

"Fourteenth Five-Year Plan" for the  
development of raw materials  
industry

Ministry of  
Industry and  
Information

Technology  
Ministry of  
Science and  
Technology  
Ministry of  
Natural  
Resources

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The raw material industry is the foundation of the real economy and supports the development of the national economy

It is a basic industry and a key field to win international competitive advantage, and is the main force of industrial base reconstruction and the main battlefield of industrial green development. In order to implement the "People's Republic of national economic and social development of the fourteenth five-year plan and the outline of the 2035 vision", improve the quality and efficiency of the development of raw materials industry, the development of this plan.

## I. Development situation

### (I) Development foundation

The raw materials industry includes petrochemicals and chemicals, iron and steel, non-ferrous metals, building materials and other industries. Since the "Thirteenth Five-Year Plan", the transformation and upgrading of the raw materials industry has been effective, with steady growth in comprehensive strength and continued enhancement of international competitiveness. **Scale advantage has been newly enhanced.** In 2020, the added value of China's raw materials industry accounts for 27.4% of the industry above the scale, crude

The output of steel, refined copper, electrolytic aluminum,

methanol, urea, cement and flat glass has remained the first in the world for many years. The self-sufficiency rate of steel, aluminum and photovoltaic glass exceeds 98%, basically meeting the needs of the national economy and military defense industry. **Structural adjustment has made new progress.** Total supply and demand of industries with serious overcapacity

The balance was basically restored, the target of 150 million tons of steel production capacity was completed ahead of schedule, and the strict control of electrolytic aluminum and cement production capacity achieved obvious results. The industrial concentration of the top 10 cement enterprise groups reached 58%. Enterprise strength to accelerate the improvement, in 2020, China (excluding Hong Kong, Macao and Taiwan) shortlisted in the world's top 500 raw materials industry enterprises 34, accounting for the shortlisted enterprises

The number of 29.1%. **Innovation capacity has reached a new level.** R&D investment intensity from 2015

The number of new materials has increased from 0.76% in 2009 to about 0.9% in 2020. The main equipment of key enterprises has generally reached the international advanced level, and more than 170 national key laboratories and engineering (technology) research centers

and 26 national key platforms of new materials have been built. **Green Turn**



**The new look of the model.** The comprehensive energy consumption of key large and medium-sized enterprises per ton of steel is lower than that of 2015

The emissions of sulfur dioxide per ton of steel and carbon dioxide emissions per 10,000 yuan of industrial added value in the building materials industry decreased by 46% and 16.5% respectively compared with 2015, reaching the world advanced level in general. The level of comprehensive utilization of resources has been steadily improved, and 168 sets of cement kiln co-disposal systems have been put into operation. Calcium carbide slag has been fully utilized, and the comprehensive utilization rate of phosphogypsum has reached

40%. **Intelligent manufacturing reached a new level.**

Through the integration of two management system assessment of

There are more than 2200 raw material enterprises, and the integration level of large raw material enterprises is 61.1, higher than the national average level of 9.1%. The numerical control rate of key processes in the raw material industry is 65.7%, including 73.8% in petrochemical enterprises, 21.7 percentage points higher than the national average. 60 intelligent manufacturing factories and digital workshops have been built.

## (II) Development environment

The "14th Five-Year" period, the raw materials industry into a new stage of high-quality development, unprecedented opportunities, challenges more severe, opportunities and challenges present many new changes.

**From the opportunity point of view, the** new development pattern accelerates the construction, the domestic large-scale market advantage further play, especially the emerging areas and the demand for high-end materials for consumer upgrading.

Provides a broad space for the sustainable and healthy development of the raw materials industry. China's fair competition market system is becoming more and more perfect, especially the various resource factors to the advantageous areas, the concentration of enterprises, for the raw materials industry to strengthen the resilience of the industrial chain to provide the basic support. The new round of scientific and technological revolution and industrial change reshape the global economic structure, especially the deep integration of a new generation of information technology and manufacturing, forging a new transformation and upgrading of the raw materials industry

The advantages provide a source of power. **From the perspective of challenges, in** the face of economic

globalization countercurrent and new

Crown pneumonia epidemic widespread impact, industry chain  
supply chain security risks highlighted, expand the country

The difficulty of the international market has increased significantly. In the face of the new situation of the new stage of high-quality development, steel Iron, electrolytic aluminum, cement and other major bulk raw material products demand will gradually reach or near the peak platform period, the scale of quantitative demand expansion momentum tends to weaken. In the face of strong constraints on resources, energy and ecological environment, carbon peak carbon neutral hard task, the people's new expectations for safe production, the task of green and safe development of raw materials industry is more urgent.

At present, the shortcomings and bottlenecks of the raw materials industry are still prominent, a serious surplus of low-end products and high-end products supply shortage coexists, the core technology of key materials and equipment independent and controllable level is not high, green low-carbon development is a long way to go, the level of digitalization is difficult to effectively support high-quality development, the key strategic resource security capacity is not strong and other issues need to accelerate the solution. In the face of the new situation, new requirements, to maintain strategic determination, enhance bottom-line thinking, adhere to the system concept,

accelerate the optimization of raw materials industry system open and high-quality development.

## II. General requirements

### (I) Guiding Ideas

Adhere to the guidance of Xi Jinping's thought of socialism with Chinese characteristics in the new era, fully implement the spirit of the 19th Party Congress and the 19th Plenary Session, based on the new development stage, complete, accurate and comprehensive implementation of the new development concept, accelerate the construction of a new development pattern, to promote high-quality development as the theme, to deepen the supply-side structural reform as the main line, to reform and innovation as the fundamental driving force, to meet the growing needs of the people for a better life. The fundamental purpose is to meet the people's growing needs for a better life, coordinate development and security, focus on improving the level of advanced industrial base and modernization of the industrial chain, focus on optimizing the structure of traditional industries and products, cultivate and expand the new materials industry, accelerate information technology empowerment, and complete the industrial chain.

shortcomings, achieve low-carbon recyclable, promote high-end industrial supply, rationalize the structure and Development of green, transformation of digital, system security, to promote the construction of a strong manufacturing country to a new level, for the comprehensive construction of a modern socialist country to start a good start, a good start to provide strong support.

