

"14th Five-Year Plan" raw  
material industry development  
plan

Ministry of  
Industry and  
Information  
Technology,  
Ministry of  
Science and  
Technology,  
Ministry of

# Natural Resources

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## II

The raw material industry is the foundation of the real economy, the basic industry supporting the development of the national economy and the key area to win international competitive advantages, and the main force of industrial base reconstruction and the main battlefield of industrial green development. This plan is formulated to implement the "Outline of the 14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Long-term Goals for 2035" and improve the quality and efficiency of the development of the raw material industry.

—, development situation

(一) The cornerstone of development is out

The raw material industry includes petrochemical and chemical industries, iron and steel, non-ferrous metals, building materials and other industries. Since the 13th Five-Year Plan, the transformation and upgrading of the raw material industry has achieved remarkable results, the comprehensive strength has grown steadily, and the international competitiveness has continued to increase. The scale advantage has been newly improved. In 2020, the added value of China's raw material industry accounted for 27.4% of the industries above designated size, and the output of crude steel, refined copper,

electrolytic aluminum, methanol, urea, cement, flat glass, etc. remained the world's first for many years. The types of materials are more abundant, and the self-sufficiency rate of steel, aluminum, photovoltaic glass, etc. exceeds 98%, which basically meets the needs of the national economy and national defense and military industry. New progress has been made in structural adjustment. The total supply and demand of the industry with serious overcapacity has basically regained balance, the target of 150 million tons of steel capacity reduction has been completed ahead of schedule, and the strict control of electrolytic aluminum and cement production capacity has achieved remarkable results. The industrial concentration of the top 10 cement enterprise groups reached 58%. In 2020, China (excluding Hong Kong, Macao and Taiwan) was shortlisted for 34 of the world's top 500 raw material industry enterprises, accounting for 29% of the number of shortlisted enterprises. Innovation ability has reached a new level. The intensity of R&D investment increased from 0.76% in 20 to about 0.9% in 2020. The main equipment of key enterprises has generally reached the international advanced level, and more than 170 state key laboratories and engineering (technology) research centers and 26 national key platforms for new materials have been built. Green transformation takes on a new look. The comprehensive energy consumption per ton of steel of key large and medium-sized enterprises decreased by 4.7% compared with 20 years, the comprehensive AC power

consumption of primary aluminum was 6.9% lower than the world average, and the carbon dioxide emissions per ton of steel and the carbon dioxide emissions of 10,000 yuan of industrial added value of the building materials industry decreased by 46% and 16.5% respectively compared with 20 years, reaching the world's advanced level. The level of comprehensive utilization of resources has been steadily improved, and 168 sets of cement kiln collaborative 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 has reached a new level. There are more than 2,200 raw material enterprises that have passed the evaluation of the integration management system of industrialization and industrialization, and the integration level of large raw material enterprises is 6L1, which is 9% higher than the national average. The numerical control rate of key processes in the raw material industry is 65.7%, of which 73.8% is petrochemical enterprises, which is 2L7 percentage points higher than the national average. 60 intelligent manufacturing factories and digital workshops have been built.

## (二) Development environment

During the "14th Five-Year Plan" period, the raw material industry has entered a new stage of high-quality development, with unprecedented opportunities and

more severe challenges, and many new changes in opportunities and challenges. From the perspective of opportunities, the construction of the new development pattern has been accelerated, and the advantages of the domestic super-large-scale market have been further exerted, especially the demand for high-end materials in emerging fields and consumption upgrading, providing a broad space for the sustainable and healthy development of the raw material industry. China's fair competition market system is becoming more and more perfect, especially the agglomeration of various resource elements in advantageous areas and enterprises, which provides basic support for the raw material industry to strengthen the resilience of the industrial chain. A new round of scientific and technological revolution and industrial transformation have reshaped the global economic structure, especially the deep integration of the new generation of information technology and manufacturing, providing a source of power for the transformation and upgrading of the raw material industry to forge new advantages. From the perspective of challenges, in the face of the headwind of economic globalization and the widespread impact of the new crown pneumonia epidemic, the security risks of the industrial chain and supply chain have become prominent, and the difficulty of expanding the international market has increased significantly. In the face of the new situation in the new stage of high-quality development, the demand for major

bulk raw materials such as steel, electrolytic aluminum, and cement will successively reach or approach the peak plateau, and the momentum of large-scale and quantitative demand expansion will tend to weaken. In the face of strong constraints on resources, energy and ecological environment, the hard task of carbon peak and carbon neutrality, the people's new expectations for safe production, and the task of green and safe development of the raw material industry is more urgent.

At present, the shortcomings and bottlenecks in the raw material industry are still prominent, the serious surplus of low-end products and the insufficient supply of high-end products coexist, the independent and controllable level of core process technology and equipment of key materials is not high, the green and low-carbon development has a long way to go, the digital level is difficult to effectively support high-quality development, and the key strategic resource guarantee ability is not strong and needs to be solved urgently. In the face of the new situation and new requirements, it is necessary to maintain strategic focus, enhance bottom-line thinking, adhere to the system concept, and accelerate the optimization, opening up and high-quality development of the raw material industry system.

## 二、 general requirements

### (一) Guiding ideology

Adhere to the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, fully

implement the spirit of the 19th National Congress of the Communist Party of China and the 19th Plenary Session of the Communist Party of China, based on the new development stage, completely, accurately and comprehensively implement the new development concept, accelerate the construction of a new development pattern, promote high-quality development as the theme, deepen supply-side structural reform as the main line, reform and innovation as the fundamental driving force, and meet the people's growing needs for a better life as the fundamental purpose. Efforts should be made to optimize the structure of traditional industries and products, cultivate and expand the new material industry, accelerate the empowerment of information technology, make up for the shortcomings of the industrial chain, achieve low-carbon recyclability, promote high-end industrial supply, structural rationalization, green development, transformation and digitalization, and system security, so as to promote the construction of a manufacturing power to a new level and provide strong support for the comprehensive construction of a modern socialist country.

## (二) Basic principles

One by one, innovation leads. Take technological innovation as the first driving force, promote the agglomeration of various innovation elements to enterprises, strengthen horizontal cooperation between industry, university, research and application, strengthen

the vertical coordination of process technology, processing equipment and information technology, improve the industrial innovation ecology, strengthen the supply of common basic technologies, break through strategic key technologies, promote the integration of technological innovation and industrial development, and accelerate the large-scale application of industrialization of achievements.

