

The "14th Five-Year Plan" for the development of the raw materials industry

Ministry of
Industry and
Information

Technology
Ministry of
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Ministry of
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Resources

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

It is a fundamental industry and a key area for winning international competitive advantages, and is the main force for the reconstruction of the industrial base and the main battlefield for the green development of industry. This plan is formulated to implement the Outline of the Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Visionary Goals for 2035, and to improve the quality and efficiency of the development of the raw materials industry.

I. Development situation

(i) Basis for development

The raw materials 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 materials industry has achieved remarkable results, the comprehensive strength has grown steadily, and the international competitiveness has continued to strengthen.

The scale advantage has been newly enhanced. In 2020, the added value of China's raw materials industry will account for 27.4 per cent of the industry above designated

size, and the gross

The output of steel, refined copper, electrolytic aluminium, methanol, urea, cement and flat glass has remained the world's largest for many years. The variety of materials has become richer, with the self-sufficiency rate of steel, aluminium and photovoltaic glass exceeding 98%, basically meeting the needs of the national economy and national defence and military industry. **New progress has been made in structural adjustment.** The total supply and demand of industries with serious overcapacity has been reduced.

Balance has basically been restored, the target of removing 150 million tonnes of iron and steel production capacity has been completed ahead of schedule, and strict control of electrolytic aluminium and cement production capacity has achieved obvious results. The industrial concentration of the top 10 cement enterprise groups has reached 58 per cent. The strength of enterprises will be upgraded at a faster pace. In 2020, China (excluding Hong Kong, Macao and Taiwan) will be listed among the world's top 500 raw material industry enterprises, accounting for 34, which will be the largest proportion of the shortlisted enterprises in the world.

This represents 29.1 per cent of the total. **Innovation capacity**

has reached a new level. The intensity of R&D investment increased from 2015

By 2020, it will have increased from 0.76 per cent in 2008 to about 0.9 per cent 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 centres and 26 national key platforms for new materials have been built. **Green Transformation**

The new look of the type of the new situation.

Comprehensive energy consumption per tonne of steel in key large and medium-sized enterprises decreased from 2015 by

It has decreased by 4.7%, the comprehensive AC power consumption of primary aluminium is 6.9% lower than the world average, the emission of sulphur dioxide per ton of steel and carbon dioxide emission of ten thousand yuan of industrial added value in the building materials industry have decreased by 46% and 16.5% respectively compared with that of 2015, and reached the world's advanced level in general. The level of comprehensive utilisation of resources has been steadily improved, and 168 sets of cement kiln co-disposal systems have been put into operation. The utilisation of calcium carbide slag has been fully realised, and the comprehensive utilisation rate of phosphogypsum has reached

40 per cent. **Intelligent manufacturing reached a new level.** Passed the assessment of the dualisation integration management system

There are more than 2,200 raw material enterprises, and the level of integration of large raw material enterprises is 61.1, which is 9.1% higher than the national average. The numerical control rate of key processes in the raw

materials industry is 65.7%, including 73.8% in petrochemical enterprises, which is 21.7 percentage points higher than the national average. Sixty intelligent manufacturing factories and digital workshops have been built.

(ii) Development environment

During the "14th Five-Year Plan" period, the raw materials 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 new development pattern to speed up the construction of the advantage of the domestic super-large-scale market to further play, especially in emerging areas and consumption upgrade demand for high-end materials.

It provides a broad space for the sustained and healthy development of the raw materials industry. The market system of fair competition in China is becoming more and more perfect, especially the gathering of various resource elements to advantageous fields and enterprises, which provides basic support for the raw materials industry to strengthen the resilience of the industrial chain. The new round of scientific and technological revolution and industrial change have reshaped the global economic

structure, especially the new generation of information technology and the deep integration of manufacturing industry, forging a new transformation and upgrading of the raw materials industry.

The advantages provided a source of motivation. **In terms of challenges,** in the face of the counter-current of economic globalisation and the new

Widespread impact of the coronary pneumonia epidemic, the industrial chain supply chain security risk highlights the expansion of the national

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

Demand for iron, electrolytic aluminium, cement and other major bulk raw material products will reach or approach the peak of the platform period one after another, and the momentum of scale and quantity demand expansion 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 raw materials industry green and safe development of the task is more urgent.

At present, the short boards and bottlenecks in the raw materials industry are still prominent, the serious surplus of low-end products and the lack of supply of high-end products co-exist, the core technology of key materials and equipment is not a high level of autonomy and control, the green and low-carbon development of the road, the level of digitalisation is difficult to effectively support the high-quality development of the key strategic resources to guarantee the ability to accelerate the solution of the problem. In the face of the new situation, new requirements, to maintain strategic stability, enhance the bottom line thinking, adhere to the system concept, accelerate the

promotion of raw materials industrial system optimisation and opening up and high-quality development.

II. General requirements

(i) Guiding philosophy

Adhere to Xi Jinping's thought of socialism with Chinese characteristics in the new era as the guidance, fully implement the spirit of the 19th CPC National Congress and the 19th Plenum, based on the new stage of development, completely, accurately, and comprehensively implement the new development concept, accelerate the construction of a new development pattern, with the theme of promoting high-quality development, deepening the structural reform of the supply side as the main line, reform and innovation as the basic driving force, and meeting the increasing needs of the people for a better life as the fundamental purpose. needs of the people, integrating development and security, focusing on improving the level of advanced industrial base and modernisation of the industrial chain, focusing on optimising the structure of traditional industries and products, fostering and growing the new material industry, accelerating the empowerment of information technology, and completing the industrial chain.

short boards, achieve low-carbon recyclability, and promote high-end and structural rationalisation of industrial supply,

The development of greening, transformation of digitalisation and security of the system will provide strong support for promoting the construction of a strong manufacturing country to a new level, and for making a good start and a good step towards building a modern socialist country in all aspects.