## (II) Basic Principles

**--Innovation leading.** Take technological innovation as the first driving force, promote all kinds of creative New elements are gathered to enterprises, strengthen horizontal cooperation between industry, academia, research and use, strengthen the vertical synergy of process technology, processing equipment and information technology, improve the industrial innovation ecology, strengthen the supply of common basic technology, break through strategic key technologies, promote the integration of technological innovation and industrial development, and accelerate the industrialization of results in scale application.

**--Market-led.** Respect for the laws of the market as the basic follow, fully develop Play a decisive role in the allocation of resources in the market, strengthen the main position of enterprises in

investment decisions, technology choices, etc. Follow the law of development of raw materials industry, better play the role of government, focusing on strategic planning guidance, standards and regulations, market order maintenance, industrial safety and security, etc., to create a good development environment.

-- **Supply and demand coordination.** To meet domestic demand as a priority task, based on the new development

The new requirements of the pattern, stabilize the reasonable proportion of raw materials industry, strengthen the security of resources, improve the quality of supply, promote the development of coupling of raw materials industry, strengthen the upstream and downstream linkage, the formation of demand traction supply, supply to create a high level of dynamic balance of demand.

--**Green security.** Take green safety as the bottom line of development, around the carbon peak

Carbon neutral target, improve energy resources conservation and environmental protection, strengthen the whole industry chain, the whole life cycle of green low-carbon safety development, focus on improving the essential safety level of key industries, to achieve the

organic unity of economic benefits and ecological benefits,  
social benefits



One.

(iii) Development goals

By 2025, the raw materials industry to protect and lead the high-quality development of manufacturing

The capacity of the industry has been significantly enhanced; the growth rate of value added remains reasonable, and the proportion in the manufacturing industry is basically stable; the scale of the new materials industry continues to improve, accounting for a significant increase in the proportion of raw materials industry; the initial formation of higher quality, better efficiency, better layout, greener and safer industrial development pattern.

--The **level of high-end supply continues to improve.**

Advanced basic materials high-end products

Quality stability reliability applicability significantly improved. Some frontier new material varieties to achieve mass production and typical applications. Breakthrough in a number of key strategic areas of key basic materials. The collaborative innovation system will be more efficient and perfect, and the national new materials platform system will be initially built. The innovation capacity of new materials industry will be significantly improved, the intensity of R&D investment in key industries will reach

more than 1.5%, and a number of key common core technologies with independent intellectual property rights will be mastered.

--The **level of structural rationalization continues to improve.** Crude steel, cement and other key raw materials The production capacity of bulk products will only be reduced and not increased, and the capacity utilization rate will be kept at a reasonable level. Further increase the concentration of industries in key areas, and form 5 to 10 leading enterprises with ecological dominance and core competitiveness of the industry chain. The industrial layout and production factors are more synergistic, and more than 5 world-class advanced manufacturing clusters are formed in the field of raw materials. The level of chemical park intensification is significantly improved, and a number of petrochemical industry bases are formed.

-- The **level of development greening has increased significantly.** Iron and steel, non-ferrous metals, building materials The total energy consumption and total carbon emission control of key industries such as iron and steel industry has achieved phased results. The comprehensive energy consumption per ton of steel in

the iron and steel industry was reduced by 2%, and the energy consumption per unit of clinker in cement products was reduced by 2%.

Consumption level decreased by 3.7%, and carbon emissions of electrolytic aluminum decreased by 5%. Key industry unit output

The value of pollutant emissions intensity, total emissions to achieve a double reduction, the industries to achieve stable emissions, new projects to meet the ultra-low emission standards. Industrial slag and other solid waste comprehensive utilization rate to further improve.

-- The **effect of digital transformation of industry is highlighted**. Maturity of intelligent manufacturing capability 3

More than 20% of the enterprises at or above the level of the key processes of numerical control rate of 70% or more, steel and other key areas of key processes to further enhance the level of numerical control. Key industries digitalization, networking, intelligent level significantly improved, accelerate the construction of enterprise network security protection capabilities, the construction of more than 100 intelligent manufacturing demonstration factories, more than 10 industrial Internet platform.

-- The **foundation of system securitization is more solid**.

Strategic resource security capacity is significantly Upgrade, the formation of a basic and stable resource security system. Key industry key production process

technology and equipment independent and controllable level significantly improved, the industry chain breakpoint blockage significantly reduced. The essential safety level of key industries is significantly improved. The task of relocation and renovation of hazardous chemical production enterprises in densely populated areas of cities and towns is fully completed.

By 2035, it will become the world's important raw material product research and development, production and application of highlands, the competitiveness of new materials industry to enhance, green low-carbon development level of the world's advanced, the industrial system security independent control.

Third, the promotion of high-end industrial supply

(A) sound innovation system

**Strengthen the innovation platform carrier support.**

Encourage advantageous enterprises to actively

participate in the national re

Point laboratory construction and system reorganization, construction of national manufacturing innovation centers in key areas, and support for the establishment of provincial innovation centers. Support the conversion institutions to integrate the industrial chain and create

The new chain, the formation of industry common technology research platform, enhance the green metallurgical selection, high-end processing

Work, stable preparation and other engineering capabilities.

Support the local practice of taking a variety of forms of local construction of national key new materials pilot platform.

Increase the construction of new materials industry measurement and testing centers, platforms and alliances.

Continue to organize the national new materials production and application demonstration, testing and evaluation platform construction, collaborative promotion of product design, development and production, system verification, batch application. Improve the innovation service support system and establish a national public platform for new materials research facilities. Establish a new materials data center to improve the ability of data services for industrial development.

**Optimize and improve the ecology of innovation mechanism.** Support raw material enterprises to

increase investment, joint

Joint downstream enterprises, universities, research institutes, around the process, equipment, products, etc., to carry out basic research and applied innovation. Develop a policy for the remuneration and incentive of scientific and

technological talents in state-owned enterprises, and give incentive policy support in performance assessment, R&D investment, total salary, and treatment of talents. Select a number of enterprises with good innovation base, try to enjoy the same policy of transformation of scientific and technological achievements in universities and research institutes, liberalize the restriction of employee shareholding, increase the weighting of innovation achievement transformation and other related indicators in the performance appraisal, and give a tilt to the core backbone personnel who have made outstanding contributions. Strengthen international exchanges and cooperation, attract foreign key enterprises and research institutions to invest in China to build factories and set up R & D centers, and encourage cooperation between Chinese and foreign institutions to carry out materials technology innovation research. Support enterprises to set up overseas material technology and equipment research and development institutions to carry out international technological innovation cooperation.

