

# Transformation of Traditional Energy Company under the Peak Carbon Dioxide Emissions and Carbon Neutrality Targets: Evidence from China Shenhua

Jiayu Chen<sup>1, †</sup>, Yuanchuang Hu<sup>2, †</sup>, Yushi Yu<sup>3, †</sup>, Yuzi Zhang<sup>4, \*, †</sup>

<sup>1</sup> Economic School, Department of Finance, Beijing Technology of Business University

<sup>2</sup> Dublin International College, Beijing University of Technology

<sup>3</sup> School of Economics and Management, Chang' An University

<sup>4</sup> International Business School, Beijing Foreign Studies University

\*Corresponding author. Email: yuziiii@bfsu.edu.cn

<sup>†</sup>These authors contributed equally.

## ABSTRACT

Environmental issues and energy crisis are one of the major challenges facing humanity in this century. This paper first analyses the environmental change crisis and points out the carbon neutral agreement reached by global countries. Then it focuses on China and explains China's carbon peaking and carbon neutral targets as well as China's current energy structure. Finally, it looks at China Shenhua Company Limited, analyses its business model and business model reform, and makes recommendations for this. The main contribution of this paper is to enlighten other traditional energy companies by focusing on one company and finding a transformation strategy for it.

**Keywords:** Carbon neutrality, Traditional Energy Enterprises, Energy Revolution, China Shenhua Company Limited.

## 1. INTRODUCTION

### 1.1. Climate Change Issues

One of the major challenges that all mankind needs to face is global climate change resulting from greenhouse gas emissions such as carbon dioxide. The scientific community and governments are forming a clearer consensus on the issue of climate change, which is that climate change will bring catastrophic consequences to the world.

According to NASA, the average global temperature has risen by more than 1.2 centigrade compared to the late 19th century. More extreme weather has been created as a result: natural disasters such as floods and heat are becoming more frequent, drought levels are increasing, glaciers are melting, sea levels are rising and many coastal countries are threatened with inundation.

### 1.2. Global Greenhouse Gas Concentration Changes

Greenhouse gas emissions contribute directly to climate change. Carbon dioxide is the most important category of greenhouse gases, and other greenhouse gases can be expressed in the form of carbon dioxide equivalents. They can absorb and rerelease infrared radiation from the atmosphere, causing the rise in temperature at the Earth's surface and thus bringing about a series of climate changes.

Over and above a century, human industrial activity has increased atmospheric CO<sub>2</sub> concentrations by a bonus 50%, which is more than the increase in 20,000 years under natural conditions.

### 1.3. Nations That Have Committed to Carbon Neutrality

According to the definition provided by the intergovernmental panel on climate change, carbon

neutrality is the equalization of global anthropogenic CO<sub>2</sub> emissions with CO<sub>2</sub> removals over a given period.

To decrease greenhouse gas emissions, it is increasingly common for countries to engage in carbon neutrality initiatives and other contributions to climate change. At an Earth Summit in December 2017, 32 countries signed the Carbon Neutral Alliance (2019). As of February 10, 2021, 127 countries have committed to becoming carbon neutral (Energy and Climate Intelligence Unit, 2020).[1]

**1.4. Timing of Peak Carbon Dioxide Emissions and Commitment to Carbon Neutrality in Major Nations**

According to table 1, some major countries have announced plans for when carbon neutrality will be achieved, with China's expected timeline being the latest in comparison. However, developed countries in Europe and the US have taken longer than China to move from peak carbon to carbon neutrality. China has only 30 years to go from peak carbon to carbon neutral, so the task of governance is more urgent and will face greater challenges.

**Table 1.** Timing of peak carbon emissions and commitment to carbon neutrality for major countries

| Nations | Carbon peak time | Carbon neutral time |
|---------|------------------|---------------------|
| UK      | The early 1970s  | 2050                |
| Germany | The late 1970s   | 2050                |
| US      | 2007             | 2050                |
| Japan   | 2013             | 2050                |
| Korea   | Not yet          | 2050                |
| China   | 2030 (forecast)  | 2060                |

And according to Table 2, by the end of 2020, 44 countries and territories have officially declared carbon neutrality targets.

