largest economy in the world, is also the largest energy consumer in the world. In 2019, its energy consumption reached 3,014 megatons of oil equivalent[1], approximately 32% higher than the United States, the second largest energy consumer in the world. At the 2015 Paris Climate Change Conference, President Xi Jinping announced to the world China's Pledge; namely, around 2030, it will peak its carbon emissions and strive to realize this goal at an earliest date; it will reduce carbon emissions per unit of GDP by 60% to 65% as compared with 2005; and it will enable its non-fossil energy consumption proportion to reach about 20%. In September 2020, at the General Debate and the Climate Ambition Summit of the 75th United Nations Conference, President Xi Jinping announced China's carbon emissions target, its carbon neutrality vision, and the new measures that will be undertaken to scale up its intended Nationally Determined Contributions, which once again showed China's confidence and determination to address climate change.

Jiangsu is the second largest province in terms of economic strength and the largest province in terms of manufacturing and energy consumption in China. By 2019, the total output value of its manufacturing industry exceeded 16 trillion yuan, accounting for approximately 1/8 of the country, or approximately 3% of the world. Jiangsu's manufacturing industry has occupied first place in China for many years; however, the lack of resources resulted in its serious dependence on importing them from outside the province, which thus displays its weakness in energy self-sufficiency.Jiangsu province clearly put forward the goal that by 2020 it will reduce the provincial coal consumption by 32 million tons. Over the past years, it has been boosting its energy consumption transformation and lowering its proportion of coal consumption. This not only coincides with the trend of green and low carbon-based cyclical development, but also meets the requirements of the actual situation. Therefore, we have conducted analytical research on the coal and energy consumption of Jiangsu province, striving to measure and grasp its trend in coal consumption and energy growth, and, by setting scenarios and objectives, we have been able to discuss the path forward in implementing change. During the research, we firstly addressed the domestic and foreign coal development trends, believing that, whether in newly increased investment projects or actual consumption, coal demand shows a declining trend, the energy consumption structure is in a process of improvement, and the space for future energy increases will mainly come from clean energy and electric power. Looking at the province's process of reducing coal consumption, we find that it has witnessed the transition from "fast growth" to "high-level fluctuation" and to the overall stage of "steady decrease"; however, it is worth noting that, despite the slight decrease in coal consumption in Jiangsu province, coal still accounts for over 60% of primary energy resources, which manifests the basic situation in China. We may, in fact, say that Jiangsu province is the epitome of clean energy use in the country; specifically, if the province can realize the transformation to clean and low-carbon energy, it will play a demonstrative role for the whole country.

The application and policies of renewable energy technologies have achieved the goal of "reducing the consumption of such fossil energy as coal" and "developing non-fossil energy resources, especially the renewable resources, with bigger efforts." During the 13th Five-year Period, in particular, Jiangsu province strictly controlled its overall coal consumption; specifically, it set coal consumption targets for its districts and cities, and also established the substitutive system for reduction (or equivalent) of coal. In the province, the amount of coal used for newly constructed projects must be accompanied by the corresponding reduction or equivalent of coal by virtue of previous dismantled projects, or those that are set to be dismantled; plus, in shutting down outdated production facilities as well as the prohibition of small coal-fired boilers and of the combustion of coarse coal in urban areas, the province has stepped up its coal reduction process. Now, it makes bigger strides towards its green and low-carbon goal, concerning either the installation structure of electric power or the energy consumption structure.

1 Data sources: BP Energy Outlook 2019 edition ; 1mtoe=1.429527 × 106tce.

Based on status analysis, we believe that the main reason for the decline of coal consumption in Jiangsu province in recent years lies in the strong control and restraint mechanisms of policies; in particular, the implementation of the total coal consumption control system and the coal reduction and substitution system has effectively curbed coal consumption in Jiangsu province, resulting in the decline in the consumption and energy ratio of coal and in the installed capacity of coal power. In addition, under the guidance of policies, the province has witnessed the rapid development of new energy which has, in turn, decreased coal consumption. The installed capacity of new energy power continues to increase; specifically, the installed capacity of offshore wind power has remained in first place in China for many years. As such, we have designed four scenarios in which to discuss the changes of coal consumption demand in the future, including Business As Usual (BAU), High Renewable Energy (HRE), Strong Industrial Coal Limitation (SIC) and Comprehensive Strong Coal Control Policy (SP).