(II) to overcome the key technologies

Strengthen the deep integration of industry, academia, research and use, promote the optimal allocation of

scientific research institutes, universities, enterprises,  
scientific research power and resource sharing, and  
overcome complex deposits and ultra-deep mine safety



Mining process technology such as full and efficient mining; overcome the composition of the uniformity control, the original The company has been able to improve the performance and stability of products through the use of process equipment technologies such as homogenization and purification of material; overcome the mercury-free production of PVC by calcium carbide, low-temperature and low-concentration flue gas desulfurization and denitrification, enhanced dust removal by chemical agglomeration of fine particles, solid waste (hazardous waste) co-disposal and resource utilization, and other pollutant prevention and comprehensive resource utilization technologies to improve resource and energy utilization and ultra-low emission levels; overcome online inspection and control, rapid physical properties of raw materials Identification and evaluation, equipment lifecycle management, fault diagnosis and predictive maintenance and other intelligent manufacturing technologies to enhance total factor productivity. Organization of advanced and applicable technology promotion, rolling development and release of key industries advanced and applicable technology directory.

### **Column 1 Technology innovation focus direction**

**Petrochemical industry. Promote the** research and development of new products such as highly selective catalysis, high-efficiency membrane

separation, intrinsic safety of hazardous processes, special metallocene polyolefin, high-end lubricants, high-purity/ultrapure chemicals and industrial special gases, methane coupling to olefin. Promote the engineering of clean and efficient utilization of coal, short process of coal-based chemicals, preparation of bio-based materials for the whole industry chain, as well as low-cost harmless treatment and resource utilization of phosphogypsum, carbon dioxide capture and storage, and comprehensive utilization technologies. Promote the industrialization of new microchannel reactor equipment and continuous flow process, storage and transportation safety of hazardous chemicals, industrial Internet and intelligent manufacturing, low global warming potential refrigerant alternatives and other technologies.

**Steel industry.** Promote high-efficiency, low-cost clean steel smelting, energy conservation and environmental protection and other key common technologies, advanced electric arc furnace and its manufacturing process, near-end shape manufacturing, special smelting, high-end testing and other general special equipment and parts production technology engineering. Promote the industrialization and application of technologies such as filling mining, low-grade difficult ore dressing, sintering flue gas circulation, mechanized raw material field, blast furnace gas fine desulfurization, high-efficiency desulfurization and denitrification, waste heat recovery, low and medium temperature waste heat utilization, and high value-added resource utilization of steel slag.

**Non-ferrous metals industry.** Promote mechanical digging and continuous mining, green and efficient mining of ion-absorbing rare earth ores, efficient utilization of resources such as associated resources of rare earth polymetallic ores and lithium in salt lakes, material recycling of extraction and separation processes, preparation of ultra-high purity metals and targets, and other new technologies. Promote technologies such as high cleanliness and high homogenization metallurgy, short process preparation of high performance alloys, precise penetration of high performance rare earth permanent magnet materials selection area, intelligent unmanned mining, mine safety management Internet of Things and cloud services, artificial intelligence dosing and scheduling, virtual simulation of key processes, smelting separation online monitoring and process control intelligence, machine vision quality online inspection and other intelligent manufacturing technology engineering. Promote the industrialization of technologies such as high-efficiency sorting and pre-selection of low-grade complex ores, high-efficiency comprehensive utilization of tailings and red mud, harmless disposal of hazardous waste containing fluorine and arsenic, and

balanced utilization of high-abundance rare earth elements

Applications.

**Building materials industry.** Promote the depth of cement desulfurization and denitrification, chemical agglomeration enhanced dust removal, efficient low-carbon energy saving and other new technology research and development. Promote non-metallic ore classification and purification, crystal shape protection, particle shape and appearance control technology, special glass melting and molding technology, advanced ceramic powder preparation technology, high temperature solid oxide fuel cell powder and its components co-firing technology, molding sintering technology, large

### (C) breakthrough key materials

Adhere to the material first and demand for traction and focus on national defense construction, people's livelihood short board and manufacturing power building major needs, rolling product catalog of key materials, the development and release of technology roadmap. The implementation of key short board material research action, the use of "list hanging" "horse race" and other ways to support the material production, application enterprises jointly with scientific research units, to carry out wide band semiconductor and display materials, integrated circuit key materials, bio-based materials, carbon-based materials, bio-medical materials and other collaborative research, Bio-medical materials and other collaborative research. Implementation of bulk basic materials to consolidate and improve action to guide enterprises in the optimization of production processes based on a new generation of information technology, such as industrial

Internet, to enhance the basic components of advanced manufacturing steel, high-strength aluminum alloy, rare and precious metal materials, special engineering plastics, high-performance membrane materials, new fiber materials, composite materials and other comprehensive competitiveness. Implementation of frontier materials forward-looking layout action, support for scientific research units jointly with enterprises, grasp the development trend of new materials technology and information technology, nanotechnology, intelligent technology and other integration trends, the development of superconducting materials, intelligent bionics, additive manufacturing materials, etc., to promote the development of a new backbone material system, strengthen the application areas of support and guidance. Implementation of the materials genetic engineering program, to explore the pilot application of new models of materials research and development. Implementation of key materials application promotion action, optimize the first batch of key new materials application insurance compensation

Mechanism, through the first (set), green building materials promotion and other measures to promote new materials should

Use.