**Table 2.** Partially Carbon Neutral Countries and Regions Committed to Achieve Carbon Neutrality

| Commitment Type    | Country and region (year of commitment)                                                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Achieved           | Suriname, Bhutan                                                                                                                                                             |
| Legislated         | France (2050), Denmark (2050), Hungary (2050), New Zealand (2050), Sweden (2045), UK (2050)                                                                                  |
| In Legislation     | EU (2050), Korea (2050), Spain (2050), Chile (2050), Canada (2050), Fiji (2050)<br>China (2060), Japan (2050), Hong Kong, China (2050), South Africa (2050), California, USA |
| Policy Declaration | (2045), Germany (2050), Switzerland (2050), Norway (2050), Finland (2035), Iceland (2040), Austria (2040), Ireland (2050), Portugal (2050),                                  |

Uruguay (2030), Costa Rica (2050), Marshall Islands (2050), Slovenia (2050)

**2. CHINA’S PEAK CARBON DIOXIDE EMISSIONS PLAN**

The Chinese government has set a definite goal to combat climate change.[1] In his speech at the general debate of the 75th United Nations General Assembly on September 22, 2020, Chinese President Xi Jinping made clear to the world the first ever timeline for China to reach carbon neutrality, i.e., China will strive to achieve peak carbon emissions by 2030 and carbon neutrality by 2060. Climate Action Tracker finds that China's carbon neutrality target could help slow global warming by the end of the century. Tables 3 presents China's carbon reduction-related commitments.

**Table 3.** China's carbon reduction-related commitments

| Year    | Program                  | Content                                                                                                                                                                                                                                                                                                                                                   |
|---------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2009.12 | World Climate Conference | Carbon emissions intensity in 2020 will be 40-45% lower than in 2005<br><br>The proportion of non-fossil energy consumption reaches 15%; carbon dioxide emissions peak around 2030, carbon dioxide emissions per unit of GDP decrease by 60-65% compared to 2005, and the proportion of non-fossil energy in primary energy consumption reaches about 20% |
| 2016.4  | Paris Agreement          | Adopt more effective policies to peak CO <sub>2</sub> emissions by 2030 and work towards carbon neutrality by 2060                                                                                                                                                                                                                                        |
| 2020.9  | UN General Assembly      | As of 2030, China's CO <sub>2</sub> emissions per unit of GDP will decline by over 65% compared to 25 years ago, non-fossil energy will represent approximately 25% of primary energy consumption, forest accumulation will rise by 6 billion cubic meters, and the total installed capacity of wind and solar power will be above 1.2 billion kilowatts. |
| 2020.12 | Climate Ambition Summit  |                                                                                                                                                                                                                                                                                                                                                           |

**3. PREVIOUS STUDIES**

Existing studies in China have mainly analyzed ways to help achieve carbon peaking and carbon neutrality

goals or strategies for green transition from a national or industry perspective. There is no study to analyze the impact on production and operations in the current policy context and how to transform and in what approach for a specific company.

As Liu Manzhi et al. in the impact and enlightenment of emission reduction policies on the development of coal industry under the background of peak carbon and carbon neutrality, proposed a development path under the policy for the coal industry without considering the uniqueness of each company in the coal industry, i.e., her proposed approach is not applicable to all companies in the industry.[2] Xu SQ in an article analyzes the measures that China should take to deal with the energy revolution from a macro level.[3]

Other countries have focused more on the impact of this goal on human development and global environmental governance, and how to use various methods to help achieve the goal. For instance, Rozkwitalska, Malgorzata highlights the role of boundary crossing in social learning in the energy transition context.[4] Westman, Linda, on the other hand, is more concerned with alternative thinking about the energy transition genuinely grounded in Chinese epistemological and philosophical constructs. [5]

**4. ARTICLE OVERVIEW**

The objective of this study is to illustrate the significant effects of China's existing energy policies for traditional energy companies in a small way by examining the industrial transformation history and business impacts of China Shenhua, a leading coal company in China, under the carbon peaking program and carbon neutral policy. To study and summarize the transformation of China Shenhua's industrial model in response to the policy changes. And make recommendations for China Shenhua's future corporate development and transformation based on the latest policies.

The next article will first analyze China's current energy structure and point out the impact of the new energy policy on China's traditional energy companies. It then focuses on China Shenhua, analyzing its current industrial model and financial situation, the adjustments it has made to its industrial model in response to the new policy, and suggestions for its future adjustment strategy.

**5. THE CURRENT SITUATION OF ENERGY DEVELOPMENT IN CHINA**

Energy consumption permeates all aspects of social manufacturing, distribution and development, and is intimately linked to the growth of the economy. Therefore, to discuss the state of energy development in

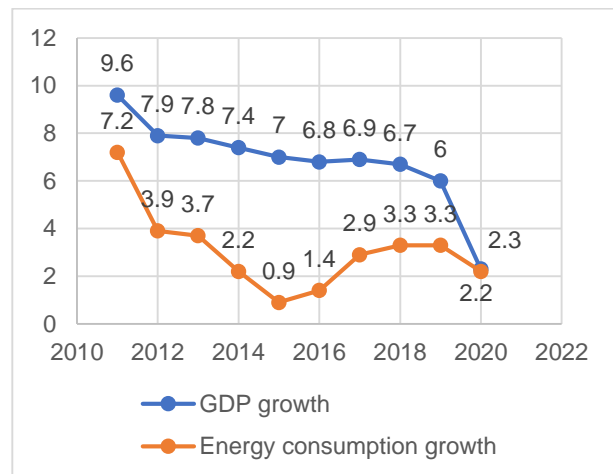
China today, we must first analyze the recent economic situation in China.