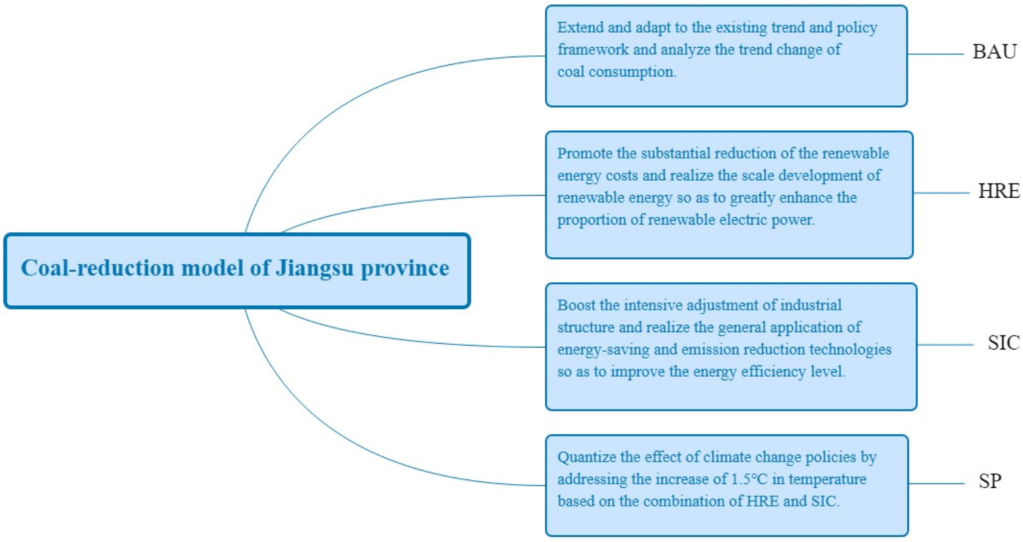


Chart 1-1 Model framework and scenario conception of coal reduction in Jiangsu province

According to the model measurement results, under BAU, it is predicted that the total coal consumption will reach 158.5 million tons by 2030, basically keeping in line with 2020; under HRE, it will reach 217.7 million tons, a decrease of 15.8% as compared with 2020; under SIC, it will reach 236 million tons, a decrease of 8.5% as compared with 2020; and under SP, it will reach 196.6 million tons, a decrease of 23.9% as compared with 2020. In the prediction interval, the high spots will occur in coal consumption under the scenarios of BAU, HRE, SIC and SP for the year of 2025 to 2024, and 2024 to 2023, about two years earlier than the coal demand high spots under BAU and SP.