(ii) Basic principles

-Innovation leadership. Take technological innovation as the first driving force, and promote all kinds of creation. New elements are gathered to enterprises, horizontal cooperation among industries, universities, research institutes and applications is strengthened, vertical synergy of process technology, processing equipment and information technology is strengthened, industrial innovation ecology is improved, supply of common basic technology is strengthened, breakthroughs in strategic key technologies are made, integration of technological innovation and industrial development is promoted, and industrialisation of results is accelerated for large-scale application.

--Market-led. Respect for the laws of the market as a basic guideline, fully develop the

Wield the decisive role of the market in the allocation of resources, and strengthen the main position of enterprises in investment decisions, technology choices and other aspects. Follow the law of development of raw materials industry, better play the role of the government, focusing on strategic planning and guidance, standards and regulations, market order maintenance, industrial safety and security, to create a favourable development environment.

--Coordination of supply and demand. Make meeting domestic demand a priority task and build on new developments.

New requirements of the pattern, stabilise the reasonable proportion of the raw materials industry, strengthen resource security, improve the quality of supply, promote the coupled development of the raw materials industry, strengthen the upstream and downstream convergence, and form a high level of dynamic equilibrium in which demand pulls supply and supply creates demand.

--Green security. Take green safety as the bottom line of development, and focus on carbon peaking.

Carbon neutral target, improve energy and resource conservation and environmental protection, strengthen the whole industrial chain, the whole life cycle of green low-

carbon safety development, focus on improving the essential safety level of key industries, and achieve the organic integration of economic benefits with ecological and social benefits.

One.

(iii) Development goals

By 2025, the raw materials industry will ensure and lead the high-quality development of the manufacturing industry.

The capacity of the industry has been significantly strengthened; the growth rate of added value has been maintained at a reasonable level, and its proportion in the manufacturing industry has been basically stable; the scale of the new materials industry has been continuously upgraded, and its proportion in the raw materials industry has been significantly increased; and a pattern of industrial development with higher quality, better efficiency, better layout, greener and safer has been initially formed.

-Supply of high-end level continues to increase.

Advanced basic materials high-end products

Quality stability, reliability and applicability have been significantly improved. Some cutting-edge new material varieties achieve mass production and typical applications. A number of key basic materials in key strategic areas have been broken through. The collaborative innovation system will be more efficient and complete, and the national new materials platform system will be built initially. 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 rationalisation has continued to improve. Crude steel, cement and other key raw materials

The production capacity of bulk products will only be reduced but not increased, and the capacity utilisation rate will be maintained at a reasonable level. The degree of industrial concentration in key areas will be further improved, and 5 to 10 leading industrial chain enterprises with ecological dominance and core competitiveness will be formed. The industrial layout and production factors will be more coordinated, and more than five world-class advanced manufacturing clusters will be formed in the field of raw materials. The intensive level of chemical parks will be significantly improved, and a number of petrochemical industry bases will be formed.

--The level of greening of development has increased significantly. Iron and steel, non-ferrous metals, building materials

Key industries, such as the iron and steel industry, have achieved milestones in controlling total energy

consumption and carbon emissions. Comprehensive energy consumption per tonne of steel in the iron and steel industry has been reduced by 2 per cent, and energy consumption per unit of clinker in cement products has been reduced by 1 per cent.

The level of consumption was reduced by 3.7 per cent, and carbon emissions from electrolytic aluminium fell by 5 per cent.

Unit production in key industries

The intensity and total volume of pollutant emissions have both declined, and various industries have achieved stable emission standards, with new projects meeting ultra-low emission standards. The comprehensive utilisation rate of industrial waste and other solid wastes has been further improved.

--Industry digital transformation effect is

highlighted. Maturity of Intelligent Manufacturing

Capability 3

More than 20% of the enterprises will be classified as grade or above, the rate of numerical control of key processes will be 70% or above, and the level of numerical control of key processes in key fields such as iron and steel will be further improved. The level of digitisation, networking and intelligence in key industries will be significantly improved, the network security protection capacity of enterprises will be accelerated, more than 100 intelligent manufacturing demonstration factories will be built, and more than 10 industrial Internet platforms will be established.

--The foundation for system securing has become

more solid. Strategic resource security capacity has

been significantly

It has upgraded and formed a basically stable resource guarantee system. The level of autonomy and control of key production process technologies and equipment in key industries will be substantially increased, and the number of industry chain breakpoints and blockages will be significantly reduced. The level of intrinsic safety of key industries has been substantially improved. The task of relocating and transforming 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, autonomous and controllable.

III. Promoting high-end industrial supply

(i) Sound innovation systems

Strengthen the support of innovation platform carriers. Encourage advantageous enterprises to actively participate in the national key

Point laboratory construction and system restructuring, construction of national manufacturing innovation centres in key areas, and support for the establishment of provincial innovation centres. Supporting the integration of industrial chain and creation of

The new chain, the formation of industrial common technology research platforms, the enhancement of green metallurgy, high-end processing

Engineering capabilities such as engineering and stable preparation. Support localities to take various forms to build national key new materials pilot platforms in the light of local realities. Increase the construction of measurement and testing centres, platforms and alliances for the new materials industry. It will continue to organise the construction of national platforms for production and application demonstration, testing and evaluation of new materials, and synergistically promote product design, development and production, system verification and batch application. Improve the innovation service support system and establish a national public platform for new materials research facilities. It will establish a data centre for new materials and improve the ability of data to serve industrial development.

Optimise and improve the ecology of the innovation mechanism. Supporting raw material enterprises to increase investment, joint Co-operate with downstream enterprises, colleges and universities, and research institutes to carry out basic research and applied innovation around processes, equipment and products. Formulate pay incentive policies

for scientific and technological talents in state-owned enterprises, and provide incentive policy support in terms of performance appraisal, R&D investment, total salary, and treatment of talents. Select a number of enterprises with good innovation foundation, implement policies on the transformation of scientific and technological achievements on an experimental basis to enjoy the same benefits as those of universities and research institutes, liberalise the restrictions on shareholding by employees, increase the weighting of relevant indicators such as the transformation of innovative achievements in performance appraisals, and give preferential treatment to the core and backbone personnel who have made outstanding contributions. Strengthening international exchanges and cooperation, attracting key foreign enterprises and research institutions to invest and set up factories and R&D centres in China, and encouraging Chinese and foreign institutions to cooperate in materials technology innovation research. Support enterprises to set up overseas research and development institutions for materials technology and equipment, and carry out international technological innovation cooperation.