111 market leadership. Respect for market laws as the basic compliance, give full play to the decisive role of the market in resource allocation, and strengthen the dominant position of enterprises in investment decision-making and technology selection. Follow the law of the development of the raw material industry, give better play to the role of the government, pay attention to strategic planning and guidance, the formulation of standards and regulations, the maintenance of market order, and the guarantee of industrial security, etc., to create a good development environment.

111 supply and demand coordination. Take meeting domestic demand as a priority task, based on the new development pattern and new requirements, stabilize the reasonable proportion of raw material industry, strengthen resource security, improve supply quality, promote the coupling development of raw material industry, strengthen the connection between upstream and downstream, and form a high-level dynamic balance

between demand driving supply and supply creating demand.

One by one, green and safe. Take green safety as the bottom line of development, focus on the goal of carbon peak and carbon neutrality, improve the level of energy resource conservation and environmental protection, strengthen the green, low-carbon and safe development of the whole industrial chain and the whole life cycle, focus on improving the intrinsic safety level of key industries, and realize the organic integration of economic, ecological and social benefits

### (3) Development goals

By 2025, the ability of the raw material industry to guarantee and lead the high-quality development of the manufacturing industry will be significantly enhanced; The growth rate of added value remained at a reasonable level, and the proportion in the manufacturing industry was basically stable; the scale of the new material industry continues to increase, and the proportion of the raw material industry has increased significantly; A higher quality, better efficiency, better layout, greener and safer industrial development pattern has been initially formed.

The high-end level of supply continues to improve. The quality, reliability, and applicability of advanced basic materials and high-end products have been significantly improved. Some cutting-edge new material varieties have achieved mass production and typical applications.

Breakthrough in a number of key basic materials in key strategic areas. The collaborative innovation system is more efficient and perfect, and the national new material platform system has been initially completed. The innovation ability of the new material industry has been significantly improved, and the R&D investment intensity of key industries has reached more than a small percentage, and a number of key common cores with independent intellectual property rights have been mastered

——The level of structural rationalization continues to improve. The production capacity of key raw materials such as crude steel and cement has only decreased but not increased, and the capacity utilization rate has remained at a reasonable level. The industrial concentration in key areas has been further improved, forming 5 or 10 industrial chain leading enterprises with ecological leadership and core competitiveness. The industrial layout and production factors are more coordinated, forming more than 5 world-class advanced manufacturing clusters in the field of raw materials.

The intensive level of chemical parks has been significantly improved, forming a number of petrochemical industry bases.

The level of greening has been greatly improved. The total energy consumption and carbon emission control of key industries such as steel, non-ferrous metals, and building materials have achieved phased results. The

comprehensive energy consumption per ton of steel in the steel industry was reduced by 2%, the energy consumption level per unit clinker of cement products was reduced by 3.7%, and the carbon emissions of electrolytic aluminum were reduced by 5%. The emission intensity and total amount of pollutants per unit output value of key industries have doubled, all industries have achieved stable emissions, and new projects have met ultra-low emission standards. The comprehensive utilization rate of solid waste such as industrial waste residue has been further improved.

The digital transformation effect of 111 industries is prominent. More than 20% of enterprises with intelligent manufacturing capability maturity level 3 and above, more than 70% of key process numerical control rates, and the level of numerical control of key processes in key areas such as steel has been further improved. The level of digitalization, networking, and intelligence in key industries has been significantly improved, and the construction of enterprise network security protection capabilities has been accelerated, with more than 100 intelligent manufacturing demonstration factories and more than 10 industrial Internet platforms built.

The foundation for the security of the 111 system is more solid. The strategic resource guarantee capacity has been greatly improved, forming a basic and stable resource security system. The independent and controllable level of key production process technology

and equipment in key industries has been greatly improved, and the breakpoints and blockages of the industrial chain have been significantly reduced. The intrinsic safety level of key industries has been greatly improved. The relocation and transformation of hazardous chemical production enterprises in densely populated urban areas has been fully completed.

By 2035, it will become a highland for the research and development, production and application of important raw material products in the world, the competitiveness of the new material industry will be comprehensively improved, the level of green and low-carbon development will be advanced in the world, and the industrial system will be safe and independent and controllable.

≡, promote the supply of industry "Lingkou | Jisi J and the elderly."

#### (一) Improve the innovation system

Strengthen the carrier support of innovation platforms. Encourage advantageous enterprises to participate in the construction of state key laboratories and system restructuring, build national manufacturing innovation centers in key areas, and support the establishment of provincial innovation centers. Support the transformation of institutes to integrate the industrial chain and innovation chain, establish an industrial common technology research platform, and improve the engineering capabilities of green beneficiation, high-end

processing, and stable preparation. Support local governments to build pilot platforms for national key new materials in various forms based on local conditions. Increase the construction of new material industry measurement and testing centers, platforms and alliances. Continue to organize the construction of national new material production and application demonstration, testing and evaluation platforms, and coordinate to promote product design, development and production, system verification, and batch application. Improve the innovation service support system and establish a public platform for national new material scientific research facilities. Establish a new material data center to improve the ability to serve the development of the data service industry.

Optimize and improve the ecology of innovation mechanisms. Support raw material enterprises to increase investment, cooperate with downstream enterprises, universities, and scientific research institutes to carry out basic research and application innovation around processes, equipment, and products. Formulate incentive policies for the salary of scientific and technological talents in state-owned enterprises, and provide incentive policy support in terms of performance appraisal, R&D investment, total wages, and talent treatment. Select a group of enterprises with a good foundation for innovation, try to enjoy the same scientific and technological achievement transformation policies as

universities and scientific research institutes, relax the restrictions on employee shareholding, increase the weight of relevant indicators such as the transformation of innovative achievements in performance appraisal, and give preference to core backbone personnel who have made outstanding contributions. Strengthen international exchanges and cooperation, attract key foreign enterprises and research institutions to invest in China to build factories and set up R&D centers, and encourage Chinese and foreign institutions to cooperate in material technology innovation research. Support enterprises to set up overseas material technology and equipment research and development institutions and carry out international technological innovation cooperation

## (二) Conquer key technologies

Strengthen the deep integration of industry, academia, research and application, promote the optimal allocation and resource sharing of scientific research forces of scientific research institutes, universities and enterprises, and overcome mining technology such as safe and efficient mining of complex mineral deposits and ultra-deep well mines. Overcome process equipment technologies such as component structure uniformity control, raw material homogenization and purification, and improve product performance and stability. Overcome pollutant prevention and comprehensive utilization

technologies such as calcium carbide production of polyvinyl chloride without mercury, low-temperature and low-concentration flue gas desulfurization and denitrification, chemical agglomeration of fine particulate matter to enhance dust removal, solid waste (hazardous waste) collaborative disposal and resource utilization, and improve the utilization rate of resources and energy and ultra-low emission level. Overcome intelligent manufacturing technologies such as online detection and control, rapid identification and evaluation of raw material properties, equipment life cycle management, fault diagnosis and predictive maintenance, and improve total factor productivity. Organize the promotion of advanced and applicable technologies, and formulate and publish a catalog of advanced and applicable technologies in key industries on a rolling basis.

