



# CHINA DUAL-CONTROL IMPACT SUMMARY

Prepared by

**HCA Consulting China**

September 29, 2021

HCA Consulting China  
Room 203, Building A  
Gao He Lan Feng Building  
98 Dong San Huan Nan Lu  
Beijing, 100021, China

[www.hcacchina.com](http://www.hcacchina.com)



# TABLE OF CONTENTS

**THE CONCEPT OF "DUAL-CONTROL" OF TOTAL ENERGY CONSUMPTION AND INTENSITY PROPOSED AND ITS TARGET ..... 3**

- 1. Key actions on total energy consumption and intensity of the "Dual-Control" ..... 4
- 2. Carbon peak and carbon neutral concepts and related policies ..... 5
- 3. 2021 Program to Improve the Dual-Control of Energy Consumption Intensity ..... 5
- 4. "14th Five-Year Plan" target: 13.5% reduction in energy consumption per unit of GDP ..... 6
- 5. Specific initiatives to Improve the Dual-Control Degree Program For Energy Consumption Intensity ..... 8
- 6. In August 2021 Carbon Emission Statistics and Accounting Working Group was established..... 10

**AREAS AFFECTED BY THE "DUAL-CONTROL" ..... 11**

- 1. Completion of Dual-Control targets for energy consumption by region in the first half of 2021 ..... 11
- 2. Administrative control ..... 16
- 3. Local policies and initiatives ..... 16
- 4. Reasons for power and production restrictions ..... 20
- 5. Comprehensive Treatment of Air Pollution in Key Regions in Autumn and Winter 2021-2022 ..... 23
- 6. The impact of Dual-Control of energy consumption on commodities ..... 25
- 7. "Dual-Control" on the price impact ..... 25

**THE CHEMICAL INDUSTRY IN THE CONTEXT OF CARBON NEUTRALITY ..... 27**

- 1. China's Carbon Emissions Policy and Development Plan ..... 27
- 2. Energy consumption in the context of Dual-Control, industrial restructuring is imperative ..... 27



## THE CONCEPT OF "DUAL-CONTROL" OF TOTAL ENERGY CONSUMPTION AND INTENSITY PROPOSED AND ITS TARGET

At the end of October 2015, the Fifth Plenary Session of the 18th Central Committee of the Communist Party of China proposed the implementation of the "Dual-Control" action on total energy consumption and intensity.

Energy consumption intensity: energy consumption per unit of GDP; Total energy consumption: energy consumption cap.

The main purpose of the "Dual-Control" action on total energy consumption and intensity is to improve energy efficiency, guide regions to deal with the relationship between "Dual-Control" of energy consumption and economic and social development, force a change in the mode of economic development, promote continuous optimization and upgrading of industrial structure, and achieve high-quality development.

During the "13th Five-Year Plan" (2015-2020) period, the country implement the "Dual-Control" action on total energy consumption and intensity, clearly requiring that by 2020, energy consumption per unit of GDP will be reduced by 15% compared to 2015, and total energy consumption will be controlled to within 5 billion tons of standard coal.

History Year	Related Planning	Effect
2006-2010	National "Eleventh Five-Year Plan" made the reduction of energy consumption per unit of GDP a binding indicator	From 2006 to 2015, China's energy consumption per unit of GDP decreased by 34%, saving 1.57 billion tons of standard coal, equivalent to 3.58 billion tons less CO <sub>2</sub> emissions.
2011-2015	The National 12th Five-Year Plan, while making the reduction of energy consumption per unit of GDP a binding indicator, put forward the requirement of reasonable control of total energy consumption	In terms of the dependence of China's economic growth on energy consumption during the two five-year planning periods, the average annual growth rate of energy consumption in the Eleventh Five-Year Plan was 6.7%, which supported an average annual growth rate of
2014	The General Office of the State Council issued the "2014-2015	11.3% of GDP. The average annual growth rate of energy consumption in the Twelfth Five-Year

History Year	Related Planning	Effect
	Action Plan for Energy Conservation and Low Carbon Development", allocating the 2014-2015 incremental energy consumption (growth rate) control target to each region	Plan was 3.6%, which supported an average annual growth rate of 7.9% of GDP. The energy consumption elasticity coefficient dropped from 0.59 in the Eleventh Five-Year Plan to 0.46 in the Twelfth Five-Year Plan.

## 1. KEY ACTIONS ON TOTAL ENERGY CONSUMPTION AND INTENSITY OF THE "DUAL-CONTROL"

"During the 13th Five-Year Plan period, in order to force a change in the development mode and accelerate the construction of ecological civilization, China has established a Dual-Control system for energy consumption, setting targets for reducing energy consumption intensity and total energy consumption nationwide, and allocating the targets into regions for strict assessment. With the joint efforts of all regions and government departments, the Dual-Control of energy consumption has achieved significant results. The national energy consumption intensity has continued to drop significantly over the past five years, and the growth rate of total energy consumption has dropped significantly compared to the Eleventh and Twelfth Five-Year Plans, supporting economic and social development. At the same time, it has played an important role in promoting high-quality development, ensuring energy security, improving ecological and environmental quality, and addressing climate change.

During the "Thirteenth Five-Year Plan" period, the country took the following measures in the "Dual-Control" of energy consumption.