(ii) Tackling key technologies

Strengthen the in-depth integration of industry, academia, research and application, promote the optimal allocation of scientific research power and resource sharing among research institutes, universities and enterprises, and tackle the safety of complex deposits and ultra-deep shaft mines.

The mine process technology, such as full and efficient mining; overcome the composition and organisation uniformity control, the original

The company will improve product performance and its stability by homogenising and purifying materials and other process equipment technologies; tackle mercury-free calcium carbide PVC production, low-temperature and low-concentration flue gas desulphurisation and denitrification, enhanced dust removal by chemical agglomeration of fine particles, coordinated disposal of solid wastes (hazardous wastes) and resource utilisation of pollutant prevention and

comprehensive utilisation of resources to improve resource and energy utilisation and ultra-low emissions; and tackle intelligent manufacturing technologies such as on-line inspection and control, rapid identification and evaluation of raw material properties, fault diagnosis and predictive maintenance to improve total factor productivity. It has also tackled intelligent manufacturing technologies such as online inspection and control, rapid identification and evaluation of physical properties of raw materials, full life-cycle management of equipment, fault diagnosis and predictive maintenance, and improved total factor productivity. It will organise the promotion of advanced and applicable technologies, and formulate and release a catalogue of advanced and

applicable technologies for key industries on a rolling basis.

Column 1 Key Directions for Technological Innovation

Petrochemical and chemical 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 polyolefins, high-end lubricants, high-purity/ultra-high-purity chemicals and industrial special gases, and methane coupled olefins. Promote the clean and efficient use of coal, short process of coal to chemicals, the preparation of the whole industrial chain of bio-based materials, as well as low-cost and harmless treatment of phosphogypsum and resource utilisation, carbon dioxide capture and storage and comprehensive utilisation of technology engineering. Promote the industrialisation and application of technologies such as new micro-channel reactor equipment and continuous flow processes, hazardous chemical storage and transport safety, industrial internet and intelligent manufacturing, and low global warming potential refrigerant substitutes.

Iron and steel industry. Promote key common technologies such as high-efficiency and low-cost clean steel smelting, energy conservation and environmental protection, and the engineering of advanced electric arc furnaces and their manufacturing processes, near-final manufacturing, special smelting, high-end testing, and other general and special-purpose equipment and parts production technologies. Promote the industrialisation and application of technologies such as charge mining, low-grade difficult ore dressing, sintering flue gas recycling, mechanised raw material yard, blast furnace gas fine desulphurisation, high-efficiency desulphurisation and denitrification, waste heat recycling, medium and low-temperature waste heat utilisation, and high-value-added resource utilisation of steel slag.

Non-ferrous metal industry. Promote the research and development of new technologies such as mechanical digging and continuous mining, green and efficient mining of ion adsorption rare earth ores, efficient use of associated resources of rare earth polymetallic ores and lithium in salt lakes, material recycling in the extraction and separation process, and the preparation of ultra-high-purity metals and targets. Promote high cleanliness and high homogenisation metallurgy, high-performance alloy short flow preparation, high-performance rare earth permanent magnet materials, such as accurate penetration of the constituency technology, intelligent unmanned mining, mine safety management Internet of

Things and cloud services, artificial intelligence dosage and scheduling, the key process virtual simulation, smelting and separation of on-line monitoring and process control intelligence, machine vision quality on-line inspection and other intelligent manufacturing technology engineering. Promote the industrialisation of such technologies as high-efficiency sorting and pre-selection of low-grade complex ores, high-efficiency comprehensive utilisation of tailings and red mud, harmless disposal of hazardous wastes containing fluorine, arsenic and other hazardous components, and balanced utilisation of high-abundance rare earth elements.

Applications.

Building materials industry. Promote the research and development of new technologies such as deep desulphurisation and denitrification of cement, enhanced dust removal by chemical agglomeration, and high-efficiency low-carbon energy saving. Promote non-metallic ore grading and purification, crystal shape protection, particle shape and appearance control technology, special glass melting and forming technology, advanced ceramic powder preparation technology, high-temperature solid oxide fuel cell powder and its components co-firing technology, molding and sintering technology, large-size artificial crystal preparation technology, structural and functional integration of refractory integrated manufacturing and diagnostic maintenance of in-service technology engineering. Promote the unmanned operation of all processes in underground mines, three-dimensional simulation of open-pit mines, unmanned blasting, online monitoring of ores, efficient dissociation of graphite, large scale protection, non-fluoride purification, special glass fibres, basalt fibres and other high-performance fibres, such as intelligent continuous drawing in pool kilns, and other mine mining and deep processing technology industrial application of materials.

(iii) Breakthroughs in key materials

Adhering to materials first and demand-driven, focusing on national defence construction, people's livelihood and the major needs of the construction of a strong manufacturing country, the rolling development of key materials product catalogues and the development and release of technology roadmaps. The implementation of key short-board materials research action, the use of the "list of commanders", "horse racing" and other ways to support materials production, application enterprises and research units to carry out joint research units, wide-band semiconductor and display materials, integrated circuits, key materials,

bio-based materials, carbon-based materials, Bio-medical materials and other collaborative research. Implement the action of consolidating and upgrading bulk basic materials, guide enterprises to optimize the production process on the basis of the use of new-generation information technology, such as the industrial Internet, to enhance the comprehensive competitiveness of steel used in basic components for advanced manufacturing, high-strength aluminium alloys, rare and precious metal materials, special engineering plastics, high-performance membrane materials, new fibre materials, composites and other materials. Implement the forward-looking layout action of cutting-edge materials, support scientific research units to join hands with enterprises, grasp the development trend of the integration of new materials technology with information technology, nanotechnology, intelligent technology, etc., develop superconducting materials, intelligent bionic, additive manufacturing materials, etc., promote the systematic development of new backbone materials, and strengthen the support and guidance of the application field. Implement the materials genetic engineering programme, and explore the pilot application of new modes of materials research and development.