Column 1: Key directions of technological innovation
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Petrochemical and chemical industry. Promote the research and development of new products such as high-selectivity catalysis, high-efficiency membrane separation, and intrinsic safety of hazardous processes, as well as new products such as special metallocene polyolefins, high-end lubricants, high-purity/ultra-high purity chemicals and industrial special gases, and methane coupling olefins. Promote the engineering of clean and efficient utilization of coal, short process of coal-based chemicals, preparation of the whole industry chain of bio-based materials, low-cost and harmless treatment and resource utilization of phosphogypsum, carbon dioxide capture, storage and comprehensive utilization. Promote the industrialization and application of technologies such as new microchannel reactor equipment and continuous flow technology, hazardous chemical storage and transportation safety, industrial Internet and intelligent manufacturing, and low global warming potential refrigerant substitutes.

Steel industry. Promote the engineering of key common technologies such as high-efficiency and low-cost clean steel smelting, energy conservation and environmental protection, and the production technology of general special equipment and parts such as advanced electric arc furnaces and their manufacturing processes, near-final manufacturing, special smelting, and high-end testing. Promote the industrialization and application of technologies such as filling mining, low-grade difficult-to-beneficiate, sintering flue gas circulation, mechanized raw material yard, blast furnace gas fine desulfurization, high-efficiency desulfurization and denitrification, waste heat recovery, waste heat utilization at medium and low temperatures, and high value-added resource utilization of steel slag.

Non-ferrous metals industry. Promote the research and development of new technologies such as mechanical tunneling and continuous mining, green and efficient mining of ion-adsorbed rare earth ores, efficient utilization of resources such as associated resources of rare earth polymetallic ores and lithium in salt lakes, material cycling in the extraction and separation process, and preparation of ultra-high purity metals and targets. Promote technologies such as high-

cleanliness and high-homogeneity metallurgy, short-process preparation of high-performance alloys, and precise penetration of high-performance rare earth permanent magnet material selection, and the engineering of intelligent manufacturing technologies such as intelligent unmanned mining, mine safety management Internet of Things and cloud services, artificial intelligence batching and scheduling, virtual simulation of key processes, online monitoring and intelligent process control of smelting separation, and online detection of machine vision quality. Promote the industrialization of technologies such as efficient sorting and pre-selection of low-grade complex ores, efficient and comprehensive utilization of tailings and red mud, harmless disposal of hazardous wastes containing fluorine and arsenic, and balanced utilization of high-abundance rare earth elements

Application:

building materials industry. Promote the research and development of new technologies such as deep cement desulfurization and denitrification, chemical agglomeration and enhanced bioremoval, and high-efficiency, low-carbon and energy-saving. Promote the engineering of non-metallic mineral grading and purification, crystal shape protection, particle shape control technology, special glass melting and molding technology, advanced ceramic powder preparation technology, high-temperature solid oxide fuel cell powder and its component co-firing technology, molding and sintering technology, large-size artificial material preparation technology, integrated manufacturing of refractory materials with structural function integration, and in-service diagnosis and maintenance. Promote the industrialization of unmanned operation of the whole

process of underground mines, three-dimensional simulation of open-pit mines, unmanned blasting, online monitoring of ores, efficient dissociation of graphite, protection of large scales, fluorine-free purification, and continuous drawing of high-performance fibers such as special glass fibers and basalt fibers.

### (三) Breakthrough key materials

Adhere to the equal emphasis on materials first and demand traction, focus on the major needs of national defense construction, people's livelihood shortcomings and manufacturing power, roll out key material product catalogs, and formulate and release technical roadmaps. Implement key shortcomings and materials research, and support material production and application enterprises to cooperate with scientific research units to carry out collaborative research on wide bandgap semiconductors and display materials, key materials for integrated circuits, bio-based materials, carbon-based materials, biomedical materials, etc. Implement the action of consolidating and upgrading bulk basic materials, and guide enterprises to use new generation information technologies such as the industrial Internet to enhance the comprehensive competitiveness of steel, high-strength aluminum alloys, rare and rare precious metal materials, special engineering plastics, high-performance membrane materials, new fiber materials, and composite materials on the basis of optimizing production processes. Implement forward-looking layout actions for cutting-edge materials, support scientific research units and joint enterprises, grasp the

development trend of integration of new material technology with information technology, nanotechnology, intelligent technology, etc., develop superconducting materials, intelligent bionics, additive manufacturing materials, etc., promote the systematic development of new backbone materials, and strengthen support and guidance in application fields. Implement the material genetic engineering program and explore the pilot application of new models of material research and development. Implement the promotion of the application of key materials, and optimize the insurance compensation for the first batch of key new materials

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mechanism, through the first (set), green building materials promotion and other measures to promote the application of new materials.

<b>Column 2 New material innovation and development project</b>
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Break through key varieties. Focusing on key application fields such as large aircraft, aero engines, integrated circuits, information and communication, biological industry and energy industry, we will overcome a number of key materials such as superalloys, aviation light alloy materials, ultra-high purity rare earth metals and compounds, high-performance special steels, degradable biological materials, special coatings, photoresists, targets, polishing fluids, industrial gases, biomimetic synthetic rubber, artificial products, high-performance functional glass, advanced ceramic materials, special separation films, and high-performance rare earth magnetism, catalysis, optical function, hydrogen storage materials and a number of other key materials.
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Enhance public platforms. Build high-end polyolefins, rare metals, powder metallurgy, advanced glass, advanced ceramics and other manufacturing innovation centers. Build a demonstration platform for the production and application of information and communication equipment, energy conservation and environmental protection, robot equipment and materials. Build a regional center for new material testing and evaluation platforms and new material data centers.