**5.1. Economic Background of China**

According to the China Energy Big Data Report 2021, in 2020, China's gross domestic product will reach 101.6 trillion yuan, up 2.3% compared to last year. Against the backdrop of the pandemic, China's macroeconomic performance is sound and it is the only economy in the world with positive economic growth.

For nearly a decade, China has been committed to maintaining medium-high GDP growth at a low energy consumption rate. In fact, the "dual carbon" policy can be understood as the continuation of the "dual control" policy since the 13th Five-Year Plan. There are similarities in guiding ideology, which means that China will reduce energy consumption and emissions. This means that total carbon emissions per unit of gross domestic product are reduced.[6]

With the formal proposal of the dual carbon policy in September 2020, China's economic development model will adjust to gradually build a "circular economy", which means the continuation and development of a low exploitation, high utilization and low emission model.[7]



**Figure 1** China's GDP and the growth of energy consumption

**5.2. China's Energy Production**

As for China's energy production, the proportions of different energy sources in China have shown different trends in the past decade. In 2016, with the promotion of the 13th Five-Year Plan, the total production of raw coal and crude oil declined compared with last year. From 2018 to 2019, affected by the supply-side structural reform, the raw coal and crude oil production industries released capacity, and the output partially rebounded. Total production of clean energy, like natural gas, and new energy, like hydro and nuclear power, has been growing steadily since 2011, roughly doubling in a decade.

**Table 4.** China's energy production from 2011 to 2019

| Year | Total raw production | Total coal production | Total crude oil production | Total natural gas production | Others |
|------|----------------------|-----------------------|----------------------------|------------------------------|--------|
| 2011 | 264658.1             | 28915.1               | 13947.3                    | 32657                        |        |
| 2012 | 267493.1             | 29838.5               | 14392.7                    | 39316.6                      |        |
| 2013 | 270523               | 30137.9               | 15786.5                    | 42336.5                      |        |
| 2014 | 266333.4             | 30396.8               | 17007.7                    | 48128.2                      |        |
| 2015 | 260985.7             | 30725.5               | 17350.9                    | 52414                        |        |
| 2016 | 241534.1             | 28375.1               | 17994                      | 58134.3                      |        |
| 2017 | 249516               | 27246                 | 19359                      | 62379                        |        |
| 2018 | 261261               | 27144                 | 20735                      | 67860                        |        |
| 2019 | 272342               | 27393                 | 22629                      | 74636                        |        |

**5.3. China's Energy Imports**

Since China has always been a major energy importer, international trade is more critical to China's energy mix than energy production. The "circular economy" measures adopted in response to the "dual carbon" target are particularly relevant to the international economic cycle, which covers the cross-border movement of energy commodities and is a direct means of carbon transfer between countries.

"Carbon neutral" means reducing net carbon emissions to zero in international trade and industrial relocation in the form of:

Assume that the carbon emission of international trade or industrial transfer of industry *i* in year *t* is:

$$EX(CO_2)_{it} = \omega_{it} * EX(USD)_{it} \tag{1}$$

$\omega_{it}$  is the carbon emission intensity of industry *i* in year *t*, and  $EX(USD)_{it}$  is the total carbon emission of international trade or industrial transfer in the same year, we have:

$$EX(CO_2)_t = \sum_i EX(CO_2)_{it} \tag{2}$$

Therefore, the realization of the "dual carbon" target mainly depends on carbon emissions, which also shows the profound impact of international energy trade and industrial transfer on the "dual carbon" target.[8]

From 2011 to 2020, China's coal and oil imports increased almost year by year, with a total increase of 77.82%, which also corresponds to the increase in China's carbon emissions during this period. Despite the reduction in carbon intensity, China's share of global emissions in 2020 increased by 9.33 percent compared with 2014.