- Implementing target responsibilities
  - Allocate the national "Dual-Control" target to the regions, major industries and key energy-using units, and strengthen the evaluation of target responsibility assessment
  - Each region according to the state's task set the annual work objectives and allocation of implementation at all levels.
- Optimizing industrial and energy structure
  - Deepen the integration of manufacturing and internet development, support the transformation and upgrading of key industries, and vigorously eliminate backward production capacity
  - Accelerate the development and growth of strategic new industries

- Promote the optimization of energy structure, reduce the proportion of coal consumption, and increase the proportion of non-fossil energy.
- Strengthening energy conservation in key areas
  - Implement industrial energy efficiency to catch up with the action to strengthen energy consumption control in high-energy-consuming industries
  - Vigorously promote building energy efficiency and the development of green buildings
  - Accelerate the construction of a comprehensive transport system, focusing on improving the energy efficiency of transport means
  - Strengthen energy conservation in public institutions, reduce energy consumption per unit of floor space and per capita energy consumption
  - Strengthen the energy-saving management of key energy-using units, and carry out key energy-using units "100 million" action.
- Implementing of energy-saving key projects
  - Organize and implement key energy conservation projects such as comprehensive improvement of energy conservation and environmental protection of coal-fired boilers, energy efficiency improvement of motor systems, waste heat warming, green lighting, demonstration of industrialization of energy-saving technologies and equipment, optimization of energy systems, coal consumption reduction and replacement, comprehensive energy efficiency improvement of key energy-using units, promotion of contract energy management, energy-saving upgrading and transformation of urbanization.

## 2. CARBON PEAK AND CARBON NEUTRAL CONCEPTS AND RELATED POLICIES

China first explicitly stated its goal of reaching carbon peak and carbon neutrality in September 2020 at the 75th session of the UN General Assembly. China announced that it would adopt stronger policies and measures and pledged to strive to carbon peak by 2030, to reduce CO<sub>2</sub> emissions per unit of GDP by 60-65% in 2030 compared to 2005, and to achieve the ambitious goal of carbon neutrality by 2060.

## 3. 2021 PROGRAM TO IMPROVE THE DUAL-CONTROL OF ENERGY CONSUMPTION INTENSITY

On September 18, 2021, the National Development and Reform Commission (NDRC) issued the "Program for Improving the Dual-Control of Energy Consumption Intensity and Total Volume", which is an important institutional document for guiding energy conservation and consumption reduction and promoting high-quality development in the current and future period, and is important for ensuring the completion of the "14th Five-Year Plan" energy conservation constraint targets and promoting the achievement of the carbon peak and carbon neutrality.

Benchmarking with the 14th Five-Year Plan of the National Economic and Social Development of the People's Republic of China and the Outline of Vision 2035, combined with the goal of carbon peak by 2030, the Program puts forward target requirements in three phases.

- The first stage is that by 2025, the Dual-Control system of energy consumption will be more sound, the allocation of energy resources will be more reasonable and the utilization efficiency will be significantly improved.
- The second stage is that by 2030, the Dual-Control system of energy consumption will be further improved, energy intensity will continue to drop significantly, total energy consumption will be reasonably controlled, and the energy structure will be more optimized.
- The third stage is to 2035, the optimal allocation of energy resources, comprehensive conservation system more mature and fixed, strong support for carbon emissions after the peak of a steady decline in the goal to achieve.

## 4. "14TH FIVE-YEAR PLAN" TARGET: 13.5% REDUCTION IN ENERGY CONSUMPTION PER UNIT OF GDP

The Government Work Report in 2021 included "Reducing Energy Consumption Per Unit of GDP by about 3%" as a major development target for 2021 and proposed a 13.5% reduction in the overall target for the 14th Five-Year Plan period (2021-2025).

The combination of energy consumption intensity ("energy consumption per unit of GDP") and total energy consumption ("energy consumption cap") has become the key driver for achieving the "30/60" target.

China's energy consumption per unit of gross domestic product (GDP) has been reduced by a cumulative 24.6% since 2012, equivalent to a reduction in energy consumption of 1.27 billion tons of standard coal. From 2012 to 2019, China has supported an average annual growth of 7% in the national economy with an average annual growth of 2.8% in energy consumption and a significant improvement in energy use efficiency.

Preliminary research predicts that in order to achieve the goal of "reducing energy consumption per unit of GDP by 13.5%", China will support a GDP growth rate of about 5% with an average annual energy consumption growth of about 2% during the 14th Five-Year Plan period, with the economic and social development will further reduce the dependence on energy consumption. Reducing energy consumption per unit of GDP is also a practical need to promote clean and low-carbon energy transition and force industrial restructuring.

According to the preliminary estimation of the National Energy Administration, during the "14th Five-Year Plan" period, for each 1 percentage point reduction on energy consumption per unit of GDP, more than 0.5 billion tons of standard coal per year and correspondingly more than 100 million tons of CO<sub>2</sub> can be reduced. The corresponding energy consumption intensity of the incremental part of the economy is only about 1/3 of the current one.

On the other hand, the proportion of secondary industry (manufacturing industry) in China's economic structure is relatively high at present. The target of reducing energy consumption per unit of GDP will push the proportion of secondary industry down and the proportion of tertiary industry (service industry) up. This target will promote the transformation and upgrading of traditional high-energy-consuming industries such as iron and steel, non-ferrous metals, building materials and chemicals, and will also help to increase the proportion of low-energy-consuming industries such as high-tech manufacturing and equipment manufacturing.

Despite the huge potential, it is also important to see the completion of the reduction of energy consumption per unit of GDP by 13.5% still facing certain difficulties and challenges.

Firstly, China is in the stage of rapid development of industrialization and urbanization, and energy consumption in residential life and transportation continues to grow, and energy consumption will maintain a rigid growth trend; Secondly, it is more difficult to explore energy-saving potential as energy-saving technologies and projects with low cost and quick results have been commonly applied and implemented. Some of the latest technologies require large investment with limited applications, and the energy-saving potential of enterprises has been narrowed; In

addition, the proportion of secondary industries including high-energy-consuming industries in China's economic structure is high, plus the energy-use structure is still dominated by coal with low end-use efficiency.

In the process of reducing energy consumption per unit of GDP, there is no doubt that the focus will be in controlling fossil energy consumption and accelerating the development of non-fossil energy. The outline of the 14th Five-Year Plan also proposes that the proportion of non-fossil energy in total energy consumption should be increased to about 20%.