By 2025, the support capacity of key materials will be improved, the public service capacity will be significantly improved, and more than 10 new material platforms will be built.

#### (四) Improve product quality

Strengthen quality management and process control. Continue to carry out actions to improve the quality of raw material industry to improve the stability, reliability and applicability of product quality. Promote and popularize advanced production and management models such as excellent performance, quality diagnosis, and continuous quality improvement. Guide enterprises to strengthen total quality management, increase product testing and evaluation, equipment maintenance guarantee, personnel training, supplier quality control, user complaint feedback, manufacturing risk analysis and other links. Strengthen the digital innovation and application of quality management, guide enterprises to make full use of cloud computing, big data, blockchain, artificial intelligence, industrial Internet and other new generation information technology means, promote advanced molding and processing methods, online testing, intelligent manufacturing, etc., establish a production process control and quality control system to

meet application needs, and improve the quality control and traceability mechanism of the whole life cycle of fertilizers, cement, waterproof materials, thermal insulation materials and other products.

Promote product standards and brand building. Take international advanced quality standards as the benchmark, strengthen the systematic construction of material standards, improve and revise the "14th Five-Year Plan" raw material industry standard system, establish a standard system covering the whole life cycle of products and upstream and downstream coordination, and promote resource conservation and rational application of materials. Focus on the needs of major technical equipment and major projects, and cultivate a number of high-end material group standards such as weathering steel, bearing steel, aviation aluminum, high-performance concrete, intraocular lens, and composite materials. Focusing on consumption upgrading and green development, revise and improve bulk materials and product standards such as construction steel, copper, water (gas) pipes, waterproof and thermal insulation materials, decoration materials, and bio-based materials. Deeply participate in international standardization work and take the lead in formulating international standards for advantageous industries. Guide enterprises to strengthen their brand development strategies and encourage enterprises to formulate enterprise standards that are higher than the relevant technical requirements of

recommended standards. Encourage industry associations and professional institutions such as petrochemical and chemical, steel, non-ferrous metals, and building materials to carry out brand cultivation management system industry standards, quality benchmarking and brand evaluation activities, strengthen industry self-discipline, increase the cultivation and transmission of quality brands and enterprise brands in industrial clusters, and improve brand influence.

Improve the quality evaluation and certification system. Establish a public service platform for quality improvement technology, improve the stability test and verification of mineral products, smelting products, sintered products, processed materials and other products, environmental adaptability evaluation, fault and defect analysis, measurement certification and other quality evaluation capabilities, improve the quality evaluation system, and promote process capability evaluation. Carry out actions to improve the measurement capacity of raw material industry enterprises, encourage enterprises to improve the measurement management system, strengthen the confirmation of measurement equipment and measurement process control, and establish an enterprise measurement guarantee system. Promote the quality grading evaluation of steel, non-ferrous metals, building materials and other industries, and strengthen the effective connection with product standards, measurement and testing technology. Continue

to carry out green building materials certification. Establish a new material certification system, support the construction of market-oriented and professional third-party high-end quality certification institutions, promote the whole industry chain, the whole life cycle, and the global evaluation demonstration of quality compliance, process stability, and service suitability, create an international certification brand, and promote mutual recognition of certification results and evaluation standards among international certification bodies.

Fourth, promote the rationalization of industrial structure

(一) Consolidate the results of capacity reduction

Strictly control new production capacity. Improve and strictly implement policies related to capacity replacement in the steel, cement, flat glass, and electrolytic aluminum industries to prevent the blind and disorderly development of copper smelting and alumina. Strictly control the new production capacity of urea, ammonium phosphate, calcium carbide, caustic soda, yellow phosphorus and other industries, and new projects should implement equal or reduced production capacity. Encourage all regions to expand the scope of capacity replacement in the raw material industry, improve the elimination of backward standards, and use comprehensive standards to promote the withdrawal of

backward production capacity in accordance with laws and regulations. It is strictly forbidden to create new restricted and eliminated projects in the "Industrial Structure Adjustment Guidance Catalogue".

Improve the long-term mechanism. Research and establish a restraint mechanism to curb the expansion of excess capacity by means such as carbon emissions, pollutant emissions, and total energy consumption. For urban steel mills that do not meet ultra-low emission requirements and weak competitiveness, as well as urban steel mills in key areas of air pollution prevention and control, we will adopt methods such as complete shutdown, transformation and development, on-site transformation, relocation and transformation to promote transformation and upgrading. Implement normalized off-peak production of cement, and explore the establishment of off-peak production mechanisms in steel and other industries. Strengthen the planning and environmental impact assessment of petrochemical and modern coal chemical industries, and scientifically determine the reasonable scale of industry development based on the implementation effect of the 13th Five-Year Plan and the requirements of carbon peak and carbon neutrality. Implement energy-saving reviews and strictly control the consumption of fuel coal in major coal-consuming industries such as petrochemicals, steel, and building materials. Improve the long-term working mechanism for preventing overcapacity, smooth 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 new production capacity in violation of laws and regulations, and continue to maintain a high-pressure crackdown.

## (二) Guide reasonable layout

Optimize the layout of new production capacity. Implement major national regional strategies, regional coordinated development strategies, and main functional area strategies, and promote the adjustment and optimization of the spatial layout of raw material industries in accordance with territorial spatial planning. Implement the petrochemical industry planning and layout plan, and strictly prohibit the construction of new projects outside the plan. Optimize the production layout of hazardous chemicals, prohibit the construction and expansion of hazardous chemical production projects outside the chemical park, and the external safety protection distance of hazardous chemical production projects must meet relevant requirements. Promote the relocation and transformation of chemical enterprises in key river basins and enter compliant chemical parks. Encourage steel smelting projects to rely on qualified existing steel smelting and production plants to gather and build. Coastal areas should arrange alumina and other projects that utilize overseas resources in an orderly

manner. Scientifically invest in sand and gravel resource mining rights, and rationally lay out a number of large-scale machine-made sand and gravel production bases. Support local governments to combine their own advantages and industrial foundations to rationally lay out new material projects in line with the classification of strategic emerging industries.