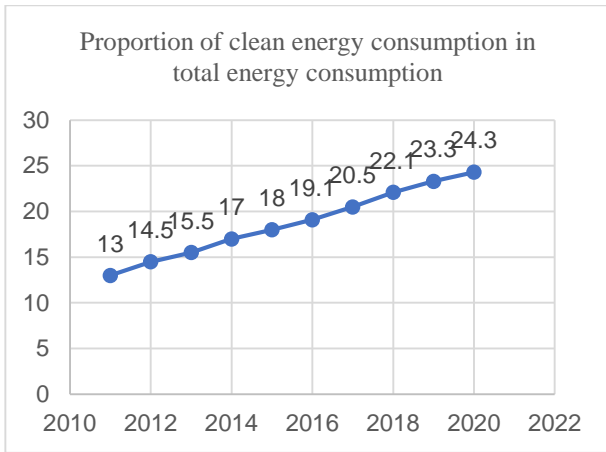
**Table 5.** China's natural gas and electricity imports and exports from 2011 to 2020

| Year | Natural gas (Billion cubic meters) |        | Electricity (billion KWH) |        |
|------|------------------------------------|--------|---------------------------|--------|
|      | import                             | export | import                    | export |
| 2011 | 312                                | 32     | 66                        | 193    |
| 2012 | 421                                | 29     | 69                        | 177    |
| 2013 | 525                                | 27     | 75                        | 187    |
| 2014 | 591                                | 26     | 68                        | 182    |
| 2015 | 611                                | 33     | 62                        | 187    |
| 2016 | 746                                | 34     | 62                        | 189    |
| 2017 | 946                                | 35     | 64                        | 195    |
| 2018 | 1246                               | 34     | 56.9                      | 209    |
| 2019 | 1333                               | 36     | -                         | -      |
| 2020 | 1403                               | -      | -                         | -      |

**Table 6.** China's coal and crude oil imports and exports from 2011 to 2020

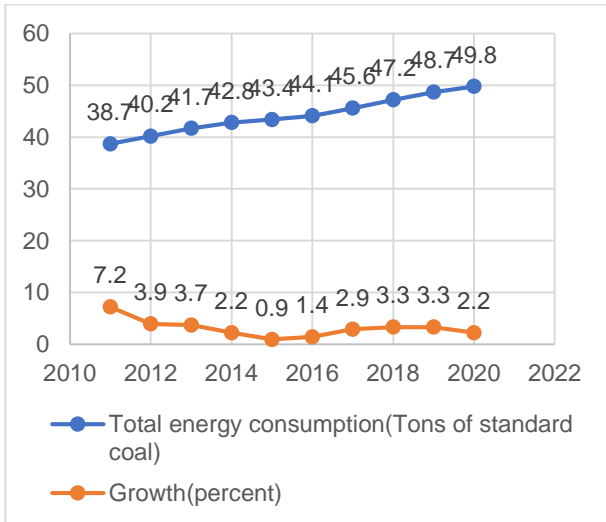
| Year | Coal (ten thousand tons) |        | Crude oil (ten thousand tons) |        |
|------|--------------------------|--------|-------------------------------|--------|
|      | import                   | export | import                        | export |
| 2011 | 22220                    | 1466   | 25378                         | 252    |
| 2012 | 28841                    | 928    | 27103                         | 243    |
| 2013 | 32702                    | 751    | 28174                         | 162    |
| 2014 | 29120                    | 574    | 30837                         | 60     |
| 2015 | 20406                    | 533    | 33550                         | 287    |
| 2016 | 25543                    | 879    | 38101                         | 294    |
| 2017 | 27090                    | 817    | 41957                         | 486    |
| 2018 | 28189                    | 493    | 46189                         | 263    |
| 2019 | 29952                    | 603    | 50568                         | 81     |
| 2020 | 30399                    | 319    | 54239                         | -      |

### 5.4. The Energy Consumption of China



**Figure 2** Proportion of clean energy consumption in total energy consumption

Although the proportion of Coal consumption in China is decreasing year by year, it will reach 56.8% in 2020, indicating that coal still occupies the leading position. The proportion of petroleum consumption is basically stable; The proportion of clean energy increased year on year, from 13% in 2011 to 24.3% in 2020, which shows the impact of emission reduction policies. From 2011 to 2020, the total energy consumption of China increased steadily and slowly, with the overall growth rate reaching a low value in 2015 and then gradually increasing. This also explains why the total amount of carbon emissions still rises despite the control of carbon emission intensity.



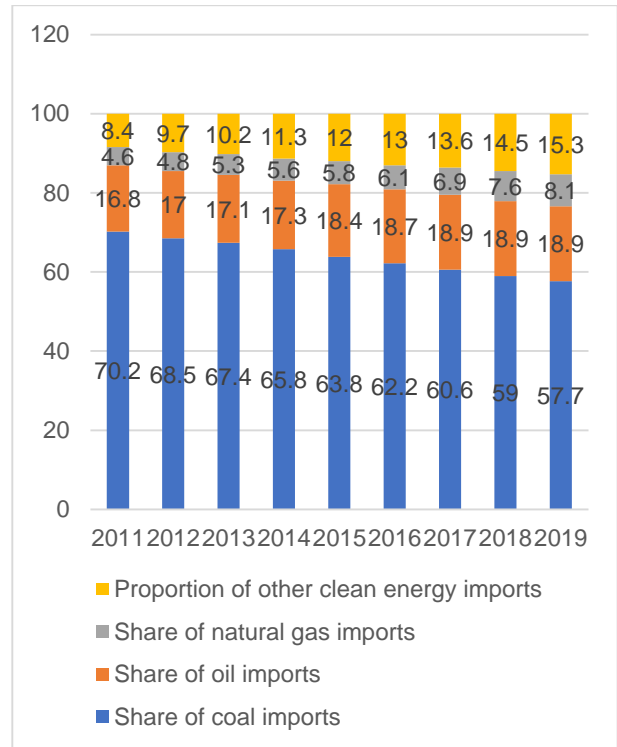
**Figure 3** Total energy consumption and growth in China