The National Energy Administration said that during the "14th Five-Year Plan" period, it will reasonably control the total energy consumption and appropriately increase management flexibility, differentiate and allocate the "Dual-Control" targets for energy consumption in each region, and strengthen the implementation of target responsibilities; at the same time, improve the paid use of energy rights and trading system, accelerate the construction of a national energy rights trading market.

## 5. SPECIFIC INITIATIVES TO IMPROVE THE DUAL-CONTROL

### DEGREE PROGRAM FOR ENERGY CONSUMPTION INTENSITY

In the practice of exploring Dual-Control of energy consumption in the 13th Five-Year Plan, the state allocated the Dual-Control targets of energy consumption to each region at the beginning of the five-year plan, but with the time development, the economic development of each region changed, and the progress of the total energy consumption target also diverged, especially some regions with faster economic growth and higher quality of development had difficulties in completing the total energy consumption target.

The Program proposes measures to increase the flexibility of total energy consumption management in five areas.

1. Energy consumption coordination for major national projects.
  - In recent years, according to the industrial development and other needs, the country has laid out a number of major projects related to the people's livelihood and development of the future, and the related projects have a huge amount of energy consumption, which has become a difficult point for the completion of the



Dual-Control target of energy consumption in the region.

- The Program stipulates that for major national projects approved by the Party Central Committee and the State Council and meeting the relevant conditions, the energy consumption of the project will be reduced to a certain extent in the Dual-Control assessment in accordance with the principle of "central and local sharing".
2. Strict control of high energy consumption and high emissions projects.
    - During the "14th Five-Year Plan" period, the number of "two-high" projects to be put into production in each region is large, and the amount of new energy consumption is large, which seriously affects the completion of the Dual-Control target of energy consumption.
    - The state urges provinces (autonomous regions and municipalities) to establish a list of "two-high" projects under construction, to be built and planned, to deal separately. Using energy consumption of 50,000 tons of standard coal as the boundary, the state and local governments strengthen the project management. By resolutely curbing the disorder development of "two-high" projects, forcing the local transformation, adjusting the structure, freeing up space for energy consumption, which is also an important means to increase the flexibility of the management of total energy consumption.
  3. Encourage regions to increase renewable energy consumption.
    - In 2030, China's non-fossil energy will account for about 25% of primary energy consumption, and the total installed capacity of wind and solar power will reach more than 1.2 billion kilowatts.
    - In the assessment of total local energy consumption, the excess consumption of renewable energy power in the region can enjoy energy consumption deductions.
  4. Encourage regions to exceed their energy intensity reduction targets.
    - The reduction of energy consumption intensity to meet the incentive target set by the state, the total energy consumption target will be exempt from the assessment.
  5. Implement market-based trading of energy-use indicators.
    - In the process of improving the Dual-Control of energy consumption, improve the system of paid use and trading of energy use rights, accelerate the construction of a national energy use rights trading market, establish a cross-regional trading mechanism for total energy consumption indicators, and promote the flow and concentration of energy elements to high-quality projects, enterprises, industries and regions with good economic development conditions.

## 6. IN AUGUST 2021 CARBON EMISSION STATISTICS AND ACCOUNTING WORKING GROUP WAS ESTABLISHED

The National Development and Reform Commission (NDRC) had a news release on August 31, saying that the Office of the Leading Group for Carbon Dumping and Carbon Neutral Work has set up a working group on carbon emission statistics and accounting, which is responsible for organizing and coordinating the national and regional carbon emission statistics and accounting for various industries.

The Working Group on Statistical Accounting is jointly headed by the Department of Resource Conservation and Environmental Protection of the National Development and Reform Commission and the Department of Energy Statistics of the National Bureau of Statistics. Members include both the Ministry of Science and Technology, Ministry of Industry and Information Technology, Ministry of Finance, etc., but also the People's Bank of China, the General Administration of Market Regulation and other relevant departments, as well as China Coal Industry Association, China Iron and Steel Industry Association and other industry associations.

Accounting is a series of activities to collect, count, record, and calculate and add up all emission-related data for carbon emission related parameters in accordance with the monitoring plan. The basis of carbon accounting is monitoring of carbon emissions, i.e. Carbon Footprint and Carbon Emissions, throughout the entire chain of energy production, transmission and use.

Although China has initially established carbon emission accounting methods and carried out inventory accounting for five years, there are still practical problems such as imperfect working mechanism, relatively backward methodological system, large deviations in statistical bases of energy consumption and carbon emission factors of some fossil energy sources, and lack of annual continuity of carbon emission accounting results, which affect the authority of the national released GHG emission inventory accounting data.

## AREAS AFFECTED BY THE "DUAL-CONTROL"

### 1. COMPLETION OF DUAL-CONTROL TARGETS FOR ENERGY

#### CONSUMPTION BY REGION IN THE FIRST HALF OF 2021

Early warnings include two aspects, each level one red, level two yellow, level three green warning

- Alert A: **Energy intensity reduction progress target warning level**
- Alert B: **Total energy consumption control target warning level**
  
- The National Development and Reform Commission's "Dual-Control" assessment of energy consumption implements a "red, yellow and green" light warning mechanism.
  - Red light is a level 1 warning, indicating that the situation is very serious, meaning that the progress target has not been completed and the gap with the target value is greater than 10%.
  - Yellow light for the second level of warning, indicating that the situation is more serious, referring to the failure to complete the progress target, and the gap with the target value of 10% or less.
  - The green light is the third level of warning, indicating the completion of the Dual-Control progress target areas, indicating that the progress is generally smooth.