Promote standardized cluster development. Formulate conditions for the identification of chemical parks, guide local governments to identify a number of chemical parks, and guide the standardized development of chemical enterprises. Promote the petrochemical industry to explore the complementary development of modern coal chemical industry and traditional refining and chemical industry, renewable energy power generation and hydrogen production industry, guide the steel industry to rely on urban mines to build distributed short-process steel mills, and promote the layout of the electrolytic aluminum industry from "coal, electricity and aluminum"

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Shift to "hydropower, wind power and other clean energy and aluminum", and promote the transformation of the building materials industry to a circular economy development model of collaborative waste disposal. Promote the construction of national demonstration bases for new industrialization industries in the field of raw materials, and promote the transformation and upgrading

of industrial agglomeration into clusters. Focus on industry segments or key products with good industrial foundation, outstanding comparative advantages, and leading technology, give full play to the leading role of leading enterprises in the industrial chain, promote factor aggregation and value enhancement, strengthen professional cooperation and supporting capabilities, and build a number of petrochemical and chemical, steel, non-ferrous metals, rare earths, green building materials, and new materials industry clusters. Timely issue production capacity warnings to prevent local blind duplication of construction.

### (三) Optimize organizational structure

Expand and strengthen leading enterprises. Adhere to the combination of market leadership and government promotion, remove obstacles to cross-regional mergers and acquisitions, clear restrictions such as market segmentation and regional blockades, coordinate and solve major problems of cross-regional mergers and restructuring, support enterprises to accelerate cross-regional and cross-ownership mergers and restructuring, improve industrial concentration, and carry out international operations. In petrochemical and chemical, steel, non-ferrous metals, building materials and other industries, cultivate a number of industrial chain leading enterprises with ecological leadership and core competitiveness, strengthen and expand rare earth enterprise groups, and encourage rare metal enterprises

to accelerate integration. Give full play to the leading role of leading enterprises in the chemical and building materials industries to promote enterprise restructuring and restructuring. Capacity replacement support policies will be given to enterprises in steel and other industries that have completed substantive mergers and restructuring. Improve industry standardized management and promote the concentration of market elements in advantageous enterprises. Encourage financial institutions to provide comprehensive financial services to raw material enterprises implementing mergers, restructuring, transformation and upgrading in accordance with the principles of controllable risk and business sustainability.

Cultivate and expand small and medium-sized enterprises. Improve the innovation ability and specialization level of small and medium-sized enterprises in the raw material industry, and encourage leading enterprises to include supporting small and medium-sized enterprises in common production. Industry chain management, quality management, standard management, cooperative R&D management, etc., establish stable supply, production, sales and other cooperative supporting relationships to achieve the integrated development of large and small enterprises. Focus on the advanced basic technology and core basic components of the raw material industry chain, and cultivate a number of specialized and new "little giant"

enterprises and individual champion enterprises in the manufacturing industry.

#### (四) Promote industrial coordination

Expand domestic demand for high-end materials. Facing the construction of major projects such as new infrastructure construction, high-end equipment, new urbanization construction, transportation and water conservancy, and the requirements of people's better life, accelerate the upgrading of traditional materials, and break down the invisible barriers and unreasonable regulations that restrict the application of materials. Revise and improve design and application specifications, expand the domestic demand market for mature products such as green building materials, promote the application of green building materials and the construction of pilot cities, promote prefabricated buildings and steel structure housing, and tap the consumption potential of high-end materials such as high-performance aluminum. Vigorously explore new markets and new uses for traditional products, and continuously improve the competitive advantage and efficiency of traditional industries. Strengthen the matching of supply and demand structure in the raw material industry, reduce ineffective supply, expand effective supply, improve the adaptability of the supply structure to the demand structure, and promote the formation of a high-level dynamic balance between demand driving supply and supply creating demand.

Strengthen the connection between upstream and downstream. Raw material enterprises strengthen synergistic symbiosis and coupling development with upstream and downstream enterprises, extend to the production of parts and components, and transform to provide integrated material systematic solutions. Adopt the cooperation model of early intervention in R&D and continuous improvement in the later stage to promote business model innovation and business innovation, and promote the transformation of production-oriented manufacturing to service-oriented manufacturing. Support industry associations to build a platform for connecting supply and demand. Establish and improve aviation materials, heavy-duty gas turbine materials, and integrated circuit materials

Clever

materials, rare earth permanent magnet materials for new energy vehicle drive motors, biomedical materials, hot-rolled steel for construction and other upstream and downstream cooperation mechanisms. Give full play to the leading role of leading enterprises in the innovative application of new materials. Support third-party institutions to organize and carry out the "one-stop" application demonstration and promotion of key materials.

## 5. Accelerate the greening of industrial development

- (1) Actively implement energy-saving and low-carbon actions

Focusing on the target nodes of carbon peaking and carbon neutrality, strengthen the concept of carbon efficiency development, fully implement carbon emission reduction actions, include carbon emissions in environmental impact assessment, and give full play to the synergistic effect of pollution reduction and carbon reduction. Formulate implementation plans for carbon peaking in key industries such as petrochemicals, steel, non-ferrous metals, and building materials to ensure that peaking is achieved by 2030, and encourage qualified industries and enterprises to take the lead in peaking. Support enterprises to implement raw material and fuel substitution, accelerate 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 to generate electricity and connect to the grid. Support key industries such as steel and cement 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 deeply implement energy cascade utilization. Optimize the product trade structure, encourage the increase in imports of primary processing products, and strictly control the export of high-energy-consuming and low-value-added products. Strengthen energy conservation

supervision in key industries and implement mandatory energy consumption quota standards for unit products. Carry out industrial energy-saving diagnosis services. Strictly implement the tiered electricity price policy for key industries such as steel, cement, and electrolytic aluminum, and improve the differentiated electricity price policy that is conducive to green and low-carbon development.

Column 3 Low-carbon manufacturing pilot project
Implement technical research. Organize the research and development of heavy and inferior oil processing and efficient conversion and utilization, large-scale high efficiency and energy saving
Coal gasification, carbon dioxide as raw material for the production of chemical products, hydrogen-rich carbon cycle blast furnace, hydrogen energy kiln, hydrogen-based direct reduction and other technologies. Promote advanced technology. The petrochemical and chemical industry promotes low-carbon technologies such as direct production of chemicals from crude oil, intelligent micro-reaction and continuous production of fine chemical products, and biological fermentation of carbon monoxide-containing industrial exhaust gas to ethanol. The steel industry promotes low-carbon technologies such as the use of steel circular materials, near-final short-process casting and rolling, and low-grade resource biometallurgy. The non-ferrous metal industry promotes low-carbon technologies such as high current density and low energy consumption aluminum electrolysis, continuous blowing of hot copper shovels, and substitution of low-carbon raw materials. The building materials industry promotes low-carbon technologies such as collaborative disposal, low-carbon and high-performance cement, carbon capture and purification, full-oxygen enriched combustion, all-electrofusion and electro-assisted melting, raw fuel substitution, and molding and sintering.