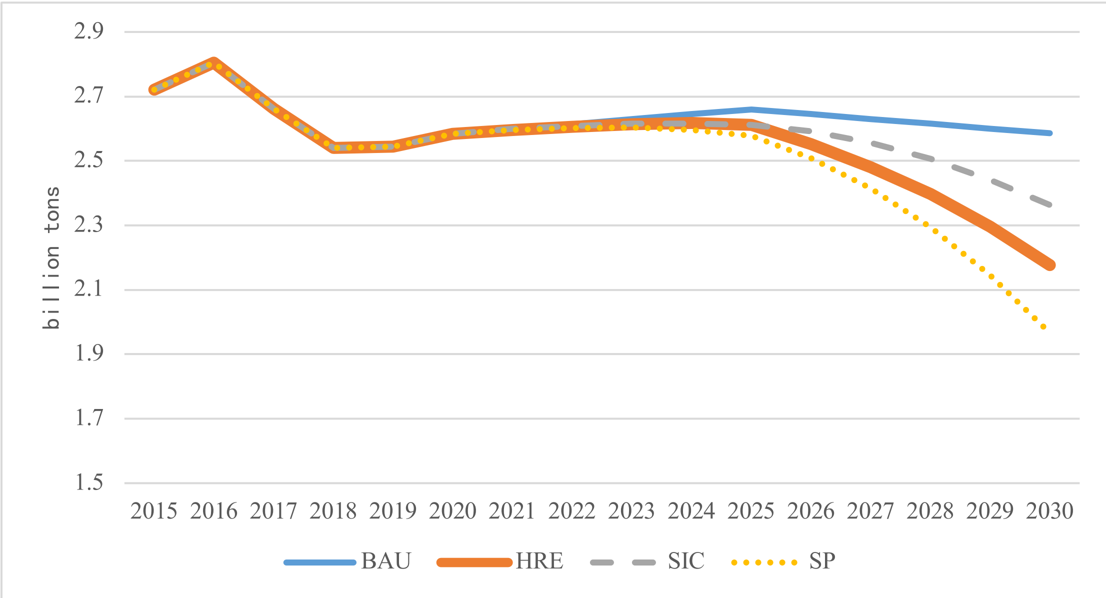


Chart 1-2 The scenario prediction and conclusion of coal consumption in Jiangsu province

Following are the shared discussions based on the model measurement results:

a. Industry-based coal consumption. Within the measurement interval, the gap between SP and BAU in terms of coal consumption in such sectors as power generation, heat supply and metallurgy will witness a gradual expansion. By 2025, coal consumption in the sectors of power generation, heat supply and metallurgy under SP will decrease to 140.4 million tons, 24.1 million tons and 37.1 million tons respectively; by 2030, those in the sectors of power generation, heat supply and metallurgy will further decrease—namely, 101.3 million tons, 22.8 million tons and 31 million tons respectively, or 78%, 82% and 65% of those under BAU.

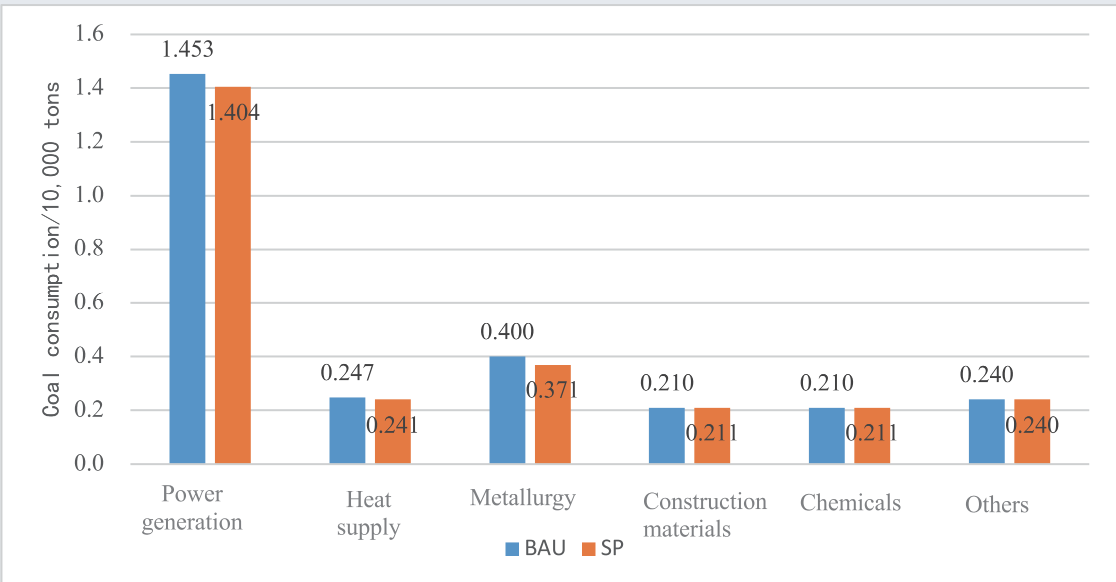


Chart 1-3 Comparison of coal consumption in different sectors under BAU and SP (2025)