Column 2 new materials
<p><b>Breakthrough in key varieties.</b> Around the key application areas such as large aircraft, aero engines, integrated circuits, information and communication, bio-industry and energy industry, to tackle high-temperature alloys, aviation light alloy materials, ultra-high-purity rare earth metals and compounds, high-performance special steel, degradable biomaterials, special coatings, photoresists, targets, polishing fluid, industrial gases, bionic synthetic rubber, artificial crystals, high-performance functional glass, advanced ceramic materials, Special separation membrane and a number of key materials such as high-performance rare earth magnetic, catalytic, optical function, hydrogen storage materials.</p> <p><b>Upgrade public platforms.</b> Construction of high-end polyolefin, rare</p>

(iv) Improve product quality

**Strengthen quality management and process control.** Continuously carry out quality improvement of raw material industry

Upgrade actions to improve the stability, reliability and applicability of product quality. Promote the popularization of performance excellence, quality diagnosis, quality continuous improvement and other advanced production management model. Guide enterprises to strengthen total quality management, increase product testing and evaluation, equipment maintenance and guarantee, personnel job training, supplier

quality control, user complaints feedback, manufacturing risk analysis and other aspects of the work. Strengthen the digital innovation and application of quality management, guide enterprises to make full use of cloud computing, big data, block chain, artificial intelligence, industrial Internet and other new generation information technology means to promote advanced molding and processing methods, online testing, intelligent manufacturing, etc., to establish production process control and quality control system to meet the application needs, and improve the whole life cycle of fertilizers, cement, waterproof materials, heat insulation materials and other products Quality control and traceability mechanism.

## **Promote product standards and brand building.**

Take international advanced quality standards as the standard

First, strengthen the construction of material standards system, improve and revise the "14-5" raw materials industry standards system, the establishment of the whole life cycle of products, upstream and downstream synergistic standards system to promote resource conservation and rational application of materials. Focus on major technical equipment, major projects and other needs, to foster a number of weathering steel, bearing steel, aviation aluminum, high-performance concrete, artificial crystal, composite materials and other high-end materials group standards. Focus on consumer upgrading, green development and other directions, revise and enhance the construction of steel, copper water

(gas) pipe, waterproofing and insulation materials, decorative materials, bio-based materials and other bulk materials and product standards. Deeply involved in international standardization work, leading the development of international standards in the advantageous industry. Guide enterprises to strengthen the brand development strategy, encourage enterprises to



develop corporate standards above the recommended standards related to technical requirements. Encourage petrochemical and chemical, iron and steel, non-ferrous metals, building materials and other industry associations and professional institutions to carry out brand cultivation management system industry standards, quality benchmarking and brand evaluation activities, strengthen industry self-regulation, increase the quality of industrial clusters brand, corporate brand and other cultivation and publicity efforts to improve the impact of the brand.

### **Sound quality evaluation and certification system.**

Formation of quality improvement technology base public Service platform to enhance the minerals, smelting products, sintered products, processing materials and other product stability test verification, environmental suitability assessment, failure and defect analysis, measurement certification and other quality evaluation capabilities, improve the quality evaluation system, and promote the process capability evaluation. Carry out raw material industry enterprises to improve the measurement capacity action, encourage enterprises to improve the measurement management system, strengthen the measurement equipment to confirm and measure the process control, the

establishment of enterprise measurement guarantee system. Promote steel, non-ferrous metals, building materials and other industries to carry out quality grading evaluation, and strengthen the effective interface with product standards, measurement, testing technology

Acceptance. Continue to carry out green building materials certification. Establish new material certification system and support city

Field, professional third-party high-end quality certification body construction, promote quality compliance, process stability, serviceability of the whole industry chain, the whole life cycle, the whole domain evaluation demonstration, to create an international certification brand, and actively promote the mutual recognition of certification results and evaluation standards between international certification bodies.

Fourth, to promote the rationalization of industrial structure

(A) to consolidate the results of production capacity

**Strictly control the new production capacity.** Improve and strictly implement the steel, cement, flat glass

Electrolytic aluminum industry capacity replacement related policies to prevent copper smelting, alumina and other blind disorderly development, new, renovation and expansion projects must meet the energy consumption limit standard advanced value, ultra-low emission value of pollutants. Strict control of urea, ammonium phosphate, calcium carbide, caustic soda, yellow phosphorus and other industries to add capacity, new projects should be implemented in equal or reduced

capacity replacement. Encourage regions to expand the scope of implementation of capacity swaps in raw material industries, improve the elimination of backward standards, the use of comprehensive standards to promote the withdrawal of backward capacity in accordance with the law. Strictly prohibit the new "Industrial Structure Adjustment Guidance Catalog" in the restricted category and elimination of class projects.

**Sound long-term mechanism.** Research and establish the use of carbon emissions, pollutant emissions, energy Total consumption and other means to curb the expansion of excess capacity constraint mechanism. Failure to meet the requirements of ultra-low emissions, weak competitiveness of urban steel mills and steel mills in key areas of air pollution prevention and control of urban steel mills to take a complete shutdown, transformation and development, in situ transformation, relocation and transformation, etc., to promote transformation and upgrading. The implementation of the normalized peak production of cement, to explore the establishment of steel and other industries peak production mechanism. Strengthen the petrochemical, modern coal chemical industry planning and planning environmental impact assessment, combined with the "Thirteenth Five-Year

Plan" implementation effect and carbon peak carbon neutral requirements, scientific determination of industry development reasonable scale. Implementation of energy-saving review, strict

Control the amount of fuel coal consumption in petrochemical, chemical, iron and steel, building materials and other major coal-consuming industries.

Sound long-term work mechanism to prevent overcapacity, open reporting channels, strengthen joint law enforcement, strengthen industry early warning, make full use of satellite monitoring, big data and other technical means to increase the investigation and punishment of illegal new production capacity, and continue to maintain a high pressure to combat the situation.

(B) guide the rational layout

**Optimize the layout of new production capacity.**

Implement major national regional strategies, regional coordination

Development strategy, the main functional area strategy, based on land and space planning, to promote the spatial layout of raw materials industry adjustment and optimization. Implement the petrochemical industry planning and layout program, and strictly prohibit the construction of new paraxylene and ethylene projects outside the planning. Optimize the layout of hazardous chemical production, prohibit the construction and expansion of new hazardous chemical production projects

outside the chemical park, and the external safety protection distance of hazardous chemical production projects should meet the relevant requirements. Promote the relocation and transformation of chemical enterprises in key watersheds into compliant chemical parks. Encourage iron and steel smelting projects rely on the existing iron and steel smelting production plant with the conditions for clustering construction. Orderly layout of coastal areas using offshore resources such as alumina projects. Scientific placement of sand and gravel resources mining rights, a reasonable layout of a number of large mechanism sand and gravel production base. Support the local combination of their own advantages and industrial base, the reasonable layout of new materials projects in line with the strategic emerging industries classification directory.