Construction of pilot projects. Organize and implement low-carbon smelting pilot projects such as hydrogen metallurgy and non-blast furnace ironmaking, carry out pilot projects for the promotion and application of carbon dioxide capture and storage technology in cement, coal chemical and other industries, promote the application of carbon dioxide in oil displacement, synthetic organic chemicals, etc., and carry out pilot projects of low-carbon cement, hydrogen energy kilns and carbon sequestration building materials.

By 2025, the total carbon emission control of key industries such as steel, non-ferrous metals, and building materials will achieve phased results.

## (二) Promote ultra-low emissions and cleaner production

Promote the implementation of ultra-low emission transformation in the iron and steel industry, and study and promote the implementation of ultra-low emissions in key industries such as chemical, coking, electrolytic aluminum, copper smelting, lead and zinc smelting, cement, glass, refractories, graphite deep processing, and ceramics. Petrochemical and chemical enterprises are encouraged to carry out initial rainwater collection and treatment, and petrochemical and steel industries are organized to carry out internal water-saving transformation. Implement mandatory cleaner production audits for enterprises that prioritize the production, use, and emission control of chemicals, promote the formulation of cleaner production transformation and improvement plans for key industries such as petrochemicals, non-ferrous metals, and building materials, and innovate the implementation mode of

cleaner production in key raw material industries. Strengthen the centralized planning and management of exhaust gas resources in industrial parks, and promote the circular, clean and high-value utilization of industrial exhaust gas. Strengthen the control of heavy metal pollution in the non-ferrous metal industry, and harmlessly treat hazardous wastes such as arsenic-containing smelting slag and aluminum ash. Restrict and phase out chemical products and processes with high toxicity, high pollution, and high environmental risks, and prohibit the illegal production and use of persistent organic pollutants, and prohibit the illegal production of mercury-added products. Support businesses

Research, develop, promote and apply production processes and equipment that reduce the amount of industrial solid waste generated and reduce the harm of industrial solid waste. Strengthen the concept of green development throughout the product life cycle, and vigorously promote green processes and green products. Guide enterprises and parks to carry out excellent environmental performance management, strengthen intelligent management and control integration, and comprehensively build green factories and green parks. Strengthen the ecological restoration of mines and build green mines. Formulate and revise a number of key standards such as environmental protection discharge and water conservation.

### (三) Improve the level of comprehensive utilization of resources

Support the efficient use of resources, continuously improve the management level of key processes and processes, improve the efficiency of primary resource utilization, and reduce resource energy consumption from the source. Comprehensively promote the comprehensive utilization of raw material industrial solid waste, focusing on tailings, waste rock, fly ash, red mud, smelting slag, electrolytic manganese slag, industrial by-product gypsum, chemical waste residue, waste fiber and composite materials, etc., to build a number of industrial resource comprehensive utilization bases, and build tailings waste slag, phosphogypsum, electrolytic manganese slag and other comprehensive utilization projects and steel nonferrous collaborative disposal of zinc-containing secondary resources in key areas, as well as coal gasifiers, cement kilns, large sintered brick tunnel kilns and other demonstration lines for the collaborative disposal of waste, so as to accelerate the realization of harmlessness, reduction, Resource disposal. Encourage the implementation of phosphogypsum "slag production" nationwide. Accelerate plastic pollution control and plastic recycling, and promote the industrialization and application of biodegradable plastics. Develop a building materials co-production system that improves the efficiency of comprehensive resource utilization. Promote

the use of recycled water, seawater and other unconventional water in the industrial production of raw materials, and reduce the amount of new water used. Promote the in-depth treatment and recycling of wastewater in petrochemical, iron and steel industries, and create a number of industrial wastewater recycling demonstration enterprises and parks. Encourage qualified regions to promote the coupled development of petrochemical and chemical industries, steel, non-ferrous metals, building materials, electric power and other industries, and establish raw materials

Industrial coupling development parks to realize the cascade utilization of energy resources and the connection of industrial cycles. Improve the resource price formation mechanism.

## 6. Accelerate the digitalization of industrial transformation

### (1) Accelerate the intelligence of the manufacturing process

Promote the construction of digital infrastructure. Encourage enterprises to accelerate the deployment of digital tools and equipment such as intelligent sensors, processors, gateways, and instrumentation in combination with the transformation of production process conditions, and improve real-time perception and data collection capabilities at 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 of the whole process of R&D, production, operation, operation and maintenance. Encourage qualified enterprises to apply 5G and other new generation information technologies to upgrade their networks and build a ubiquitous perception and interconnection factory operating environment.

Improve the level of intelligent production. Encourage enterprises to develop and apply advanced process control systems based on data-driven, mechanism models, empirical models, and simulation models to optimize the operating parameters of production equipment. Establish real-time monitoring, early warning of abnormal working conditions, dynamic scheduling of the whole process, and intelligent disposal of key links such as raw material feeding, reaction process, smelting process, quality control, pollutant emissions, and energy consumption. Build digital twin models for major production scenarios, process flows, and key core equipment. Encourage the application of robots in positions with high labor intensity, harsh working environment, greater safety risks, and high precision requirements. Establish an enterprise management and business decision-making system that integrates information such as customer service, operation management, production execution and process control.

Accelerate the reform of enterprise management system. Support enterprises to carry out pilot demonstrations and graded evaluation of the integration

of industrialization and industrialization management systems. Organize and carry out the assessment of the integration of industrialization and industrialization, clarify the development priorities and improvement paths of enterprises with different integration degrees, and guide enterprises

Improve the level of information technology integration and application step by step or across levels. Support the promotion and replication of advanced practical experience in the integration of industrialization and industrialization of advantageous enterprises, incorporate supporting enterprises into the common supply chain collaboration, quality control, cooperative research and development management system, drive the improvement of the intelligent level of upstream and downstream enterprises in the industrial chain, and enhance the security of the industrial chain and supply chain. Support small and medium-sized enterprises to accelerate transformation and upgrading, and promote the popularization and application and collaborative innovation of new generation information technology in R&D and design, manufacturing, operation and management, product services, etc.