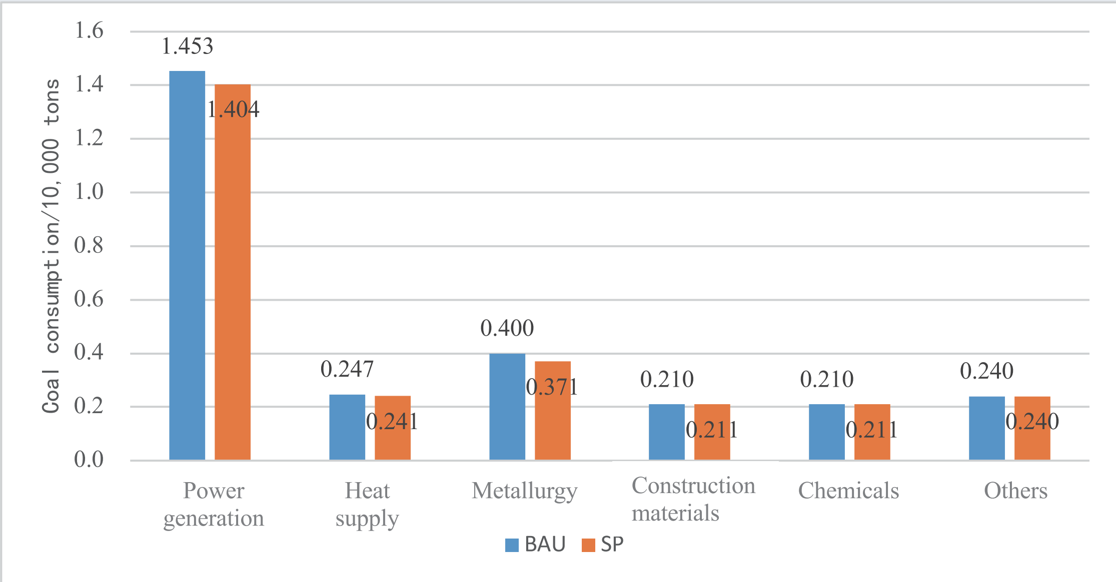


Chart 1-4 Comparison of coal consumption in different sectors under BAU and SP (2030)

b. Electric power installation structure. The installation proportions of solar energy and wind power under SP and BAU will witness a constant increase, those of coal power will be in a continual decrease, and the increase or decrease under BAU and SP will become comparatively larger. By 2030, the installation proportion of coal power under SP will reach 23.38%, a decrease of 16% of that under BAU; while those of solar power and wind power will reach 29.35% and 23.85% respectively, 11% and 9% higher than that under BAU.

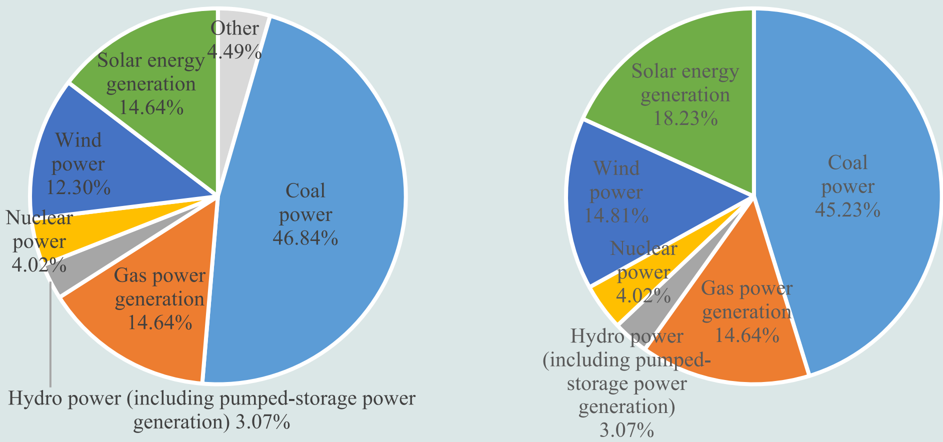
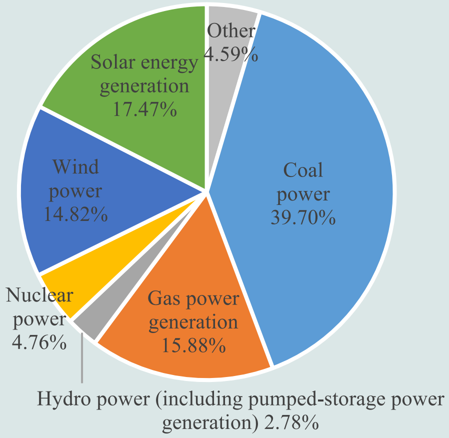