**Promote the development of standardized clusters.**

Develop conditions for the identification of chemical parks, and guide

Local identification of a number of chemical parks, to guide the development of chemical enterprises clustering standardization. Promote the petrochemical and chemical industry to explore the complementary development of modern

coal chemical industry and traditional refining industry, renewable energy power generation and hydrogen industry, guide the steel industry to build distributed short process steel plants based on urban mines, and promote the layout of the electrolytic aluminum industry from "coal - electricity - aluminum"



To "hydropower, wind power and other clean energy - aluminum" shift, promote the building materials industry to synergistic

Disposal of waste in the circular economy development model change. Promote the construction of national new industrialization industry demonstration bases in the field of raw materials, and promote the transformation and upgrading of industrial clusters to clusters. Focus on the industrial base, outstanding comparative advantages, leading technology industry segments or key products, play a leading role in the industry chain leading enterprises to promote the gathering of elements and value enhancement, strengthen specialized collaboration and supporting capabilities, to create a number of petrochemical chemicals, iron and steel, non-ferrous metals, rare earth, green building materials, new materials industry clusters. Timely release capacity warning to prevent blind duplication of local construction.

(iii) Optimization of organizational structure

**Make bigger and stronger leading enterprises.**

Adhere to the combination of market-led and government-promoted

Remove obstacles to cross-regional mergers and acquisitions, clear market segmentation, regional blockades and other

restrictions, coordinate and solve major problems of cross-regional mergers and acquisitions, support enterprises to accelerate cross-regional and cross-ownership mergers and acquisitions, improve industrial concentration, and carry out international operations. In the petrochemical and chemical industry, iron and steel, non-ferrous metals, building materials and other industries, cultivate a number of leading enterprises with ecological dominance and core competitiveness of the industry chain, strengthen and enlarge the rare earth enterprise group, and encourage rare metal enterprises to accelerate the integration. Play a leading role in the chemical and building materials industry leading enterprises to promote corporate restructuring and reorganization. For the completion of substantive mergers and acquisitions of steel and other industry enterprises to give capacity replacement support policy. Improve the standard management of the industry, and promote the concentration of market elements to the superior enterprises. Encourage financial institutions in accordance with the risk-controlled, commercially sustainable principles, to the implementation of mergers and acquisitions, transformation and upgrading of raw materials enterprises to provide comprehensive financial services.

**Cultivate and strengthen small and medium-sized enterprises.** Improve the innovation capacity of small and medium-sized enterprises in the raw materials industry and specialization level, encourage leading enterprises to incorporate supporting SMEs into the common production

Industry chain management, quality management, standards management, cooperative R&D management, etc., to establish a stable

The supply, production, sales and other collaborative relationships to achieve the development of small, medium and large enterprises to integrate. Focus on the raw material industry chain, advanced basic technology, core basic components, etc., to cultivate a number of specialized and special new "small giant" enterprises, manufacturing single champion enterprises.

(D) promote industrial synergy

**Expand domestic demand for medium- and high-end materials.** For new infrastructure construction, high-end installation

The company has also been working on the construction of new urbanization, the construction of major projects such as transportation and water conservancy and the requirements of people's good life, accelerating the upgrading of traditional materials and breaking the invisible barriers and unreasonable regulations that restrict the application of materials. Revise and improve the design and application specifications, expand the domestic market for mature products such as green building materials,

promote the application of green building materials and the construction of pilot cities, promote assembly-type buildings and steel houses, and tap the consumption potential of high-performance aluminum and other high-end materials. Vigorously explore new markets and new uses for traditional products, and continuously improve the competitive advantage and competitive efficiency of traditional industries. Strengthen the supply and demand structure of the raw materials industry match, reduce ineffective supply, expand effective supply, improve the adaptability of the supply structure to the demand structure, and promote the formation of demand traction supply, supply to create a high level of dynamic balance of demand.

**Strengthen the linkage between upstream and downstream.** Raw material enterprises to strengthen coordination with upstream and downstream enterprises Symbiosis and coupling development, extension to the production of parts and components, and transformation to the provision of integrated material systematization solutions. The use of R & D early intervention, continuous improvement of the cooperation model, to promote business model innovation and industry innovation, to promote production-oriented manufacturing to service-

oriented manufacturing transformation. Support industry associations to build a platform for linking supply and demand. Establish and improve the quality of aviation materials, heavy-duty gas turbine materials, integrated circuit materials

materials, rare earth permanent magnet materials for new energy vehicle drive motors, bio-medical materials

Upstream and downstream cooperation mechanisms such as hot-rolled steel for construction. Play a leading role in the innovation and application of new materials. Support third-party organizations to carry out "one-stop" application demonstration of key materials to promote the work.

#### V. Accelerate the development of green industry

##### (A) actively implement energy-saving and low-carbon action

Focus on carbon peak, carbon neutral target nodes, strengthen the concept of carbon efficiency development, the full implementation of carbon emission reduction action, carbon emissions into the environmental impact assessment, play a synergistic effect of pollution reduction and carbon reduction. Develop carbon peak implementation plans for key industries such as petrochemicals and chemicals, iron and steel, non-ferrous metals, and building materials, and ensure that they reach the peak by 2030, and encourage industries and enterprises with conditions to take the lead in reaching the peak. Support enterprises to implement raw materials and fuel substitution, speed up the conversion of industrial coal

to electricity and coal to gas, and increase the proportion of renewable resources and clean energy use. Support enterprises to use waste heat and pressure power generation and grid connection. Support key industries such as iron and steel, cement and other key industries to build a statistical accounting, monitoring and evaluation system for carbon emissions throughout the production process. Accelerate the energy-saving and low-carbon transformation and upgrading of raw material enterprises, encourage enterprises to build energy management centers, and further implement energy gradient utilization. Optimize product trade structure, encourage increased imports of primary processed products, and strictly control exports of high energy-consuming and low value-added products. Strengthen energy conservation monitoring in key industries and implement mandatory unit product energy consumption limit standards. Carry out industrial energy-saving diagnostic services. Strictly implement the ladder tariff policy for key industries such as iron and steel, cement and electrolytic aluminum, and improve the differentiated tariff policy that is conducive to green and low-carbon development.