Region	Alert A	Alert B	Energy consumption reduction target per unit of GDP in 2021 (compared to 2020)	Remarks
Qinghai	Red	Red	3.0%	The incremental energy consumption in 2021 is controlled at about <b>1.17 million tons of standard coal</b>
Ningxia	Red	Red	3.3%	In 2021, the region's incremental energy consumption will be controlled within <b>2.6 million tons of standard coal</b>

Region	Alert A	Alert B	Energy consumption reduction target per unit of GDP in 2021 (compared to 2020)	Remarks
Guangxi	Red	Red	According to the national target	2021, to complete the national energy saving and carbon reduction targets
Guangdong	Red	Red	3.1%	Total energy consumption in 2021 will be controlled at about 16.1 million tons of standard coal
Fujian	Red	Red	According to the national target	
Xinjiang	Red	Yellow	~3%	
Yunnan	Red	Red	According to the national target	On the basis of ensuring the completion of the crude steel production reduction target task in 2021, adjust the province's steel enterprises production timing, September 2021 scheduled production adjustment (adjustment ratio shall not be less than 30% of the monthly assessment target task) to November-December production
Shaanxi	Red	Yellow	~3%	
Jiangsu	Red	Red	~3%	In 2021, the ecological and environmental quality will continue to improve, and the emission of major pollutants will complete the target tasks set by the state
Zhejiang	Yellow	Yellow	3.2%	By 2025, the province's energy consumption per unit of GDP will be reduced by 15%, with an average annual decline of 3.2%. Total energy consumption of 269.1 million tons of standard coal, new energy consumption of 22.5 million tons of

Region	Alert A	Alert B	Energy consumption reduction target per unit of GDP in 2021 (compared to 2020)	Remarks
	Yellow	Yellow		standard coal (all excluding the national energy consumption of a single project); elimination of backward excess capacity to free up the stock of energy use of about 8 million tons of standard coal
Henan	Yellow	Green	Within 3%	By 2025, energy consumption per unit of GDP will be reduced by more than 15%. 2021 January-June, the province's energy consumption per unit of GDP decline rate and the annual decline of more than 3% of the target has a large gap, the energy-saving work situation is grim
Gansu	Yellow	Green	See Remarks	By 2025, energy consumption per unit of gross regional product will drop 13% compared to 2020, and carbon dioxide emissions per unit of GDP will be reduced to meet national requirements
Sichuan	Yellow	Yellow	According to the national target	
Anhui	Yellow	Yellow	According to the national target	
Guizhou	Yellow	Green	According to the national target	
Shanxi	Yellow	Green	~3.5%	
Heilongjiang	Yellow	Green	~3%	By 2025, energy consumption and CO2 emissions per unit of GDP will be reduced by 13.5% and 18% respectively

Region	Alert A	Alert B	Energy consumption reduction target per unit of GDP in 2021 (compared to 2020)	Remarks
Liaoning	Yellow	Green	Reduced by more than 3%	
Jiangxi	Yellow	Green	~3%	
Shanghai	Green	Green	~1.5%	In 2021, the comprehensive energy consumption per unit of gross domestic product (GDP) and carbon dioxide emissions per unit of GDP will decrease by about 1.5% compared with the previous year; the incremental energy consumption of the city will be controlled at about 4.5 million tons of standard coal; the incremental carbon dioxide emissions will be controlled at about 9 million tons; and the total coal consumption will be controlled at less than 42 million tons.
Chongqing	Green	Green	~3.2% (2021 1H)	
Beijing	Green	Green	According to the national target	Energy consumption per unit of gross regional product continues to decline, and the goal of controlling total carbon emissions and reducing the intensity of carbon dioxide emissions per unit of gross regional product meets national requirements
Tianjin	Green	Green	~3.7%	In 2021, the city's total energy consumption will be controlled within 83 million tons of standard coal, and in the first half of 2021, the city's energy consumption intensity will drop by 3.9% year-on-year, higher than the annual target of 3.7%, ranking first among municipalities in terms of reduction

Region	Alert A	Alert B	Energy consumption reduction target per unit of GDP in 2021 (compared to 2020)	Remarks
Hunan	Green	Green	~3%	
Shandong	Green	Green	3.5%	In 2021, the total energy consumption of cities will remain unchanged and controlled at <b>418 million</b> tons of standard coal
Jilin	Green	Green	~3%	
Hainan	Green	Green	Exceeded the target set by the state	
Hubei	Green	Red	~2.5%	Major pollutant emissions continue to decline
Hebei	Green	Green	3.0%	By 2025, energy consumption per unit of GDP will be about <b>15%</b> lower than in 2020
Inner Mongolia	Green	Green	3.0%	In 2021, the region's incremental energy consumption will be controlled within <b>5 million</b> tons of standard coal

The National Development and Reform Commission (NDRC) stressed that for provinces (regions) with energy consumption intensity is not reduced but increased (except for major projects in the national planning layout), the energy conservation review of "two-high" projects will be suspended since August 12, 2021, and the submission of "two-high" projects to National Development and Reform Commission will be suspended since September 2021.

In a press conference held by the National Development and Reform Commission on August 17, 2021, the spokesman indicated that since this year, all regions and departments actively promote the work related to carbon reduction and has achieved certain results. However, in some places, the work has "deviation" problem, and corrections should be made. The "campaign-style" carbon reduction has resulted detachment from reality. Some

regions, industries and companies proposed reduction goals beyond the stage of development; some regions engaged "across the board" shutdown; some financial institutions took abrupt actions against coal and electricity projects such as the withdrawal of loans.

## 2. ADMINISTRATIVE CONTROL

Energy consumption "Dual-Control" mechanism is a strict environmental regulation policy. From retrospect, once a local assessment performance warning appears, the region would use administrative means to control and strive to complete the annual target. This "warning-rectification-compliance" trigger mechanism is reinforced by the concept of "ecological civilization" and the "30/60" target.

In general, the government issued Dual-Control performance initiatives would cover specific details including for the industry, product (technology process, product quality level, etc.), capacity scale, phase-out or replacement criteria, completion time and other aspects. In short, it is to review and control the high-energy-consuming projects, and to shut down those that do not meet the energy consumption requirements; and to raise the approval threshold for new high-energy-consuming projects, making it difficult for high-energy-consuming projects to land in the short term.