Implement key materials application promotion action,
optimise insurance compensation for the first batch of key
new materials application

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

Column 2 New Material
<p>Breakthroughs in key materials Focusing on large aircraft, aircraft engines, integrated circuits, information and communications, bio-industry and energy industry and other key application areas, to overcome high-temperature alloys, aerospace light alloy materials, ultra-high purity rare-earth metals and compounds, high-performance special steels, biodegradable biomaterials, special coatings, photoresists, targets, polishing fluids, industrial gases, bionic synthetic rubber, artificial crystals, high-performance functional glass, advanced ceramic materials, Special separation membranes and high-performance rare earth magnetic, catalytic, optical function, hydrogen storage materials and a number of key materials.</p> <p>Upgrading public platforms. Construct manufacturing innovation centres for high-end polyolefins, rare metals, powder metallurgy, advanced glass, (iv) Improving product quality Construct production and application demonstration platforms for information and communication equipment, energy conservation and environmental protection, and robotics equipment and materials. Construct a regional centre for new materials testing and evaluation platform and a data centre for new materials.</p> <p>Strengthen quality management and process control. Continuously carry out quality improvement in the raw materials industry</p> <p>By 2025, the ability to safeguard key materials will have been upgraded, and the capacity of public services will have been significantly improved.</p> <p>(c) Upgrading actions to improve the stability, reliability and More than 10 new materials platforms will be built.</p>

suitability of product quality. Promote the popularisation of advanced production management models such as performance excellence, quality diagnosis and continuous quality improvement. Guiding enterprises to strengthen total quality management, increase product testing and evaluation, equipment maintenance and security, personnel training, supplier

quality control, user complaints and feedback, manufacturing risk analysis and other aspects of work. 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 of information technology means, promote advanced moulding and processing methods, online testing, intelligent manufacturing, etc., to establish production process control and quality control system to meet the needs of the application, and to improve the whole life cycle of fertilizers, cement, waterproofing materials, heat-insulating and heat-protecting materials and other products. Quality control and traceability mechanism.

Promote product standards and brand building.

Take international advanced quality standards as the standard

It will strengthen the construction of material standard system, 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 synergies, and promote the saving of resources and the rational application of materials. Focusing on the needs of major technology and equipment, major projects, etc., a number of weather-resistant steel, bearing steel, aerospace aluminium, high-performance concrete, artificial crystals, composite materials and other high-end materials group standards are cultivated. Focusing on the direction of consumption upgrading and green development, revise and improve the standards for steel for construction, copper water and other materials.

(Standards for bulk materials and products such as (gas) pipes, waterproof and thermal insulation materials, decorative materials and bio-based materials. It has been deeply involved in international standardisation work, and has taken the lead in formulating international standards for advantageous industries. Guide enterprises to strengthen

the brand development strategy, and encourage enterprises to formulate enterprise standards that are higher than the relevant technical requirements of the recommended standards. Encourage petrochemical and chemical, iron and steel, non-ferrous metals, building materials and other industry associations and professional bodies to carry out brand cultivation management system industry standards, quality benchmarking and brand evaluation activities, strengthen industry self-discipline, increase the quality of industrial clusters brand, enterprise brand and other cultivation and publicity efforts to improve brand influence.

Improve the quality evaluation and certification

system. Formation of a quality enhancement technology base public

It has provided service platforms to enhance the quality evaluation capabilities of mineral products, smelting products, sintered products, processed materials and other products, such as stability test verification, environmental adaptability evaluation, failure and defect analysis, measurement certification, etc., to improve the quality evaluation system, and to promote the evaluation of process capabilities. Carry out the measurement capability

of raw materials industry enterprises to enhance action to encourage enterprises to improve the measurement management system, strengthen the confirmation of measurement equipment and measurement process control, the establishment of enterprise measurement security system. Promote iron and steel, non-ferrous metals, building materials and other industries to carry out quality grading evaluation, and strengthen the effective convergence with product standards, metrology and testing technology.

Receiving. Continuously carry out green building materials certification. Establish a certification system for new materials and support municipal

The construction of field-based and professional third-party high-end quality certification bodies, the promotion of quality compliance, process stability, service applicability of the whole industry chain, the whole life cycle, the whole region evaluation demonstration, to create an international certification brand, and actively promote the mutual recognition of certification results and evaluation standards among international certification bodies.

IV. Promoting the rationalisation of the industrial structure

(i) Consolidation of the results of the removal of production capacity

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

Policies related to the replacement of production capacity in the aluminium electrolysis industry have been implemented to prevent the blind and disorderly development of copper smelting and alumina, and new construction and expansion projects must reach the advanced value of energy consumption limit standards and the value of ultra-low pollutant emissions.

Strictly control urea, ammonium phosphate, calcium carbide, caustic soda, yellow phosphorus and other industries to add

new capacity, new projects should be implemented in the capacity of equal or reduced replacement. Encourage regions to expand the implementation of capacity replacement in the raw materials industry, improve the elimination of backward standards, the use of comprehensive standards in accordance with the law to promote the withdrawal of backward production capacity. It is strictly prohibited to build new projects in the restricted and eliminated categories of the Guidance Catalogue for Industrial Structure Adjustment.

Sound long-term mechanisms. Research into the establishment of a mechanism for the application of carbon emissions, pollutant emissions, and energy efficiency.

(c) A constraint mechanism to curb the expansion of excess capacity by means of total consumption and other means. Urban steel mills that fail to meet ultra-low-emission requirements and are weakly competitive, as well as steel mills in cities in key areas for air pollution prevention and control, have been taken to adopt such means as complete closure, transformational development, local transformation and relocation, so as to promote transformation and upgrading. Implementing regularised peak production of cement and exploring the establishment

of peak production mechanisms for steel and other industries. Strengthen petrochemical and modern coal chemical industry planning and planning environmental impact assessment, combined with the "13th Five-Year Plan" implementation effect and carbon peak carbon neutral requirements, scientifically determine the reasonable scale of industry development. Implementing energy-saving review, strict

Controlling the amount of fuel coal consumed by major coal-consuming industries such as petrochemicals and chemicals, iron and steel, and building materials.