Into coal gasification, carbon dioxide as raw material for chemical products, hydrogen-rich carbon cycle blast furnace, hydrogen energy kiln, hydrogen-based direct reduction and other technologies.

**Promote advanced technologies.** The petrochemical industry promotes low-carbon technologies such as direct production of chemicals from crude oil, intelligent micro-reaction and continuous production of fine chemicals, and bio-fermentation of ethanol from industrial tail gas containing carbon monoxide. Iron and steel industry to promote the use of recycled steel materials, near the final shape of the short process casting and rolling, low-grade resources such as biometallurgy low-carbon technology. Non-ferrous metals industry to promote high current density and low energy consumption aluminum electrolysis, hot state copper matte continuous blowing refining, low-carbon raw material substitution and other low-carbon technologies. Building materials industry to promote

(B) to promote ultra-low emissions and clean production

Promote the implementation of ultra-low emission transformation of the iron and steel industry, research to promote the implementation of ultra-low emissions in key industries such as chemical, coking, electrolytic aluminum, copper smelting, lead and zinc smelting, cement, glass, refractory materials, graphite deep processing, ceramics. Encourage petrochemical and chemical enterprises to carry out initial rainwater collection and treatment, petrochemical and chemical, iron and steel industries and other organizations to carry out internal water-saving transformation. The production, use and emission of priority control chemicals, the implementation of mandatory clean production audits, promote petrochemical and chemical, non-ferrous metals, building materials and other key industries to develop clean

production transformation and upgrading plans, innovative raw materials key industries clean production implementation model. Strengthen the centralized planning and management of industrial park tail gas resources and water laddering, centralized treatment, and promote the recycling of industrial tail gas, clean, high-value utilization. Strengthen the non-ferrous metal industry heavy metal pollution control, harmless treatment of arsenic-containing smelting slag, aluminum ash and other hazardous waste. Restrict and phase out highly toxic, highly polluting, high environmental risk chemical products and process technologies, prohibit the illegal production and use of persistent organic pollutants, and prohibit the illegal production of mercury-added products. Support enterprises

Research, development, promotion and application to reduce the amount of industrial solid waste generation and reduce industrial solid waste hazardous

Harmful production processes and equipment. Strengthen the concept of green development of the entire product life cycle, and vigorously promote green processes and green products. Guide enterprises and parks to carry out excellent environmental performance management, strengthen intelligent control and integration of governance, the comprehensive construction of green factories and green parks. Strengthen the ecological restoration of mines and build green mines. Develop and revise a number of environmental emission, water conservation and other key standards.

(C) to enhance the comprehensive utilization of resources

Support the efficient use of resources, continue to improve the level of key processes and process management, improve the efficiency of primary resource utilization, and reduce resource and energy consumption from the source. Comprehensively promote the comprehensive utilization of industrial solid waste of raw materials, focusing on tailings, waste rock, fly ash, red mud, smelting slag, electrolytic manganese slag, industrial by-product gypsum, chemical waste slag, waste fiber and

composite materials, etc., to build a number of industrial resources comprehensive utilization base, in key areas to build tailings waste, phosphogypsum, electrolytic manganese slag and other comprehensive utilization and non-ferrous iron and steel co-disposal of secondary resources containing zinc project, as well as coal gasification furnace, the Cement kilns, large sintered brick tunnel kiln co-disposal of waste and other demonstration lines to accelerate the harmless, reduction, resource disposal. Encourage the implementation of nationwide phosphogypsum "to slag production. Accelerate the treatment of plastic pollution and plastic recycling, and promote the industrialization and application of biodegradable plastics. Development of building materials to enhance the efficiency of the comprehensive use of resources co-production system. Promote the use of recycled water, seawater and other non-conventional water in the production process of raw materials industry as a priority, to reduce the amount of new water intake. Promote the deep treatment and recycling of waste water in petrochemical and chemical industries, steel and other industries, and create a number of industrial waste water recycling demonstration enterprises and parks. Encourage

conditional areas to promote the development of petrochemical and chemical, iron and steel, non-ferrous metals, building materials, electricity and other industries coupled, the establishment of raw materials

Industrial coupling development park, to achieve energy resources laddering and industrial recycling articulation

Connection. Improve the resource price formation mechanism.

Sixth, accelerate the transformation of industry digital

(A) to accelerate the manufacturing process intelligence

**Promote the construction of digital infrastructure.**

Encourage enterprises to combine production process conditions

Transformation, accelerate the deployment of digital tools and equipment such as intelligent sensors, processors, gateways, instruments and meters, and enhance the real-time sensing and data collection capabilities of production sites such as ore mining, smelting and processing, and chemical reactions. Establish a unified data integration and management platform to achieve centralized data management for the entire process of research and development, production, operation, operation and maintenance. Encourage enterprises in a position to apply 5G and other new generation of information technology to upgrade the network, the construction of ubiquitous awareness of the interconnected plant operating

environment.

**Improve the level of production intelligence.**

Encourage enterprises to develop applications based on data-driven

Advanced process control system with dynamic, mechanism model, empirical model and simulation model to optimize the operating parameters of production operation equipment.

Establish real-time monitoring, early warning of abnormal working conditions, dynamic scheduling of the whole process, and intelligent disposal for key links such as raw material feeding, reaction process, smelting process, quality control, pollutant emission, and energy consumption. Build digital twin models for major production scenarios, processes, and key core equipment. Encourage the application of robots for jobs with high labor intensity, harsh operating environment, high safety risks, and high precision requirements. Establish an enterprise management and operation decision system that integrates information on customer service, operation management, production execution and process control.