### 5.5. China's energy development forecast

According to the "2030 Carbon peak Action Plan" and "The Circular Economy Development of 14th Five-year Plan " initiated by the State Council, during this

unique period, the contribution of energy conservation and circular economy to China's emission reduction will reach 30%, and by 2030, 35%.

In 2017, China's carbon emission intensity was 0.77kg/USD.[6] Considering China's changing trend of energy structure and the expected economic situation, carbon emission intensity needs to be reduced by at least 75% to achieve carbon neutrality. That means non-fossil energy needs to occupy more than 35 per cent of the China's energy consumption by 2035, and coal, which is the dominant energy source today, needs to account for less than 40 per cent.



**Figure 4** China's energy imports by Share from 2011 to 2019

Therefore, China's energy development will adhere to coal reduction, oil control, gas increase, and leap-forward development of renewable energy to achieve low-carbon transformation, which means that the proportion of coal power generation will also be reduced to about 40%, and the electrification rate of terminal energy needs to exceed 30% by 2025 and 40% by 2035. In order to gradually realize the improvement of energy efficiency and effective reduction of carbon emission level.

## 6. BUSINESS MODEL OF CHINA SHENHUA

### 6.1. The Impact of 'Carbon Peaking and Carbon Neutrality Goals' on Chinese Traditional Energy Enterprises

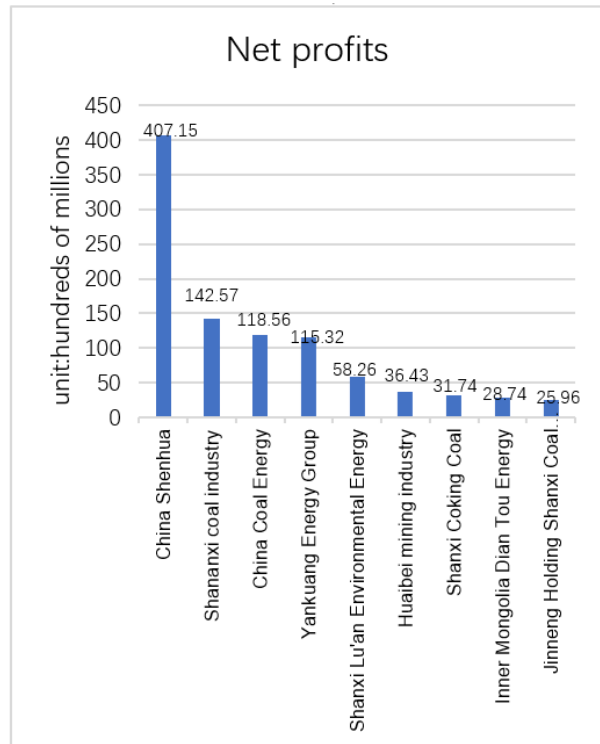
Confronted with ‘carbon peaking and carbon neutrality goals’, traditional energy enterprises, such as the coal industry, need to pay close attention to energy conservation and emission reduction, make green transformation, and work together to reach the goals of carbon neutralization and carbon peak in the target year, so as to make due efforts and contributions to the environment of China and even the world. According to the policy instructions, China will strive to shift from high-carbon energy to low-carbon energy, from high-carbon industry to low-carbon industry, from high-carbon economy to low-carbon economy, and from high-carbon society to low-carbon society by 2030[9]. In China, reducing carbon emissions is mainly to reduce coal consumption. Challenged by global warming, coal has become "energy elimination", "industry elimination" and "employment elimination". The higher the peak value and the larger the scale, the more passive the adjustment will be, and the later and more passive the action will be, the greater the cost will be. To this end, China must be determined to reduce coal production and consumption, control it below 4 billion tons and standard coal below 3 billion tons, put forward double reduction targets and indicators year by year, improve double increase targets and indicators for renewable energy production and consumption, implement continuous substitution of black energy, namely "de coal", and accelerate the transformation to green energy; At the same time, efforts should be made from the demand side and the supply side at the same time, so as to depress the coal consumption demand to a great extent and drive the reduction of coal production. This means that the traditional coal industry is facing great challenges of green transformation and green development. At the same time, the withdrawal of coal from the historical stage also means that a large number of employees in the traditional coal industry are facing the challenge of unemployment, and the national employment policy should also be actively implemented.