Chart 1-5 Comparison of power installation structure under BAU and SP (2025)[2]

2 The left chart shows the scenario of BAU, while the right one shows SP.



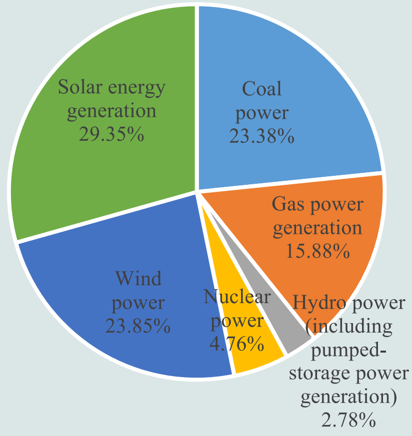
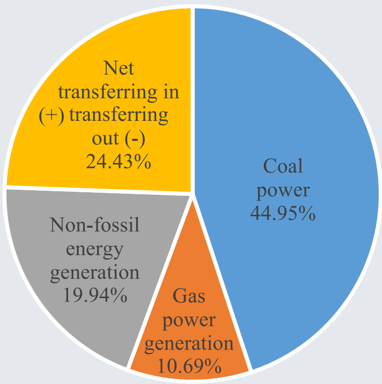


Chart 1-6 The comparison of power installation structure under BAU and SP(2030)

c. Power supply structure. SP and BAU are the same in the overall trend: the coal power proportion in the power supply will gradually decrease, and the non-fossil energy proportion will be on the rise, with a more obvious trend interval in comparison with BAU and SP. By 2030, non-fossil energy generation under SP will reach 34.73%, thus becoming the largest power supply source, more than 10% higher than that under BAU.



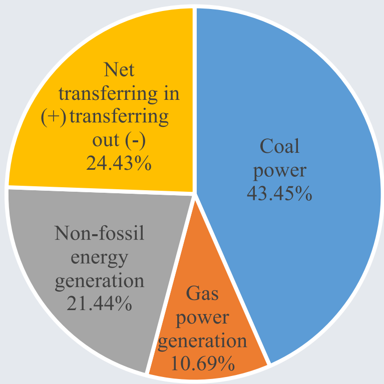
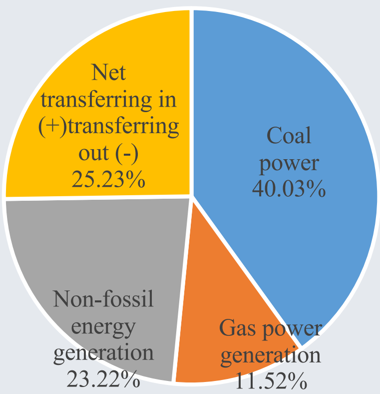


Chart 1-7 The comparison of power supply structure under BAU and SP(2025)



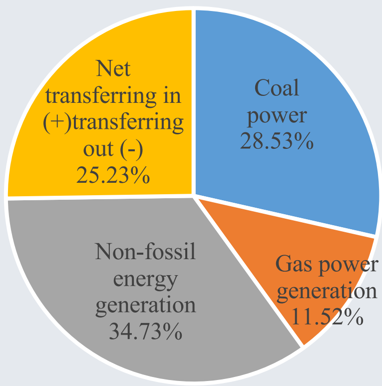


Chart 1-8 The comparison of power supply structure under BAU and SP (2030)

d. Proportion of electricity produced by renewable energy resources. The proportions of this kind of electricity under BAU and SP show a rising trend, and much stronger than those under BAU and SP. By 2030, the electricity produced by renewable energy resources under SP will reach 31.65%, 15% higher than that under BAU.