**Accelerate the change of enterprise management system.** Support enterprises to carry out the integration of the two management bodies

Department of pilot demonstrations and graded

standardization assessment. Organize the assessment of the degree of integration of the two, clarify the development priorities and improvement paths of enterprises with different degrees of integration, and guide enterprises to



Improve the level of information technology integration application level by level or across levels. Support the advantages of the two enterprises

Integrate the promotion and replication of advanced practical experience, incorporate supporting enterprises into a common supply chain synergy, quality control, cooperative research and development and other management systems, drive upstream and downstream enterprises in the industry chain to improve the level of intelligence, and enhance the supply chain security of the industry chain. Support small and medium-sized enterprises to accelerate the transformation and upgrading, and promote the popularization of the application and collaborative innovation of new-generation information technology in research and development, design, manufacturing, operation and management, product services and other aspects.

(B) promote industrial Internet empowerment

Accelerate the construction of secondary nodes of industrial Internet logo resolution for raw materials, and promote the exploration and application of logo resolution in supply chain collaboration, product tracking and tracing, inventory management, etc. Encourage leading enterprises to build and networked collaboration platform among enterprises to achieve

resource sharing and collaborative manufacturing of multiple production bases. Encourage leading enterprises in the industry chain to build enterprise-level industrial Internet platform, to achieve the integration of the supply chain of the industry chain, and build industry-specific and regional industrial Internet platforms and professional and technical industrial Internet platforms. Encourage enterprises based on the platform to open up the enterprise side and the user side of the data to the downstream customer demand-oriented, product structure and manufacturing processes to reconfigure, from mass production to mass customization of production. Create cross-industry and cross-discipline industrial Internet platforms, and explore the cross-discipline integration of raw materials industry and logistics, urban construction, energy and other industries. Encourage the leading enterprises in raw materials sub-sectors, third-party institutions and other leading to build specialized, characteristic industrial Internet platform for raw materials, to promote the digital transformation of key equipment and on the cloud on the platform. Focus on key aspects of the cultivation and promotion of a number of process management industrial APP and solutions for small and medium-sized

enterprises to provide R & D design, software use, manufacturing, equipment operation and maintenance, business management, warehousing and logistics services.  
Accelerate the exploration of raw materials industry

The industry and the "5G+industrial Internet" integration development, to create more typical application scenarios. Empowering enterprises to improve quality, reduce costs and increase efficiency.

(C) consolidate the digital support foundation

Promote the construction of intelligent manufacturing standards system by industry. Build an intelligent manufacturing standard test and verification platform, and accelerate the standard pilot and promotion in key industries and fields. Support the formation of industry intelligent manufacturing alliances, the establishment of expert committees. Cultivate a number of raw material intelligent manufacturing system solution providers and industrial Internet service providers by industry and scene, and select and publish a supplier directory. For the characteristics of

Column 4 Digital	
<p>the raw materials industry, the formation of a number of digital intelligent system solutions. Increase the combination of information technology and specialization of composite intelligent management of intelligent mines and smart factories (workshops) talent team training, the formation of a number of digital intelligent development of raw materials industry leader enterprises industrial Internet network security classification and grading management, promote the application of</p> <p><b>Carry out pilot demonstrations.</b> Develop digital transformation guidelines for smart manufacturing in key industries, action plans, and promote the formation of intelligent production and service specialization of composite intelligent management of intelligent mines and smart factories (workshops) talent team training, the formation of a number of digital intelligent development of raw materials industry leader enterprises industrial Internet network security classification and grading management, promote the application of</p> <p><b>Build a service platform.</b> Develop "industrial Internet + key industries" and grading management, promote the application of</p>	<p>Develop digital transformation guidelines for smart manufacturing in key industries, action plans, and promote the formation of intelligent production and service specialization of composite intelligent management of intelligent mines and smart factories (workshops) talent team training, the formation of a number of digital intelligent development of raw materials industry leader enterprises industrial Internet network security classification and grading management, promote the application of</p>

commercial cryptography technology, enhance the key industry enterprises industrial Internet security protection capabilities.

Seven, to protect the security of the industrial system  
(A) improve the ability to protect resources

### **Rational development of domestic mineral**

**resources.** Increase the shortage of iron ore, copper, potassium and other

Mineral resources prospecting efforts, actively carry out deep and peripheral existing mines to find minerals.

Implement preferential tax policies, encourage the adoption of advanced processes and equipment that reduce the generation of mining solid waste, make efficient and intensive use of low-grade ores, and encourage the comprehensive use of complex co-existing ores and mining solid waste. When delineating the ecological protection red line and other control lines, fully articulate with strategic mineral resource areas. Appropriate new high-standard mines to strengthen the role of domestic mineral resources "ballast" and basic security capacity. Optimize the management mechanism of the total annual mining control index, scientific regulation of rare earth, tungsten and other mineral resources mining scale. Improve the policy of mineral resources equity gold.

### **Expand diversified resource supply channels.**

Develop "urban mine" resources and support

Advantageous enterprises to establish large scrap steel and recycled aluminum, copper, lithium, nickel, cobalt, tungsten, molybdenum and other recycling bases and industrial clusters, and promote the integrated development of recycling, dismantling, processing, classification and distribution of recycled metals. Build a mineral resource reserve system with the joint participation of the state and enterprises, combining product reserves and resource reserves. Improve the ore trading market system and form an open,

transparent, fair and reasonable pricing mechanism.
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Promote international cooperation in the field of mineral resources, optimize the structure and layout of overseas investment in accordance with the principles of equality and mutual benefit and win-win cooperation, participate in overseas resource development in a standardized and orderly manner, and enhance the global strategic capacity of mineral resources. Encourage the import of light hydrocarbons and other low-carbon petrochemical raw materials. Strictly enforce the import standards of renewable resources and promote the import of high-quality renewable resources.
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resources, optimize the structure and layout of overseas investment in accordance with the principles of equality and mutual benefit and win-win cooperation, participate in overseas resource development in a standardized and orderly manner, and enhance the global strategic capacity of mineral resources. Encourage the import of light hydrocarbons and other low-carbon petrochemical raw materials. Strictly enforce the import standards of renewable resources and promote the import of high-quality renewable resources.