**6.2. Business model of China Shenhua**

China Shenhua was founded in Beijing in 2004 and listed on the Hong Kong Stock Exchange in June 2005. It was subsequently listed in Shanghai Stock Exchange in October 2007. China Shenhua is among the world's premier listed coal-based integrated energy companies. According to the "Top 250 Global Energy Companies 2021" list published by Platts Energy Information, China Shenhua is ranked second among Chinese companies. The group's main businesses are the manufacture and marketing of coal and electricity, the operation of rail, port and ship transportation, and the production of coal-to-olefin. China Shenhua is committed to innovating and improving its technology to maintain its strong competitiveness. Its coal mining, safe production, clean coal-fired power generation and heavy-duty railroad

transportation technologies are at the leading level at home and abroad.

Translated with [www.DeepL.com/Translator](http://www.DeepL.com/Translator) (free version)



**Figure 5** net profits ranking among Chinese energy companies in 2020

The integrated business model of coal, electric power, railway, port, shipping and coal chemical industry is the unique business mode and profit model of China Shenhua. China Shenhua's main business income mainly comes from the coal division, and its products are mainly power coal. According to the annual financial reports from 2019 to 2020 of Chain Shenhua, in the first three quarters of 2020, the coal segment achieved an operating revenue of 134.965 billion yuan (before merger and offset), accounting for 64% of the total revenue; The gross profit is 37.686 billion yuan, accounting for 55% of the total gross profit. The coal segment was followed by power generation and railway. Ports, shipping and coal chemical industry had small scale of revenue.

As a leading enterprise in the coal industry, China Shenhua adheres to innovation and its coal green mining and safety production technology is at the international advanced level. Also its technologies such as clean coal-fired power generation and heavy haul railway transportation are at the domestic leading level. As mentioned above, it has initially formed an integrated operation mode of scientific and technological resources with scientific decision-making, system management, research and development and achievement transformation and a development mode driven by

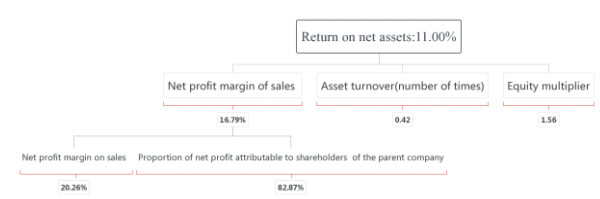
scientific and technological innovation, which bringing to a especially strong competitor in the industry.

Additionally, it closely follows the implementation of national policies. Since President Xi proposed at the 75th UN General Assembly on September 22, 2020: "China will independently increase its contribution and implement stronger policies and measures in an effort to peak CO2 emissions by 2030 and work towards carbon neutrality by 2060." Besides adhering to the new development concept, deeply promoting the supply side structural reform, striving to expand effective investment, strengthening to tackle key core technologies and continuing to promote transformation and upgrading, it focus on the goal and task of "carbon peak and carbon neutralization" and scientifically prepare the "The 14th Five-year plan". It goes all lengths to do a good job in coal production, increase the proportion of high-quality production capacity, and promote safe, clean, intelligent and efficient mining. What's more, China Shenhua tries to do excellent Coal power events, construct clean and efficient units with high standard, reduce unit energy consumption. For instance, Jinjie energy puts the world's first high-level layout project of steam turbine platform into operation, and the one million KW coal power project in Java Indonesia was put into operation for power generation.

**6.3. The industrial transformation that, China Shenhua has made in response to the dual-carbon policy**

Aimed at keeping its leading position in the industry, China Shenhua closely follows the implementation of new national policies. Since President Xi put forward relevant policies at the 75th UN General Assembly on September 22, 2020, China Shenhua goes all lengths to do a good job in coal production, increase the proportion of high-quality production capacity, and promote safe, clean, intelligent and efficient mining. What's more, China Shenhua tries to do excellent coal power events, construct clean and efficient units with high standard, reduce unit energy consumption. For instance, Jinjie energy puts the world's first high-level layout project of steam turbine platform into operation, and the one million KW coal power project in Java Indonesia was put into operation for power generation.