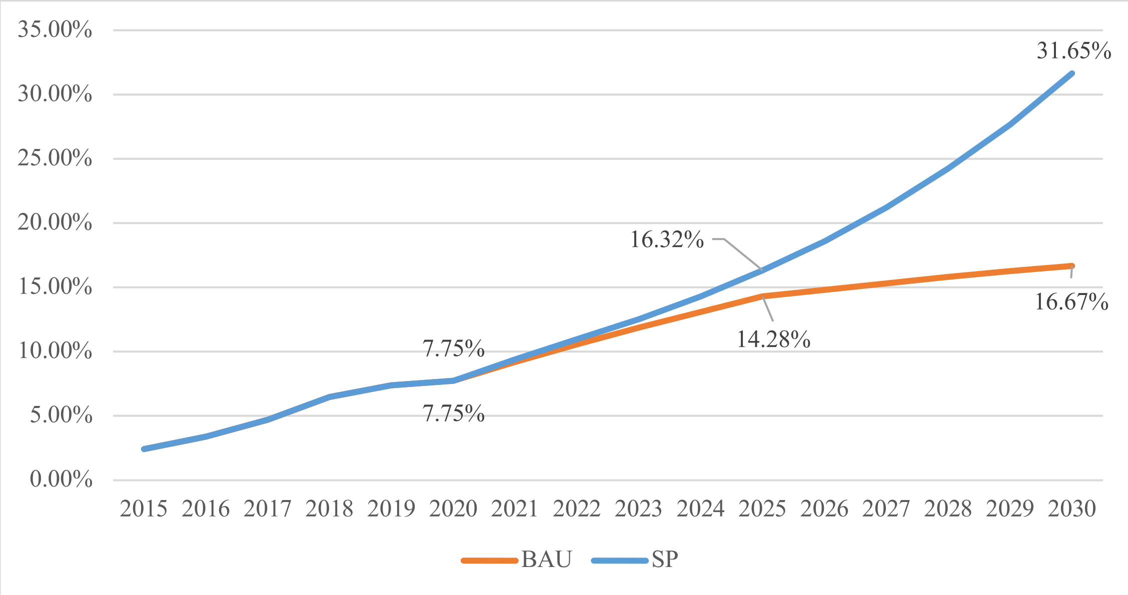


Chart 1-9 Change of the proportions of electricity produced by renewable energy resources under BAU and SP

The analysis and discussions show that SP is the hypothetical scenario which features the largest drop in coal consumption and the fastest growth of renewable energy in Jiangsu province. It means the continual decrease of coal consumption in the sectors of power generation, heat supply and metallurgy, the substantial rise of the proportion of green, clean and low-carbon energy, and the acceleration of energy structure transformation; therefore, we suggest that the coal reduction road map carried out under SP, and the path analysis be conducted to this end[3].

As such we believe that the key to controlling the total coal consumption in Jiangsu province lies in the structural adjustment of supply-side production capacity, and the structural upgrading of demand-side consumption, the core being that we should construct the power system which takes coal as the foundation; use clean energy resources as the leading factor; feature a safe and stable operation; increase power substitution; and improve the proportion of electricity taken from outside the area. At the same time, we should establish a relevant restraint mechanism for coal consumption and consolidate effective support from substitute technologies so as to ensure that total coal consumption can be reduced in a stable manner under economic, safe and reliable circumstances, and realize the reform of the energy structure and green economic growth of the whole province.

3 As a matter of fact, SP is a scenario created as per multiple assumptions. The released results show that the SP scenario is surely the optimal objective route among the coal reduction road maps in Jiangsu province; however, the realization of this objective is inseparable from the support of policy tools and very strong executive power; therefore, for the selection and application of policy tools, we believe that we should consider the comprehensive implementation of policies and conduct and overall consideration of coal consumption and the energy systems where it is based. Only in such a way can we strive to ensure the implementation of the road map.