Improve the long-term working mechanism for preventing overcapacity, open up reporting channels, strengthen joint law enforcement, enhance industry early warning, make full use of satellite monitoring, big data and other technical means, increase the investigation and handling of illegal and irregular new production capacity, and continue to maintain a high-pressure crackdown.

(ii) Guiding a rational layout

Optimise the layout of new production capacity.

Implementing major national regional strategies, regional coordination

It has promoted the adjustment and optimisation of the spatial layout of the raw materials industry on the basis of the development strategy and the strategy of the main functional area, and on the basis of territorial spatial planning. Implement the planning and layout programme for the petrochemical industry, and strictly prohibit the construction of new paraxylene and ethylene projects outside the planning. Optimise the layout of hazardous chemical production, prohibit new construction and

expansion of hazardous chemical production projects outside chemical parks, and ensure that the external safety protection distance of hazardous chemical production projects meets the relevant requirements. Promote the relocation and transformation of chemical enterprises in key watersheds into compliant chemical parks. Encourage iron and steel smelting projects to rely on existing iron and steel smelting production plants with conditions for clustering and construction. Alumina and other projects using overseas resources will be placed in an orderly manner in coastal areas. Scientific placement of sand and gravel resources mining rights, rational layout of a number of large-scale mechanism of sand and gravel production base. Supporting localities to combine their own advantages and industrial foundation, and reasonably layout new material projects in line with the classification catalogue of strategic emerging industries.

Promote standardised cluster development.

Formulate conditions for the identification of chemical parks and guide

Localities have identified a number of chemical parks to guide the clustering and standardised development of chemical enterprises. Promote the petrochemical industry to explore

the complementary development of modern coal chemical industry and traditional refining industry, renewable energy power generation and hydrogen production industry, guide the iron and steel industry to rely on urban mines to build distributed short-flow steel mills, and promote the layout of the aluminium industry from the "coal-electricity-aluminium" to the "coal" industry.

Shift to "hydroelectricity, wind power and other clean energy-aluminium" to promote the building materials industry to synergistic

Transforming the development mode of the circular economy by disposing of waste. Promote the construction of national industrial demonstration bases for new industrialisation in the field of raw materials, and promote the transformation and upgrading of industrial agglomeration into clusters. Focusing on industry segments or key products with a good industrial foundation, outstanding comparative advantages and leading technologies, giving play to the leading role of leading industrial chain enterprises, promoting the aggregation of elements and value enhancement, strengthening specialised collaboration and supporting capacity, and creating a number of petrochemical and chemical, iron and steel, non-ferrous metals, rare earths, green building materials, and new materials industry clusters. Timely issuance of production capacity warnings to prevent blind duplication of construction at the local level.

(iii) Optimisation of the organisational structure

Make leading enterprises bigger and stronger.

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

Removing obstacles to cross-regional mergers and reorganisations, clearing up restrictions such as market segmentation and regional blockades, coordinating the resolution of major issues in cross-regional mergers and reorganisations of enterprises, and supporting enterprises in accelerating cross-regional and cross-ownership mergers and reorganisations, increasing industrial concentration, and carrying out international operations. In the petrochemical and chemical industry, iron and steel, non-ferrous metals, building materials and other industries, cultivate a number of ecological dominance and core competitiveness of the industry chain leading enterprises, stronger and larger rare earth enterprise groups, and encourage rare metal enterprises to speed up the integration. Give play to the leading enterprises in the chemical and building materials industries to promote enterprise restructuring and reorganisation. For the completion of substantive mergers and reorganisation of iron and steel and other industries enterprises to give capacity replacement support policy. Improve the standardised management of the industry and promote the concentration of market elements in the dominant enterprises. Encourage financial institutions to provide comprehensive financial services to raw materials

enterprises implementing mergers and reorganisation, transformation and upgrading in accordance with the principles of controllable risk and commercial sustainability.

Nurturing and growing small and medium-sized enterprises. Improving the innovation capacity of small and medium-sized enterprises in the raw materials industry and specialisation levels, encouraging leading enterprises to include supporting SMEs in common production

Industry chain management, quality management, standard management, co-operative R&D management, etc., to establish stable

It has set up collaborative and supporting relationships in the areas of supply, production and sales, so as to realise the integrated development of large, medium and small enterprises. Focusing on the raw materials industry chain, advanced basic technology, core basic parts and components, to cultivate a number of speciality, speciality and new "small giant" enterprises, manufacturing industry single champion enterprises.

(iv) Promoting industrial synergy

Expanding domestic demand for medium- and high-end materials. For the construction of new infrastructure, high-end

In order to accelerate the upgrading of traditional materials and break down invisible barriers and unreasonable regulations that restrict the application of materials, we are working to improve the design and application specifications of green building materials and other mature products, expand the market for green building materials and pilot cities, and promote the application of green building materials and the construction of steel-structured

housing. Revise and improve 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-structured houses, and tap the consumption potential of high-end materials such as high-performance aluminium. Vigorously develop new markets and uses for traditional products, and continuously improve the competitive advantages and competitive efficiency of traditional industries. Strengthen the matching of supply and demand structures in the raw materials 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 of demand-driven supply and supply-created demand.

Strengthening upstream and downstream linkage.

Raw material enterprises to strengthen cooperation with upstream and downstream enterprises

Symbiosis, coupled development, to the production of parts and components, parts of the extension, to provide integrated material systematic solutions change. Adopt the cooperation mode of early intervention in R&D and

continuous improvement in the later stage, promote business model innovation and industry innovation, and promote the transformation of production-oriented manufacturing to service-oriented manufacturing. Support industry associations to build a platform to connect supply and demand. Establish and improve aerospace materials, heavy-duty gas turbine materials, integrated circuit materials and other materials.

materials, rare earth permanent magnet materials for new energy vehicle drive motors, and biomedical materials, Upstream and downstream cooperation mechanisms such as hot-rolled steel for construction. Give full play to the role of leading enterprises in driving the innovation and application of new materials. Supporting third-party organisations to carry out "one-stop" application demonstration of key materials.