**6.4. DuPont analysis of main financial index of China Shenhua during the first three quarters in 2020**



**Figure 6** Dupont analysis of main financial index of China Shenhua during the first three quarters in 2020

**6.4.1. Analysis of Return on Net Assets**

Return on net assets reveals the level of remuneration received by the owner's equity of an enterprise. It is an important metric to measure an enterprise's profitability. The higher the index, the higher the return brought by shareholders' investment. The core of measuring the value of modern enterprises is ROE that the enterprise can bring to its shareholders. According to the annual report data of China Shenhua from 2019 to 2020, it can be concluded that the return on net assets of the enterprise is 11%, which is in the normal range of 15% to 40%, indicating that the enterprise has good profitability in the past year.

**6.4.2. Analysis of The Turnover Rate of Total Assets**

An enterprise's turnover rate of total assets indicates both the speed at which total assets are recycled from input to output during the enterprise's operation and the quality and efficiency of the management and utilization of total assets. As a rule, higher the value, faster is the turnover of the total assets of the enterprise. The higher the sales capacity, the more efficient the utilization of assets. According to the annual report data of China Shenhua from 2019 to 2020, it can be concluded that the total asset turnover rate of the enterprise is 0.42, which is less than the normal value of 0.8, indicating that the enterprise may have too much inventory backlog in the past year, resulting in low asset utilization.

**6.4.3. Analysis of Net Profit Margin of Sales**

The Net Profit Margin on Sales is the ratio of net profit to sales revenue. It reflects a company's ability to generate sales revenue in a given period. In other words, it reveals how net profit will change when a company's sales revenue increases by one yuan. According to the annual report data of China Shenhua from 2019 to 2020, it can be concluded that the net sales interest rate of the enterprise is 20.56%, which is within the reasonable range of 20% to 30%, indicating that the enterprise has paid attention to improving operation and management and improving the profitability of the enterprise while promoting the enterprise to expand sales in the past year.

**6.4.4. Analysis of Equity Multiplier**

Equity multiplier manifests how many times the total assets are the total shareholders' equity. The size of an enterprise's financial leverage can be reflected by it. The larger the index, the smaller the proportion of capital the shareholders invested in assets and the owners invested in all assets, and the higher the degree of the liabilities of

a company. According to the annual report data of China Shenhua from 2019 to 2020, it can be concluded that the equity multiplier of the enterprise is 1.56, which is less than the normal range of 2 to 3, indicating that the capital the shareholders invest in the company is relatively high and constitutes a large proportion of total assets. In this case, the degree of the debt in the enterprise is generally low, which means that the rights and interests of creditors are easier to be protected, but the return rate of shareholders is relatively low. In enterprise management, we must seek an optimal capital structure to maximize enterprise value.

## **7. SOLUTIONS OF CHINA SHENHUA ENERGY COMPANY LIMITED**

### ***7.1. Withdraw the Development Rights of Watmark Project and Transfer the Ecological Land***

Shenhua Watmark Coal Mine Co., LTD. (" Watmark Company "), a wholly-owned subsidiary of China Shenhua Energy Co., LTD. (" The Company "), and the Government of The State of New South Wales (" NSW "), Australia, signed a Deed of Agreement (" Agreement ") for the Watmark Project Mining Right and Ecological Land Disposal.

But recently (2021.04.21), for the sake of keeping up with the growth of clean energy and low-carbon transformation, as well as to meet the NSW government's environmental protection needs and the planning adjustment for the region, Watermark Company has withdrawn from the development rights of Watermark Project by consensus with the NSW Government.

### ***7.2. Capture and Storage Carbon Dioxide after Combustion in Jinjie Energy Coal-fired Power Plant***

Relying on Jinjie Energy No.1 600 MW sub-critical unit, the project integrates a number of new technologies such as new amine absorbents and high efficiency energy saving processes, forming a set of new technology system suitable for China's coal-fired power plant. During the trial operation of the Jinjie CCS demonstration project, the CO<sub>2</sub> capture rate was over 90% and the captured CO<sub>2</sub> concentration was over 99%.

Jinjie CCS demonstration project has been put into operation smoothly, providing technical support for China's coal-fired power plants to promote the realization of "near zero emissions", and accumulating practical experience for China's thermal power plants to carry out large-scale carbon capture projects of one million tons, which is of great significance for the implementation of the goals of "carbon peak" and "carbon neutrality".

### ***7.3. Set up the China Energy Low Carbon Fund***

On August 27, 2021, the eighth meeting of the fifth Board of Directors of the Company approved the Company as a limited partnership.

Investing two billion yuan of its own funds to take part in the foundation of the China Energy low carbon Fund, and signed Partnership Agreement of China's Investment Fund for Green and Low-Carbon Development in Energy (Limited Partnership) (" Partnership Agreement ") with Development Co., LTD. (" Guodian Electric Power ") and etc.

The duration of the fund is 8 years, among which the investment period is 3 years, the Fund manager has the right to unilaterally exercise the right to extend the investment period by 1 year.