## 3. LOCAL POLICIES AND INITIATIVES

For the first half of the "Dual-Control" of Alert A and Alert B regions, regional governments has implanted corresponding control policies in the hope of reaching the annual target.

The following are a few of the regions that first proposed production (power) restrictions in mid to late September

### 1) Zhejiang Province

- Zhejiang Province currently has 49 chemical parks (agglomerations). As of 2020, there are more than 5,000 chemical industry enterprises in Zhejiang Province, with hundreds of product categories.



- Some the key energy-using enterprises are required to reduce the energy load or to shut down production, and this may continue until September 30.
  - According to the province's emergency meeting on September 20, the province is required to immediately implement electricity load reduction on energy-using enterprises. All regions should ensure the shutdown of key energy-using enterprises until the end of September
  - By 11 am of September 21, key energy-using enterprises will be shut down by power companies if voluntarily shut down not taken place. A total of 161 enterprises in Shaoxing Keqiao area, all printing and dyeing, chemical fiber industry enterprises, will be shutdown, accounted for more than half capacity of Zhejiang Province, one-third capacity of the country.

## 2) Jiangsu Province

- In late August, Jiangsu issued a "Resolute Curb Two-High Project Development Notice," requiring that since August 13, the mentioned nine municipalities suspend the review of "two-high" projects (except for the national planning layout of major projects)
- At present, among 37 cement clinker kilns in Jiangsu, 14 of them were shutdown. At present, many cement companies in Jiangsu are limiting their production by about 30%-50%.
- Some soda ash enterprises in Jiangsu have already cut production in September, and the utilization rate may drop by 20%. The whole Jiangsu soda ash production capacity accounts for 17.4% of the total domestic production capacity.
- Nantong, Jiangsu, as the hub of weaving industry, a large number of weaving enterprises shut down from September 10 to October 1.
- Following the earliest power restrictions in Nantong in early September, enterprises in Xuzhou, Taizhou, Suzhou and many other places have been notified of production restrictions, and 2,000 chemical plants will be affected by the temporary shutdown.
- Printing and dyeing agglomeration areas received shutdown notice, more than 1,000 enterprises are requested to engage "two days open and two days close" practice.

## 3) Shandong Province

- Due to coal supply shortage, power restriction measures to start.
- On September 12, the industry area of Zibo City started 16:00-20:00 daily power restrictions and changed to 7:30 a.m. to 24:00 since September 18.

## 4) Guangdong Province

- Guangdong Power Grid said that since September 16, the implementation of the "open two day and stop five days" power program. Power security load which is 15% lower than the total load will be provided from 7:00 to 23:00 on Sunday, Monday, Tuesday, Wednesday and Thursday each week.

## 5) Shaanxi Province

- Ensure the completion of the annual energy consumption Dual-Control target tasks, September energy consumption control will be within 1.4 million tons of standard coal.
  - Among the 194 key target enterprises, 4 enterprises were suppressed production 60%, nearly 70% of the enterprises were limited to 50% of production.
  - The newly built "two-high projects" are not allowed put into production
    - The new "two-high" projects have been put into operation, are required to cut 60% of production
    - Previous "two-high" enterprises need to ensure 50% cut in September
- Regulation period: September 2021 - December 2021.

## 6) Yunnan Province

- Yellow phosphorus production capacity accounted for more than 40% of the national proportion, silicon production capacity accounted for 20% of the country.
- The average monthly production of industrial silicon will cut by 90% from September to December on the base of the August production.
- Ensure that the average monthly production of green aluminum is not higher than the production in August from September to December.
- The average monthly production of yellow phosphorous will cut by 90% from September to December on the base of the August production.
- Fertilizer manufacturing, basic chemical raw materials manufacturing, coal processing, ferroalloy refining and other four industries could have higher energy consumption than average industry, and those with 1-2 times higher than the average are limited production by 50%, and those higher than the average level of 2 times are required to cut 90% production.

## 7) Qinghai Province

- On August 20, some of the electrolytic aluminum enterprises in Qinghai Province received the power restriction warning notice from the State Grid Xining, and the specific power restriction time and power restriction plan has not yet been notified

## 8) Xinjiang Uygur Autonomous Region

- Specific power restriction time and power restriction plan has not yet been notified

## 9) Inner Mongolia Autonomous Region

- As of August 2021, 417,000 tons/year of electrolytic aluminum production capacity has been shut down and no signs of resumption of production
- Inner Mongolia previously issued a document to strictly control the time of the enterprise power restrictions, and electricity prices should not up more than 10%.

## 10) Guizhou Province

- Guizhou Province issued warning on possible power shortage.

## 11) Guangxi Autonomous Region

- The electrolytic aluminum enterprises in the region are required to reduce the monthly electricity load by 35% from September on the basis of the average monthly electricity load from January to June for the whole period.
- High-energy-consuming enterprises such as alumina, steel and cement have also been given clear criteria for reducing production

## 12) Sichuan

- The governments officials in red alert regions, Guangyuan City, Ya'an City, Aba Prefecture, were called for warning
- Suspension of power in non-essential production, lighting, and office has taken place