V. Accelerating the greening of industrial development

(i) Actively implementing energy-saving and low-carbon actions

Focusing on the target nodes of carbon peaking and carbon neutrality, we will strengthen the concept of carbon-efficient development, fully implement carbon emission reduction actions, incorporate carbon emissions into environmental impact assessment, and give full play to the synergistic effect of pollution reduction and carbon reduction. It has formulated implementation plans for carbon peaking in key industries such as petrochemicals and chemicals, iron and steel, non-ferrous metals, and building materials, ensured that carbon peaking will be achieved by 2030, and encouraged industries and enterprises with the conditions to take the lead in achieving carbon peaking. Support enterprises to implement raw

material and fuel substitution, accelerate industrial coal-to-electricity and coal-to-gas conversion, 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. Supporting key industries such as iron and steel, cement and other key industries to build a system of statistical accounting, monitoring and assessment of carbon emissions in the whole production process. Accelerate the promotion of energy-saving and low-carbon transformation and upgrading of raw material enterprises, encourage enterprises to build energy management centres, and implement in-depth energy laddering. Optimise the trade structure of products, encourage the increase of imports of primary processed products, and strictly control the export of high-energy-consuming and low value-added products. Strengthening energy-saving supervision of key industries and implementing mandatory energy consumption limit standards per unit of product. Carry out industrial energy-saving diagnostic services. Strictly implement the policy of stepped electricity prices for key industries such as iron and steel, cement, electrolytic aluminium, etc., and improve the differentiated electricity price policy conducive to green and

low-carbon development.

Into coal gasification, carbon dioxide as feedstock for chemical production, hydrogen-rich carbon cycle blast furnaces, hydrogen kilns, hydrogen-based direct reduction and other technologies.

Promotion of advanced technologies. The petrochemical industry promotes low-carbon technologies such as the direct production of chemicals from crude oil, the intelligent micro-reaction and continuous production of fine chemicals, and the bio-fermentation of carbon monoxide-containing industrial tail gas to make ethanol. The iron and steel industry promotes low-carbon technologies such as the use of recycled materials in iron and steel, short-flow casting and rolling near the end, and biometallurgy of low-grade resources. The non-ferrous metal industry will promote low carbon technologies such as high current density and low energy consumption aluminium electrolysis, hot copper matte continuous blowing and low carbon raw material substitution. The building materials industry promotes low-carbon technologies such as co-disposal, low-carbon and high-performance cement, carbon capture and purification, oxy-rich combustion, all-electric melting and electric fusion, raw fuel substitution, and moulding and sintering.

Building pilot projects. It has organised and implemented pilot projects on low-carbon smelting such as hydrometallurgy and non-blast-furnace ironmaking, carried out pilot projects on the promotion and application of carbon dioxide capture and storage technology in the cement and coal chemical industries, promoted the application of carbon dioxide in the driving of oil and the synthesis of organic chemicals, and carried out pilot projects on low-carbon cement, hydrogen kilns and carbon-fixed building materials.

By 2025, key industries such as iron and steel, non-ferrous metals and building materials will have achieved milestones in controlling total carbon emissions.

(ii) Promotion of ultra-low emissions and cleaner production

It has pushed forward the implementation of ultra-low emission reforms in the iron and steel industry, and studied and promoted the implementation of ultra-low emission in key industries such as chemicals, coking, aluminium electrolysis,

copper smelting, lead and zinc smelting, cement, glass, refractory materials, graphite deep-processing and ceramics. Encourage petrochemical and chemical enterprises to carry out initial rainwater collection and treatment, and petrochemical and chemical, iron and steel industries to organise enterprises to carry out internal water-saving renovation. For enterprises producing, using and discharging priority control chemicals, implement mandatory cleaner production audits, promote key industries such as petrochemical and chemical industries, non-ferrous metals, building materials and other key industries to formulate cleaner production transformation and upgrading plans, and innovate cleaner production implementation modes for key raw material industries. Strengthen the centralised planning and management of tail gas resources in industrial parks and water laddering and centralised treatment, and promote the recycling, cleaning and high value utilisation of industrial tail gas. Strengthen the heavy metal pollution control in the non-ferrous metal industry, and harmlessly treat arsenic-containing smelting slag, aluminium ash and other hazardous wastes. Restrict and phase out highly toxic, highly polluting and environmentally risky chemical products and process technologies, prohibit the illegal production and use of

persistent organic pollutants, and prohibit the illegal production of mercury-added products. Supporting enterprises

Research and development, promotion and application of the reduction of the amount of industrial solid waste generated and the reduction of industrial solid waste hazards

Harmful production processes and equipment. We will strengthen the concept of green development throughout the life cycle of products, and vigorously promote green processes and products. It will guide enterprises and parks to carry out excellent environmental performance management, strengthen intelligent control and integrated management, and comprehensively build green factories and green parks. Strengthen ecological restoration of mines and build green mines. A number of key standards on environmental emissions and water conservation have been revised.

(iii) Upgrading the comprehensive use of resources

Supporting the efficient use of resources, continuously upgrading key processes and process management, improving the efficiency of primary resource use, and reducing resource and energy consumption at the source. Comprehensively promote the comprehensive utilization of solid waste in the raw materials industry, focusing on tailings, waste rock, fly ash, red mud, smelting slag, electrolytic manganese slag, industrial by-product gypsum, chemical waste residue, waste fibers and

composite materials, etc., and build a number of comprehensive utilization bases of industrial resources, and build comprehensive utilization of tailings waste, phosphogypsum, electrolytic manganese slag, etc., and iron and steel non-ferrous synergistically dispose of zinc-containing secondary resources projects in key regions, as well as coal gasification furnaces, cement kiln, large-scale sintered-brick tunnel kiln co-disposal of waste and other demonstration lines, to accelerate the realization of harmlessness, reduction and resource disposal. Encourage the nationwide implementation of phosphogypsum "slag to production". Accelerate the treatment of plastic pollution and plastic recycling, and promote the industrialisation and application of biodegradable plastics. Develop building materials cogeneration systems that enhance the efficiency of comprehensive resource utilisation. Promote the priority use of recycled water, seawater and other non-conventional water in the production process of raw material industries, and reduce the amount of new water intake. Promote the deep treatment and recycling of wastewater in petrochemical and chemical industries, iron and steel industries, and create a number of industrial wastewater recycling demonstration enterprises and parks.