The withdrawal period shall start from the next day after the end of the investment period to the date of expiration of the fund term.

The company's participation in this investment can effectively use the existing funds, improve the efficiency of capital use, and indirectly expand green and low-carbon business areas.

## **8. CONCLUSION**

### ***8.1. Conclusion of Key Findings***

We identified the impact of 'carbon peaking and carbon neutrality goals' on Chinese traditional energy enterprises and pursued closely into China Shenhua, which has responded to the new policy. New energy development and energy structure innovation are concerns that humans must tackle in this era in order to deal with the energy crisis and alleviate environmental difficulties. Traditional energy corporations are clearly in crisis, as the national energy development strategy is completed and associated legislation are implemented. As a result, in order to assist traditional energy companies in dealing with the situation and finding solutions, we examine China Shenhua, one of China's traditional energy companies, and analyze the dilemma and potential solutions for the entire traditional energy industry by examining the company's strategy in light of the major trend of energy transformation. By implementing larger and more homogeneous carbon dioxide capturing system, as well as new foundation, a hydrogen energy and energy storage, which accelerate breakthroughs in low-carbon, zero-carbon, and negative-carbon technologies is within reach.

### ***8.2. Research Significance***

In order to cope with the energy crisis and alleviate environmental problems, new energy development and



energy structure innovation are the issues that people must solve in this era. With the finalization of the national energy development strategy and the introduction of relevant policies, it is clear that traditional energy companies are in crisis. Therefore, in order to help traditional energy companies, handle the situation and find ways to cope with it, we focus on China Shenhua, one of the traditional energy companies in China, and analyse the dilemma and the way out of the whole traditional energy industry by analysing the company's strategy under the major trend of energy transformation. We analysed the policy environment and industry model of this company and proposed effective improvement strategies for it. Our study will serve as a recommendation for the future development of the company and will also facilitate the transformation of other traditional energy companies in China to stay firm when the new energy era comes.

### **8.3. Future Study and Limitation**

Our research does not focus on the financial statements of China Myth. For example, we can query the cash flow of this company before and after the implementation of the "dual carbon" policy. In addition, we did not explain the impact of the "dual carbon" policy on the industry from the perspective of credit promotion. Therefore, we will read the prospectus of Shenhua in recent years, which means we can understand the financing situation of the company and the risks of the industry before and after the implementation of the "dual carbon" policy. The purpose of financing, the increase or decrease of business operations, and the flow of funds are necessary to understand the current situation of the enterprise.

## **REFERENCES**

- [1] Zhao, X., Ma, X., Chen, B., Shang, Y., & Song, M. (2022). Challenges toward carbon neutrality in China: Strategies and countermeasures. *Resources, Conservation and Recycling*, 176, 105959.
- [2] Liu, M., Zhang, L., and Wen, J. "Impact of emission reduction policies on the development of coal industry in the context of double carbon and implications." *Coal Economic Research* 41.07(2021):21-26. doi:10.13202/j.cnki.cer.2021.07.003.
- [3] Hu Angang China's goal of reaching the carbon peak by 2030 and its main ways [J] *Journal of Beijing University of Technology (SOCIAL SCIENCE EDITION)*, 2021,21 (03): 1-15
- [4] Rozkwitalska M. Social Learning for Energy Transition—A Literature Review. *Energies*. 2021; 14(24):8531. <https://doi.org/10.3390/en14248531>
- [5] Ping Huang, Linda Westman, Vanesa Castán Broto, A 'correlative' turn for transition studies on China, *Environmental Innovation and Societal Transitions*, 10.1016/j.eist.2021.09.017, (2021).
- [6] Guo Yu, Xuefeng Jiang, Jiaquan Dai, Lining wang&Tianze Peng.(2021). Some thoughts on China's energy development and energy security under the "dual carbon" goal. *International Petroleum Economics* (11),1-8.
- [7] Xiaoyan Meng, Xiaoping Xiong&Yi Wang.(2022). Constructing a Circular economy System for "double carbon" : Opportunities, Challenges and Countermeasures. *Environmental Protection (Z1)*,51-54.doi:10.14026/j.cnki.0253-9705.2022.z1.013.
- [8] Xi Chen.(2021). Has China's international economic cycle achieved "double carbon" goal? -- Based on the analysis of influencing factors and theoretical conditions. *Journal of Yangzhou University (Humanities and Social Sciences Edition)*(06),70-84. doi:10.19411/j.cnki.1007-7030.2021.06.007.
- [9] Bouman, T., Verschoor, M., Albers, C. J., Böhm, G., Fisher, S. D., Poortinga, W., ... & Steg, L. (2020). When worry about climate change leads to climate action: How values, worry and personal responsibility relate to various climate actions. *Global Environmental Change*, 62, 102061.