(二) Promote the empowerment of the industrial Internet

Accelerate the construction of secondary nodes for Internet identification analysis in the raw material industry, and promote the exploration and application of identification analysis in supply chain collaboration, product tracking and traceability, inventory management, etc. Encourage leading enterprises to build a networked collaboration platform with various enterprises to realize resource sharing and collaborative manufacturing of

multiple production bases. Encourage leading enterprises in the industrial chain to build enterprise-level industrial Internet platforms, realize the integration of industrial and supply chains, and build characteristic industrial Internet platforms and professional and technical industrial Internet platforms for specific industries and regions. Encourage enterprises to open up enterprise and user-side data based on the platform, and reconstruct the product structure and manufacturing process based on downstream customer needs, so as to realize the transformation from large-scale mass production to large-scale customized production. Build a cross-industry and cross-field industrial Internet platform, and explore the cross-field integration of the raw material industry with logistics, urban construction, energy and other industries. Encourage leading enterprises in the raw material industry and third-party institutions to take the lead in building a professional and characteristic raw material industrial Internet platform, and promote the digital transformation of key equipment and the cloud platform. Focus on key links to cultivate and promote a number of process management industrial APPs and solutions, and provide small and medium-sized enterprises with R&D and design, software use, manufacturing, equipment operation and maintenance, operation and management, warehousing and logistics and other services. Accelerate the exploration of the integration and development of the raw

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

(三) Consolidate the foundation of digital support

Promote the construction of intelligent manufacturing standard system by industry. Build an intelligent manufacturing standard test and verification platform, and accelerate the pilot and promotion of standards in key industries and fields. Support the establishment of industry intelligent manufacturing alliances and the establishment of expert committees. Cultivate a number of raw material intelligent manufacturing system solution suppliers and industrial Internet service providers by industry and scenario, and select and publish supplier lists. According to the characteristics of the raw material industry, a number of digital intelligent system solutions have been formed. Increase the training of compound talents and teams that combine informatization and specialization, and form a group of leading teams in the digital and intelligent development of the raw material industry. Deepen the implementation of classified and hierarchical management of industrial Internet network security for raw material manufacturers, promote the application of commercial cryptographic technology, and improve the

industrial Internet security protection capabilities of enterprises in key industries.

#### Column 4 Digital Empowerment Project

Carry out pilot demonstrations. Formulate digital transformation guidelines and action plans for intelligent manufacturing in key industries, and promote pilot demonstrations of smart mines and smart factories (workshops) integrating intelligent production, intelligent operation and maintenance, and intelligent management. Promote the research and development and application of mining industrial Internet and intelligent equipment, encourage the promotion and application of 5G and big data in Shanhe factories, and provide safe and convenient network connections for the digital construction of enterprises.

Build a service platform. Formulate an action plan of "Industrial Internet + Key Industries" to support leading enterprises and digital service providers in the industry to build an industrial Internet platform that connects consumption and production, supply and manufacturing, products and services, and has the characteristics of the raw material industry. Support local governments and park management departments to build industrial Internet platforms in their regions, and promote the modernization of governance systems and industry management methods.

Improve the standard system. Formulate a number of intelligent manufacturing-related standards around smart factory reference architectures, data exchange technical specifications, data collection specifications, etc.

By 2025, more than 100 intelligent manufacturing demonstration factories and more than 10 industrial Internet platforms in key industries will be built in the field of raw materials.

### 7. Ensure the security of the industrial system

(1) Improve the ability  
to guarantee  
resources

Rationally develop domestic mineral resources. Increase the exploration of iron ore, copper, potassium and other scarce mineral resources, and actively carry out deep and peripheral prospecting of existing mines. Implement preferential tax policies, encourage the adoption of advanced processes and equipment to reduce the generation of solid mining waste, efficiently and intensively utilize low-grade ores, and encourage the comprehensive utilization of complex co-associated mines and mine solid waste. When delineating control lines such as ecological protection red lines, they should be fully connected with strategic mineral resource areas. Appropriately build new high-standard mines to strengthen the role of domestic mineral resources as a "ballast stone" and basic support capabilities. Optimize the management mechanism of annual mining total control indicators, and scientifically regulate the mining scale of mineral resources such as rare earths and tungsten.

Improve the policy of mineral resources equity fund.

Expand diversified resource supply channels. Develop "urban mine" resources, support advantageous enterprises to establish large-scale scrap steel and recycled aluminum, copper, lithium, nickel, cobalt,

tungsten, molybdenum and other recycling bases and industrial agglomeration areas, and promote the integrated development of recycled metal recycling, dismantling, processing, classification and distribution. Build a mineral resource reserve system with the joint participation of the state and enterprises, combining product reserves and resource land reserves. Improve the ore trading market system and form an open, transparent, fair and reasonable pricing mechanism. Promote international cooperation in the field of mineral resources, optimize the structure and layout of overseas investment in accordance with the principles of equality, mutual benefit and win-win cooperation, participate in overseas resource development in a standardized and orderly manner, and enhance the global strategic capabilities of mineral resources. Encourage the import of low-carbon petrochemical raw materials such as light hydrocarbons. Strictly implement the import standards for renewable resources and promote the import of high-quality renewable resources.

Column 5 Strategic resource security guarantee project
Implement the relevant planning requirements of strategic mineral resources, implement domestic prospecting actions for strategic minerals, and realize the search

Increase reserves. Support the construction of key domestic mines such as iron ore, copper ore, and rare earths, and select and build a number of important inorganic and non-metallic mineral resources for efficient development and utilization bases. Build renewable resource recycling projects in line with industrial policies. Encourage enterprises to standardize the exploration and development of overseas resources, and build comprehensive resource bases such as the integration of mining, bending, and metallurgy. By 2025, the resource guarantee capacity will be significantly improved, a stable and open resource security system will be built, a number of domestic first-class large-scale key mineral development enterprises will be formed, and more than one key non-metallic mineral development and utilization base will be built. The domestic self-sufficiency rate of ferrous metals has been greatly improved, with the scrap ratio reaching more than 30%, and the proportion of recycled copper and aluminum output reaching 35% and 20% respectively.