Encourage conditional areas to promote the coupled development of petrochemical and chemical, iron and steel, non-ferrous metals, building materials, electric power and other industries, and establish a raw materials

Industrial coupling development parks to achieve the gradual use of energy resources and industrial circularity

Connections. Improve the
resource price formation
mechanism.

VI. Accelerating the
digitalisation of industrial
transformation

(i) Accelerating manufacturing process intelligence

Promote the construction of digital infrastructure.

Encourage enterprises to combine production process
conditions

Renovation, accelerating the deployment of intelligent sensors, processors, gateways, instrumentation and other digital tools and equipment, and improving the real-time sensing and data collection capabilities at production sites such as ore extraction, smelting and processing, chemical reaction and so on. Establish a unified data integration and management platform to realise centralised management of data for the whole process of R&D, production, operation, operation and maintenance. Encourage enterprises in a position to do so to apply new-generation information technologies such as 5G to upgrade their networks, and build a ubiquitous sensing and interconnected factory

operating environment.

Improve the level of production intelligence.

Encourage enterprises to develop and apply data-driven

Advanced process control system with dynamic, mechanistic, empirical and simulation models to optimise 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 feed, reaction process, smelting process, quality control, pollutant emission, and energy consumption. Construct digital twin models for major production scenarios, processes, and key core equipment. Encourage the application of robots in positions with high labour intensity, harsh working environment, high safety risks and high precision requirements. Establish an enterprise management and business decision-making system that integrates information on customer service, business management, production execution and process control.

Accelerate the change of enterprise management system. Support enterprises to carry out the integration of dual-use management system

(c) Pilot demonstration and graded standardisation

assessment. Organise and carry out the assessment of the degree of integration of the two systems, clarify the development priorities and promotion paths of enterprises with different degrees of integration, and guide them to

Upgrade the level of information technology integration and application on a level-by-level or cross-level basis. Supporting advantageous enterprises in dualisation

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

(ii) Promoting the empowerment of the industrial Internet

Accelerate the construction of the second-level node of identification resolution for the industrial Internet of raw materials, and promote the exploration and application of identification resolution in supply chain collaboration, product tracking and traceability, and inventory management. Encourage leading enterprises to build a networked collaboration platform with other enterprises to achieve resource sharing and collaborative

manufacturing in multiple production bases. Encourage leading industrial chain enterprises to build enterprise-level industrial Internet platforms, realise the integration of industrial chain supply chain, and build featured industrial Internet platforms for specific industries and regions as well as specialised technology-based industrial Internet platforms. Enterprises are encouraged to connect enterprise-side and user-side data based on the platform, and reconfigure the product structure and manufacturing process oriented to the needs of downstream customers, so as to achieve the transformation from mass mass production to mass customised production. Create a cross-industry and cross-field industrial Internet platform, and explore the cross-field integration of the raw materials industry with logistics, urban construction, energy and other industries. Encourage leading enterprises of raw material subsectors and third-party institutions to take the lead in building specialised and characteristic raw material industrial Internet platforms, and promote the digital transformation of key equipment and uploading to the cloud and platform. Focusing on key links to cultivate and promote a number of process management industrial APP and solutions, providing services for small and medium-sized enterprises

in R&D and design, software use, manufacturing, equipment operation and maintenance, business management, warehousing and logistics. Accelerating the exploration of raw material industrial

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

(iii) Strengthening the digital support base

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

Column 4 Digital
<p>Carry out pilot demonstration projects. Formulate guidelines and action plans for the digital transformation of intelligent manufacturing in key industries, and technology and specialisation of composite talents, team training efforts, the formation of a number of raw materials industry digital intelligent development of leading teams.</p> <p>Deepen the implementation of industrial Internet security classification and grading management for raw material production enterprises, and promote the application of enterprises and digital service providers to build industrial Internet platforms that link consumption and production, supply and manufacturing, products and services, and have the characteristics of the raw materials industry. Supporting local governments and park management departments to build regional industrial Internet platforms, and promoting the modernisation of the</p>

commercial password technology, and enhance the industrial Internet security protection capability of key industrial enterprises.

VII. Securing the industrial system

(i) Improving resource security capacity

Rational development of domestic mineral

resources. Increase in the development of iron ore, copper, potassium and other scarce

Efforts are being made to prospect for mineral resources, and active efforts are being made to search for minerals in the deep parts of existing mines and in the periphery. Tax incentives will be implemented to encourage the adoption of advanced processes and equipment to reduce the generation of mining solid waste, the efficient and intensive use of low-grade ores, and the comprehensive use of complex co-associated ores and mining solid waste. When drawing the red line of ecological protection and other control lines, they are fully connected with strategic mineral resource areas. Appropriate new high-standard mines will be built to strengthen the role of domestic mineral resources as "ballast" and basic guarantee capacity. Optimise the management mechanism of the annual mining total control index, and scientifically regulate the scale of mining of rare earths, tungsten and other mineral resources. Improve the policy on mineral resources royalties.

Expanding diversified resource supply channels.

Developing "urban mine" resources, supporting Advantageous enterprises have established large-scale recycling bases and industrial agglomerations for scrap steel and recycled aluminium, copper, lithium, nickel, cobalt, tungsten and molybdenum, and promoted the integrated development of recycling, dismantling, processing, classification and distribution of recycled metals. Construct a mineral resources reserve system that combines the participation of the state and enterprises, and the combination of product reserve and resource land reserve.