Increase the reserves of ore. Support the construction of iron ore, copper ore, rare earths and other key domestic mines, the selection and construction of a number of important inorganic non-metallic mineral resources efficient development and utilization base. Construction of renewable resources recycling projects in line with industrial policies. Encourage enterprises to standardize the exploration and development of overseas resources, the construction of mining and metallurgy integration and other comprehensive resource base.

(B) enhance the supporting capacity

**Expand supporting supply channels.** Sort out the supply chain of industry chain of key industries of raw materials

Shortcomings, to carry out key equipment, parts, instruments, raw and auxiliary materials and other supply security assessment, the development of supporting supply security work plan. Promote the establishment of a key industry sector industry chain supply chain information sharing platform, and strengthen the supply and demand of key supporting products docking. Support enterprises to establish a working mechanism to deal with the security of the industrial chain supply chain, establish a sound reserve system, and improve the ability to ensure supply in emergencies. Encourage enterprises to develop and implement the "spare tire" plan, and promote the diversified layout of supply channels. Support industrial clusters to carry out third-party spare parts and raw materials supply services.

**Strengthen the development and application of**



**short board equipment.** Around the ground pressure monitoring equipment, collaborative melting Technology and equipment, large casting equipment, new high-speed smelting equipment and other special production equipment, high precision bearings, special valves, high-pressure pumps and other key components, non-destructive testing equipment and other precision instruments, support upstream and downstream enterprises, research institutes and supporting enterprises to carry out joint research, accelerate the breakthrough of bottleneck constraints, enhance the supply chain of independent controllability. The use of the first (set) of major technical equipment insurance compensation mechanism to encourage enterprises to actively develop and use innovative equipment. Timely adjustment of major technical equipment and products imported key components, raw materials commodity catalog, to create a fair competitive market environment.

Column 6: Chain
<p><b>Organize collaborative research.</b> Encourage upstream, midstream and downstream of the industry chain, small, medium and large enterprises to integrate innovation, the organization of high-end special production equipment, core components, precision instruments for testing, core raw materials and auxiliary materials, industrial software and other collaborative research, to open the supply chain blockage point breakpoint.</p> <p><b>Expand supporting channels.</b> Promote the establishment of a key industry sector industry chain supply chain information sharing platform, strengthen the supply and demand of key supporting products, establish key areas of industry chain supply chain alliances, support the formation of consortia</p>

(C) enhance the level of safety production

**Strengthen the essence of enterprise safety.** Adhere

to the people first, life first, increase safety

Full technical transformation efforts, the elimination of technical equipment that does not meet the requirements of safe production. Promote enterprise source management, reduce safety risks, and improve the level of essential safety of enterprises. Implement the industrial Internet + production safety action plan, the use of information technology, the construction of industrial Internet-based production safety perception, monitoring, early warning, disposal and evaluation system, research and development of key industries industrial Internet + production safety implementation guidelines, to carry out pilot demonstrations. Promote the wisdom of chemical parks, and promote the relocation and transformation of hazardous chemical

production enterprises in densely populated urban areas.

**Promote the implementation of the main responsibility of enterprises.** Guide enterprises to implement production safety laws and regulations

Regulation standard system, strengthen the awareness of safety risk prevention, fulfill the main responsibility of safety production, and improve the level of safety production management. Support and encourage enterprises to promote the standardization of production safety, strengthen the role of safety technology and management team, and do a good job of production safety training. Guide enterprises to improve the key parts, key links and major sources of danger monitoring and early warning mechanism, establish and improve the production safety risk classification and control and hidden danger investigation and treatment

Management system.

#### VIII. Security measures

##### (A) strengthen the implementation of planning

Strengthen departmental coordination and up-and-down linkage. Relevant state departments in accordance with the division of responsibilities, grasp the relevant work to implement. Each region to strengthen the interface with this plan, the main content of the plan and major projects into the region's key work arrangements. Petrochemical, steel and other key industries around the planning objectives and tasks, combined with the actual industry to develop specific implementation ideas. Establish a mid-term evaluation mechanism, the completion of the plan and the implementation of the process of new issues, new situations to strengthen the dynamic tracking, if necessary, according to the procedures for adjusting the content of the plan. Industry organizations give full play to the role of connecting enterprises and the government bridge, timely feedback on the implementation of planning issues and suggestions.

##### (B) strengthen policy synergy

Give full play to the role of planning to lead, strengthen the fiscal, financial, investment, import and export, energy,

ecological environment, natural resources, prices and other policies and industrial policy synergies. Investment departments at all levels, natural resources departments in charge of planning as an important basis for investment project approval, filing and land and sea approval. The planning involves chemical parks, bases, demonstration projects, major projects and other layout and construction should be implemented in the region "three lines a single" ecological and environmental zoning control requirements, related development and construction planning and construction projects should be carried out in accordance with the law environmental impact assessment. Make full use of existing funding channels to support the major projects involved in the plan. Deepen the integration of production, play the role of the national production integration platform, through financial services, equity investment and other means, and actively support projects in line with the plan. Actively apply internationally accepted rules to create a fair competitive market environment. Strengthen intellectual property protection and services.

(C) strengthen the protection of talent

Guide universities to optimize the layout of disciplines and specialties according to the development needs of raw material industry, and expand the scale of training talents in mining, metallurgy, materials and chemistry. Deepen the construction of new engineering disciplines and optimize the professional structure of related fields. Carry out mapping of talent needs in key areas of raw materials industry, and build a big data platform and expert information bank for industrial talents. Strengthen the cultivation of engineers and technical skill talents in urgent need, and implement the plan to improve the quality of vocational education and cultivate excellence. Increase the introduction of overseas high-level teams, talents and services to protect the efforts. Implement new material talent training program, and continuously organize overseas (border) and domestic training for talents in the field of new materials.

(D) to increase publicity and guidance

Make full use of various media and take various forms to strengthen the publicity and coverage of the planning content, implementation progress and typical experience. Formulate a refined industrial policy to eliminate the misconception that the raw material industry is a "one-size-

fits-all" industry, effectively enhance the industry's self-confidence, guide the development of the city and industry, and create a favorable public opinion atmosphere for the high-quality development of the raw material industry. Give full play to the role of industry associations and professional institutions to strengthen the dissemination and implementation of the plan.