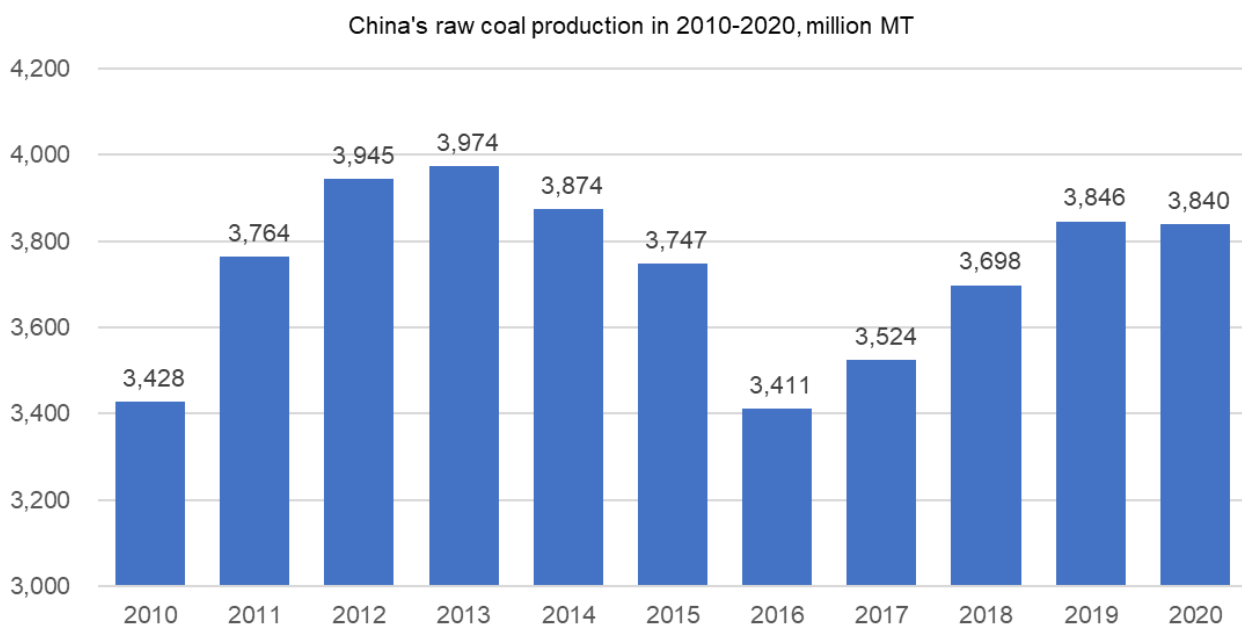
## 13) Other areas.

- Henan: Some companies are cut down power supply for more than three weeks.
- Chongqing: Some factories were restricted and shut down for power supply in early August.
- Ningxia: High energy-consuming enterprises are required to stop production for one month.
- Anhui: 2.5 million kilowatts gap, decided to start the province's power saving program from September 22.

## 4. REASONS FOR POWER AND PRODUCTION RESTRICTIONS

### 1) Key factors contributing to the plant shutdown

- Some provinces failed to meet the Dual-Control of energy consumption target in the first half of the year, and focused on limiting production in order to complete the Q3 target, which brought impact on short-term production
  - **Energy Consumption Dual-Control Target has short-term production impact, particularly in September. The Dual-Control policy may continue to the end of the year in some sectors**
- Some provinces have to adopt new power supply policy due to insufficient power supply
- The power gap caused by the lack of coal supply has been suppressing production since July and may be difficult to ease during the year
  - National coal production is barely increased compared to 2019, while power generation is on the rise and coal inventories at all power plants are significantly down.
- The reasons for the lack of coal are as follows.
  - The shutdown of a number of small coal mines and open-pit coal mines without investment on large coal mines has tight coal supply when the demand continues to rise
  - The export in 2021 continues to rise, resulting higher demand for electricity consumption, while power plants have no incentives to increase power output due to high coal price and carbon reduction requirement.
  - In 2021, China also limits its coal imports from Australia, resulting the price of imported coal increased significantly.



## 2) Why not expand the supply of coal, instead of limiting electricity?

The key components for manufacturing industry are raw materials and power which demand has been increasing

- The total amount of electricity generated in 2021 is not low,
  - In the first half of the year, China's total power generation was 3.8 trillion kilowatt hours, twice as much as the United States.
- China's foreign trade is growing extremely fast this year.
  - In the first eight months, the total value of China's foreign trade imports and exports was RMB 24.78 trillion, up 23.7% year-on-year and 22.8% over the same period in 2019.
  - With increasing export, the demand of raw materials also increases
- The demand for power generation is high, however, the cost of power generation is also increasing.
  - Since this year, the domestic coal supply and demand continued to rise, and coal prices rose sharply.
    - The unit price of standard coal rose 50.5% year-on-year, while the price of electricity remained basically unchanged
    - The power plant will lose more than RMB 0.1 for every unit of electricity generated, and RMB 10 million for 100 million KWH, or more than RMB 100 million loss per month.
  - The price of electricity is strictly regulated, and it is difficult for power plants to balance their costs, so some plants would rather generate less or even no electricity.
- The high demand from incremental orders from overseas is not sustainable.
  - The increased domestic capacity due to the incremental orders will be the last straw that crushes a large number of SMEs in the future as the orders are temporary
  - Power shortage will regulate the capacity expansion, and protect the downstream when the future order crisis comes.
- Achieving the requirement of completing industrial transformation is urgent.
  - China wants to implement backward production capacity phase-out in addition to achieving the 30/60 goal and environmental protection
  - China has been moving towards this goal in recent years, only since last year, due to the epidemic, the global manufacturing industry has stagnated and a large number of manufacturing orders have returned to the mainland, and the demand for high energy consumption products in China increased.
  - In the short term, in order to accomplish the goals set by China's industrial transformation, China cannot simply expand the supply of coal, and power and production restrictions are the main path for traditional industries to achieve the Dual-Control targets for energy consumption.
- Production restrictions enhance the position and bargaining power of China's manufacturing industry in the global industrial chain.
  - The problem of the manufacturing industry today is that the pricing power of raw materials is controlled by international capital, which has been soaring, while the pricing power of finished products is jeopardized by

the internal capacity expansion and price competition. The current domestic enterprises engage price competition which is not conducive to the overall competitiveness of China.

- Preventing inflationary risks cannot be ignored.
  - The United States overprints a lot of dollars, and those dollars don't just disappear into thin air.
  - China's manufactured goods, sold to the United States, are exchanged for dollars. How many dollars Chinese companies earn back from the U.S., the Chinese central bank has to exchange for the equivalent amount of renminbi.
  - The result is that there are more and more local currency. Money is overheated on the supply side can boost production, when transferred to the consumption side, it is extremely easy to trigger price increases and inflation. The control of energy consumption, not only the requirements of carbon neutrality, it is also the intentions of the state!