In the report we also make a preliminary estimation of the synergy effect of the reduction of pollution and carbon emissions on the basis of the implementation of the road map. Under HRE, we will reduce 149,284,600 tons of carbon dioxide (CO_2), 484,300 tons of sulfur dioxide (SO_2) and 421,600 tons of nitric oxide (NO_X); under SIC, we will reduce 810,612,000 tons of CO_2, 263,000 tons of SO_2 and 229,000 tons of NO_X; and under SP, we will reduce 226,677,900 tons of CO_2, 735,400 tons of SO_2 and 640,200 tons of NO_X. The reduction of carbon dioxide emissions will facilitate the realization of the carbon emissions peak target, and this is also one of the key tasks currently under study in Jiangsu province.

Given that the coal-power generating units in Jiangsu province already meet the requirements for ultra-low emissions, the reduction of SO_2 and NO_X indicated here is taken as only the theoretical measurement value; however, at the actual layer, due to the relationship with waste gas disposal, the synergy effect is not so directly obvious as that of the effect of carbon emissions reduction.

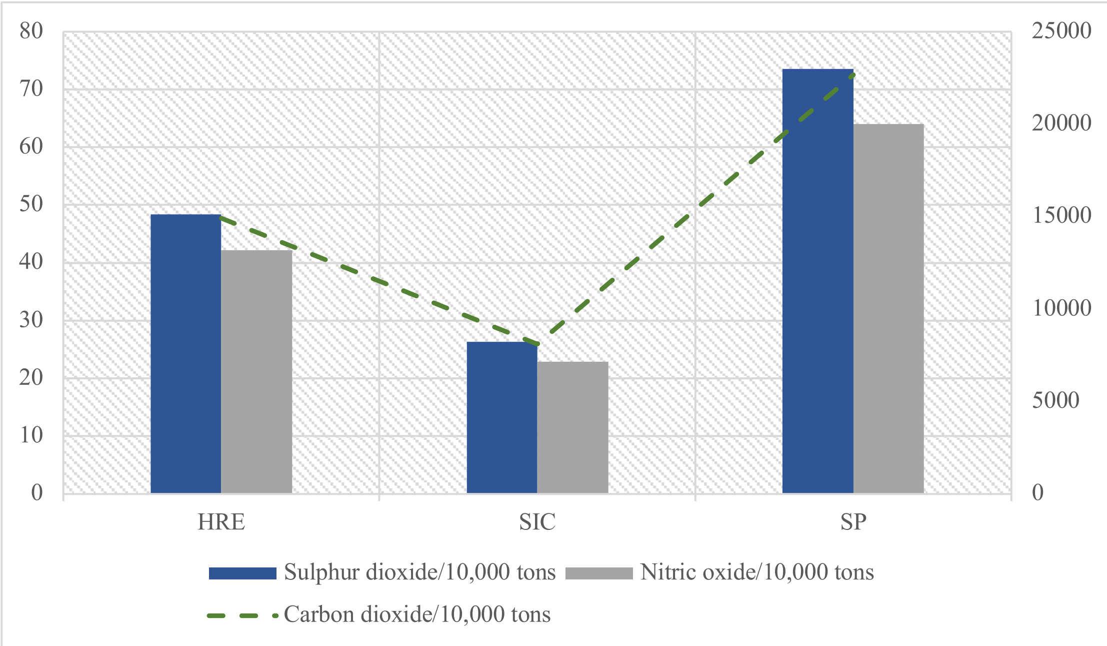


Chart 1-10 Impact of the implementation of the Coal Reduction Road Map on the emissions of air pollutants and carbon dioxide

Finally, we would like to point out that the research data in this topic mainly come from IEA, the BP Statistical Review of World Energy, the China Statistical Yearbook, the China Energy Statistical Yearbook, and the Jiangsu Statistical Yearbook, as well as relevant data and materials or academic research achievement available online. We would hereby like to extend our sincere respect and appreciation to all of them.

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