## (二) Enhance supporting capabilities

Expand supporting supply channels. Sort out the shortcomings of the industrial chain and supply chain of key raw material industries, carry out supply safety assessments of key equipment, parts, instruments, raw and auxiliary materials, and formulate supporting supply guarantee work plans. Promote the establishment of an industrial chain and supply chain information sharing platform in key industries and fields, and strengthen the connection between supply and demand of key supporting products. Support enterprises to establish a working mechanism to deal with the security of the industrial chain and supply chain, establish and improve the reserve system, and improve the ability to ensure emergency supply. Encourage enterprises to formulate

and implement "spare tire" plans and promote the diversified layout of supply channels. Support industrial agglomeration areas to carry out third-party spare parts raw and auxiliary material supply services.

Strengthen the development and application of short-board equipment. Focusing on special production equipment such as ground pressure monitoring equipment, collaborative melting technology and equipment, large-scale melting and casting equipment, new quick-setting smelting equipment, key components such as high-precision bearings, special valves, high-pressure pumps, and precision instruments such as non-destructive testing equipment, support upstream and downstream enterprises, scientific research institutes and supporting enterprises to carry out joint research, accelerate breakthroughs in bottleneck constraints, and enhance the independent and controllable capabilities of the industrial chain and supply chain. Use the insurance compensation mechanism of the first (set) of major technical equipment to encourage enterprises to develop and use innovative equipment. Timely adjust the catalogue of key components and raw materials for major technical equipment and product imports to create a fair and competitive market environment.

Column 6 Supplement and strengthen the chain project

Organize collaborative research. Encourage the integration and innovation of upstream, midstream and downstream of the industrial chain, large and medium-sized enterprises, organize high-end special production equipment, core components, precision instruments for testing, core raw materials, industrial basic software, etc. to collaborate on key problems to open up supply chain blockages and breakpoints.

Expand supporting channels. Promote the establishment of industrial chain and supply chain information sharing platforms in key industries, strengthen the supply and demand docking of key supporting products, establish industrial chain and supply chain alliances in key areas, support the formation of consortia between enterprises, and build an independent and controllable ecosystem through industrial collaboration. Study and establish a reserve system that takes into account strategic reserves and commercial reserves, support enterprises to formulate emergency reserve systems and work plans such as important materials, key equipment, spare parts and other emergency reserves to deal with major emergencies, rationally plan reserve varieties and reserve cycles, and improve the ability of enterprises to resist risks.

By 2025, the breakpoints and blockages of the main industrial chain and supply chain will be effectively relieved, and the safety level will be significantly improved.

### (三) Improve the level of safe production

Strengthen the intrinsic safety of enterprises. Adhere to the supremacy of the people and the supremacy of life, increase the intensity of safety technology transformation, and eliminate technical equipment that does not meet the requirements of safe production. Promote source governance of enterprises, reduce safety risks, and improve the level of intrinsic safety of enterprises. Implement the industrial Internet + safety production action plan, use information technology to build a safety production perception, monitoring, early warning,

disposal and evaluation system based on the industrial Internet, study and formulate industrial Internet + safety production implementation guidelines for key industries, and carry out pilot demonstrations. Promote the intelligent construction of chemical parks and promote the relocation and transformation of hazardous chemical production enterprises in densely populated urban areas.

Promote enterprises to implement their main responsibilities. Guide enterprises to implement the safety production laws, regulations and 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 construction of safety production standardization, strengthen the role of safety technology and management teams, and do a good job in safety production training. Guide enterprises to improve the monitoring and early warning mechanism of key parts, key links and major hazards, and establish and improve the hierarchical control of safety production risks and the investigation and treatment of hidden dangers Rational system.

## 8. Safeguard measures

### (一) Strengthen the implementation of planning

Strengthen departmental coordination and linkage. Relevant state departments shall do a good job in the

implementation of relevant work in accordance with the division of responsibilities. All localities have strengthened the connection with this plan, and included the main contents of the plan and major projects in the key work arrangements of the region. Key industries such as petrochemical and chemical industry and iron and steel focus on the planning goals and tasks, and formulate specific implementation opinions based on the actual situation of the industry. Establish a mid-term evaluation mechanism, strengthen dynamic tracking of the completion of the plan and new problems and new situations that arise in the implementation process, and adjust the content of the plan according to procedures when necessary. Industry organizations give full play to the role of bridges connecting enterprises and the government, and provide timely feedback on planning implementation issues and suggestions.

## (二) Strengthen policy coordination

Give full play to the leading role of planning, and strengthen the coordination and cooperation between fiscal and taxation, finance, investment, import and export, energy, ecological environment, natural resources, prices and industrial policies. The investment authorities and natural resources departments at all levels regard planning as an important basis for the approval and filing of investment projects and the approval of land and sea use. The layout and construction of chemical parks, bases,

demonstration projects, major projects, etc. involved in the planning should implement the regional "three lines and one order" ecological environment zoning control requirements, and relevant development and construction plans and construction projects should carry out environmental impact assessment in accordance with the law. Make full use of existing funding channels to support major projects involved in planning. Deepen the cooperation between industry and finance, give full play to the role of the national industry and finance cooperation platform, and support projects that meet the plan through financial services, equity investment and other means. Actively use international rules to create a level playing field environment. Strengthen intellectual property protection and services.

### (三) Strengthen talent protection

Guide colleges and universities to optimize the layout of disciplines and majors according to the development needs of the raw material industry, and expand the training scale of professionals in mining, metallurgy, materials, chemistry and other disciplines. Deepen the construction of new engineering disciplines and optimize the professional structure in related fields. Carry out a survey of talent demand in key areas of the raw material industry, and build a big data platform and expert information database for industrial talents. Strengthen the training of urgently needed engineers and technical skills,

and implement the vocational education quality improvement and training plan. Increase the introduction of overseas high-level teams, talents and service guarantees. Implement the new material talent training plan, and continue to organize overseas and domestic training for talents in the field of new materials.

#### (四) Increase publicity and guidance

Make full use of various media and adopt various forms to strengthen publicity and reporting on planning content, implementation progress and typical experiences. Formulate refined industrial policies, eliminate the misunderstanding that the raw material industry is included in the "two highs and one capital" industry, effectively enhance industry self-confidence, guide the integrated development of industry and city, and create a good 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, and strengthen the publicity and implementation of plans.