### 3) "Assessment of "Dual-Control of energy consumption"

Since this year, in order to achieve the 30/60 goal, the assessment of "Dual-Control of Energy Consumption" and "two-high" control has been relatively strict, and the assessment results will be used as the basis for the work evaluation of the local leadership team.

Some areas still face "two-high" project disorder expansion and increase of total energy consumption. In the first three quarters, local governments have over used energy consumption indicators. For example, a lot of high energy consumption projects, such as chemical fiber, data centers, etc., were approved in 2020, and many projects are put into production in first half of 2021, resulting in the total energy consumption set to rise.

Entering the fourth quarter, in less than four months from the end of the year "big test", the "named regions" one after another took measures to improve energy consumption to avoid exceeding the energy consumption quota. Jiangsu, Guangdong, Zhejiang and other major chemical provinces have struck hard, with thousands of enterprises taking measures such as production suspensions and power cutdown, catching local enterprises off guard.

### 4) Impact on traditional industries

Production restrictions have now become the most direct and effective way to control energy consumption around China. However, for many industries, the changes in the economic situation, the recurrence of overseas epidemics and the intricate trend of commodities this year have left various industries facing diverse problems, and the Dual-Control of energy consumption has once again caused shocks by production restrictions.

**For the petrochemical industry, although in previous years, there have been power restrictions at the peak of electricity consumption, but "open two stop five", "90% of production restrictions", "thousands of enterprises to stop production" is the case unprecedented. If power restrictions continue, production capacity is certainly not able to keep up with demand, making the demand side of the supply more tight.**

**For the high energy consumption of the chemical industry, the overall chemical prices are expected to continue to rise in the fourth quarter and hit the high point. Companies will also face double pressure of price increase and shortage of goods.**

## 5. COMPREHENSIVE TREATMENT OF AIR POLLUTION IN KEY REGIONS IN AUTUMN AND WINTER 2021-2022

On September 14, 2021, the Ministry of Ecology and Environment (MOE) issued a letter to solicit comments on the "Comprehensive Treatment of Air Pollution in Key Regions in Autumn and Winter 2021-2022 (Draft for Comments)".

Considering the environmental conditions of the air around the autumn and winter and the impact of regional transmission, the implementation of the program will be in Beijing, Tianjin, Hebei and surrounding areas, "2 + 26" cities. Specifically.

- Beijing
- Tianjin
- Shijiazhuang, Tangshan, Qinhuangdao, Handan, Xingtai, Baoding, Zhangjiakou, Chengde, Cangzhou, Langfang, Hengshui City, Xiongan New Area, Dingzhou, Xinji City, Hebei Province
- Taiyuan, Yangquan, Changzhi, Jincheng, Datong, Shuozhou, Jinzhong, Yuncheng, Xinzhou, Linfen, Lvliang in Shanxi Province

- Jinan, Zibo, Zaozhuang, Dongying, Weifang, Jining, Tai'an, Rizhao, Linyi, Dezhou, Liaocheng, Binzhou, Heze City, Shandong Province
- Zhengzhou, Kaifeng, Luoyang, Pingdingshan, Anyang, Hebi, Xinxiang, Jiaozuo, Puyang, Xuchang, Luohe, Sanmenxia, Nanyang, Shangqiu, Xinyang, Zhoukou, Zhumadian, Jiyuan City, Henan Province
- Xi'an, Tongchuan, Baoji, Xianyang, Weinan City (including Hancheng) and Yangling Demonstration Zone, Shaanxi Province

The impact of the Program on the industrial sector.

- The program proposes to resolutely curb the "two-high" project disorder development
  - Petrochemical, chemical, coal chemical, coking, iron and steel, building materials, non-ferrous, coal power and other industries are the focus. A review of proposed, under construction and planned "two-high" projects will be monitored
  - Strictly implement energy consumption "Dual-Control", capacity replacement, regional reduction of pollutants, coal reduction and other requirements.
  - Investigate the illegal launch and unapproved projects according to the law and punish illegal and non-compliant enterprises.
  
- Steel Industry
  - Strictly prohibit new steel smelting capacity. In addition to relocation, capacity replacement, no approval of new capacity projects
  - Before the commissioning of new steel projects, the capacity used for replacement needs to be withdrawn simultaneously
  - Strictly implement the requirements of crude steel production reduction in 2021
  
- Electricity price
  - Increase the price policy support, and natural gas gate prices do not rise
  - Further expand the proportion of electricity price fluctuations in the valley of the heating period
  - Encourage the implementation of differential price policies for restricted and eliminated enterprises, as well as industrial enterprises that meet the ultra-low emission requirements. Products affected by the "Dual-Control"



## 6. THE IMPACT OF DUAL-CONTROL OF ENERGY CONSUMPTION ON COMMODITIES

The Dual-Control policy mainly targets high energy consumption industries, and there are six main categories of high energy consumption industries that need attention, namely: chemical raw materials and chemical products manufacturing, ferrous metal smelting and rolling processing industry, non-ferrous metal smelting and rolling processing industry, non-metallic mineral products industry, petroleum processing and coking and nuclear fuel processing industry, and electricity and heat production and supply industry.

## 7. "DUAL-CONTROL" ON THE PRICE IMPACT

**After the Dual-Control policy is introduced, the supply side has been suppressed, and most industrial products raised prices. The magnitude of price increases depends on the specific product environment, and those experienced power restriction previously will have even higher price increase.**

**The impact on the downstream manufacturing industry, especially those with relatively weak bargaining power, e.g., home appliances, clothing, textiles, machinery manufacturing, automotive and other companies, is bound to increase production costs, and will be impacted in short-term and even medium and long-term.**

Basic chemical prices for the third week of September 2021.

Product	Early Week Price, RMB/MT	Weekend Price, RMB/MT	Weekly ups and downs, %	Year-on-year increase or decrease, %
Yellow phosphorus	34,500	60,000	73.91%	285.85%
Dichloromethane	4,240	6,650	56.84%	181.78%
Phosphoric acid	8,700	12,333	41.76%	154.30%
Trichloromethane	3,300	4,600	39.39%	151.37%
Caustic soda	653	895	37.16%	97.79%
Epichlorohydrin	15,867	20,333	28.15%	76.81%
R134a	26,167	32,167	22.93%	106.64%



Product	Early Week Price, RMB/MT	Weekend Price, RMB/MT	Weekly ups and downs, %	Year-on-year increase or decrease, %
Acetic acid	6,127	7,050	15.07%	176.11%
Acetic anhydride	9,863	11,150	13.05%	100.45%
Lithium hydroxide	148,000	163,000	10.14%	198.17%
Aniline	10,267	11,300	10.06%	137.06%
Silicone DMC	38,333	42,000	9.57%	142.31%
Ethyl acetate	8,450	9,100	7.69%	60.14%
Pure benzene	8,080	8,680	7.43%	156.05%
R22	23,000	24,667	7.25%	66.29%
Adipic acid	10,220	10,920	6.85%	66.46%
Hydrogenated benzene	7,970	8,490	6.52%	161.63%
Lithium carbonate	139,000	147,400	6.04%	278.92%
Phenol	9,420	9,960	5.73%	87.04%
Lithium iron phosphate	60,000	63,000	5.00%	70.27%

## THE CHEMICAL INDUSTRY IN THE CONTEXT OF CARBON NEUTRALITY

### 1. CHINA'S CARBON EMISSIONS POLICY AND DEVELOPMENT PLAN

In terms of total energy consumption, China has seen a gradual slowdown in the growth rate of total energy consumption in recent years. Total energy consumption reached 39,361 TWh in 2019, up 4% year-on-year. In terms of energy consumption structure, coal remains the main source of primary energy consumption in China. Energy consumption in China in 2019 was 4.87 billion tons of standard coal, up 3.3% year-on-year, with coal consumption accounting for 57.6% of total energy consumption, far exceeding the world average of 27%.

From the perspective of carbon emission structure, energy consumption and industrial process account for a relatively high proportion. In 2019, energy consumption process accounted for 76.8%, industrial process accounted for 15.2%, and agriculture accounted for 6.4%, of which carbon emissions from the energy sector again mainly originated from fossil fuels. In terms of the structure of carbon emissions from each segment, China's carbon emissions are mainly concentrated in electricity and industry, with electricity accounting for 44.64% of CO<sub>2</sub> emissions and industry accounting for 38.92%, which together account for more than 80% of total CO<sub>2</sub> emissions, with a relatively concentrated carbon emission structure.

Chemical raw materials and chemical products, petroleum processing and coking, chemical fiber, rubber products, plastic products carbon emissions were 193 million tons, 142 million tons, 3.43 million tons, 1.76 million tons and 1.76 million tons, a total of about 3.55% of carbon emissions accounted for a relatively low percentage.

### 2. ENERGY CONSUMPTION IN THE CONTEXT OF DUAL-CONTROL, INDUSTRIAL RESTRUCTURING IS IMPERATIVE

For the chemical industry, carbon neutrality makes industrial restructuring inevitable. From the supply side, the new production capacity of high-energy-consuming chemical will be strictly restricted, and the cost of coal energy will rise, thus pushing the industry to carry out technological innovation and improve the proportion of clean energy use. In the context of carbon neutrality, the concentration of the industry will be further enhanced. From the demand side, the cost of clean energy use will fall, technology investment will increase, and demand for renewable

energy such as wind power and photovoltaic will rise, ushering in a period of rapid development. The middle and downstream industries will usher in demand changes, and chemical materials with energy-saving and consumption-reducing effects, such as biodegradable plastics and biofuels, may usher in development opportunities.

The impact of carbon neutral policy on chemical products is mainly focused on the supply side. Along with the gradual implementation of the dual-control policy on energy consumption in various provinces and cities, the capacity of high-energy-consuming sub-sectors is subject to strict supply constraints, and the growth rate of capacity will gradually decline.

Among the most affected products are industrial silicon, yellow phosphorus, soda ash and other sub-industries. According to industrial energy consumption guidelines, industrial silicon, yellow phosphorus, spandex, ammonia, have higher industrial energy consumption, with industry access values of 2800kg of standard coal/ton, 2800kg of standard coal/ton, 1450kg of standard coal/ton, 1350kg/ton (coal) or 1100kg/ton (natural gas) respectively. In the future, these industries will be affected by the carbon emission control, and the expansion plan will be strictly limited, and the industry capacity will gradually fall back after reaching the peak.

By region, China's high-energy-consuming capacity distribution is more concentrated, and the western region's capacity is hit harder. China's Xinjiang region industrial silicon production capacity accounted for 33% of the total capacity. Inner Mongolia calcium carbide production capacity accounted for 36% of the total capacity, and calcium carbide PVC production capacity accounted for 22% of the total capacity.

Inner Mongolia, Xinjiang, Guizhou, Yunnan, Shandong and other places are large chemical energy-consuming provinces, which are more affected by the carbon neutral policy.

By industry, the coal chemical industry has a high carbon emission factor, which will be strictly limited. In 2020, coal to methanol accounts for the largest carbon emission, 52.8% in coal chemical industry, coal to olefin, coal to oil, coal to gas and coal to glycol all account for less than 25% each. In 2020, the coal chemical industry emitted 320 million tons of CO<sub>2</sub>, of which about 63.5% comes from process and 33% comes from fossil combustion. The carbon neutral policy will promote the coal chemical industry to improve the process flow, enhance the efficiency of resource utilization, and improve the refinement of the industry.