<p>Column 5 Strategic</p> <p>Improve the ore trading market system and form an open,</p>
<p>Resource Security Project</p> <p>Implementation of the requirements of the relevant planning for strategic mineral resources, implementation of the strategic mineral domestic</p>
<p>Promote international cooperation in the field of mineral</p> <p>prospecting action, and the realisation of the search for</p>

resources, optimise the structure and layout of overseas investment in accordance with the principles of equality and mutual benefit and win-win cooperation, participate in the development of overseas resources in a standardised and orderly manner, and enhance the ability of global strategy for mineral resources. Encourage the import of low-carbon petrochemical raw materials such as light hydrocarbons. Strictly enforce import standards for renewable resources and promote the import of high-quality renewable resources.

Increasing mining reserves. It supports the construction of key domestic mines for iron ore, copper and rare earths, and selects and builds a number of bases for the efficient development and utilisation of important inorganic and non-metallic mineral resources. Construction of renewable resources recycling projects in line with industrial policy. Encourage enterprises to carry out overseas resource exploration and development in a standardised manner, and build comprehensive resource bases such as integrated mining, processing and metallurgy.

By 2025, the ability to guarantee resources will be significantly improved, a stable and open resource guarantee system will be constructed, and a new resource guarantee system will be formed.

A number of first-class large-scale key mineral development enterprises have been set up in China, and more than 15 key non-metallic ore bases for efficient development and utilisation have been constructed. The domestic self-sufficiency rate of ferrous metals will be substantially increased, the ratio of scrap steel will reach more than 30 per cent, and the ratio of recycled copper and aluminium production will reach 35 per cent and 20 per cent respectively.

(ii) Enhancement of supporting capacities

Expand supporting supply channels. Combing raw materials key industry chain supply chain

Short boards, carry out supply security assessment of key equipment, parts and components, instruments and meters, raw and auxiliary materials, etc., and formulate work plans for supporting supply security. Promote the establishment of industry chain supply chain information sharing platforms in key industries and fields, and strengthen the docking of supply and demand of key supporting products. Support enterprises to establish a working mechanism to deal with industrial chain supply chain security, set up a sound reserve system, and improve the ability to guarantee supply in case of

emergency. Encourage enterprises to formulate and implement "spare tyre" plans 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, synergistic melting Technical equipment, large-scale melting and casting equipment, new quick-setting 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 instrumentation, to support the upstream and downstream enterprises, research institutes and supporting enterprises to carry out joint research and accelerate the breakthrough of bottlenecks, and to enhance the ability of the industry chain supply chain independent and controllable. Using the first (sets) 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 catalogue, to create a fair competition in the market environment.

Column 6 Chain-
<p>Organise collaborative research and development projects through the upstream, downstream and downstream of the industrial chain, large, medium and small enterprises to integrate and innovate, and organise collaborative research and development of high-end special production equipment, core parts and components, precision instruments for testing, core raw materials and auxiliary materials, and industrial basic software, so as to open up the blockage points of the supply chain.</p> <p>Expanding supporting channels. Promote the establishment of an information-sharing platform for industrial chain supply chains in key industries, strengthen the matching of supply and demand of key supporting products, establish industrial chain supply chain alliances in key areas, support the formation of consortiums among enterprises, and build an autonomous and controllable ecosystem through industrial synergy. It has studied the establishment of a reserve system that takes into account both strategic and commercial reserves, supported enterprises in formulating emergency reserve systems and work plans for important materials, key equipment and spare parts to cope with major emergencies, and reasonably planned for reserve varieties and reserve cycles, so as to enhance the risk-resistant capability of enterprises.</p> <p>By 2025, the breakpoints and blockages in the supply chain of the main industrial chain will be effectively resolved, and the level of security will be significantly improved.</p>

(iii) Enhancing safety and productivity

Strengthening the intrinsic safety of enterprises.

Adhere to people first and life first, and increase safety. Efforts have been made to reform all technologies and eliminate technologies and equipment that fail to meet the requirements for safe production. Promote enterprise source management, reduce safety risks, and improve the essential safety level of enterprises. It will implement the Industrial Internet + Safe Production Action Plan, make use of information technology to build a system for sensing,

monitoring, early warning, disposal and assessment of safe production based on the Industrial Internet, study and formulate guidelines for the implementation of Industrial Internet + Safe Production in key industries, and carry out pilot demonstrations. It will promote the intelligent construction of chemical parks and the relocation and transformation of hazardous chemical production enterprises in densely populated urban areas.

Promoting the implementation of the main responsibility of enterprises. Guidance to enterprises on the implementation of work safety laws and regulations regulation and standard system, strengthen the awareness of safety risk prevention, fulfil the main responsibility for work safety, and improve the level of work safety management. Supporting and encouraging enterprises to promote the standardisation of work safety, strengthening the role of safety technology and management teams, and providing good work safety training. Guiding enterprises to improve the monitoring and early warning mechanism of key parts, key links and major sources of danger, and establishing and improving the risk classification and control of production safety and hidden danger investigation and treatment.

The system of management.

VIII. Safeguards

(i) Enhanced planning and implementation

(c) Strengthening sectoral coordination and upward and downward linkages. Relevant State departments are working to implement the relevant work in accordance with their division of responsibilities. Each region will strengthen the connection with this plan and incorporate the main contents of the plan and major projects into the key work arrangements of the region. Petrochemical and chemical industries, iron and steel and other key industries around the planning objectives and tasks, combined with the actual implementation of the industry to develop specific views. Establish a mid-term evaluation mechanism to strengthen the dynamic tracking of the completion of the plan and new issues and situations arising in the implementation process, and adjust the content of the plan in accordance with the procedures when necessary. Industry organisations give full play to their role as a bridge connecting enterprises and the government, and provide timely feedback on planning and implementation issues and suggestions.

(ii) Enhancing policy synergies

Give full play to the leading role of planning, and strengthen the synergy between policies on fiscal, taxation, finance, investment, import and export, energy, ecology and environment, natural resources and price, and industrial policies. Investment authorities at all levels and authorities in charge of natural resources take planning as an important basis for investment project approval, filing and approval of land and sea use. The layout and construction of chemical parks, bases, demonstration projects and major projects involved in the planning should implement the regional "three lines and one single" ecological and environmental zoning control requirements, and the relevant development and construction planning and construction projects should carry out environmental impact assessment in accordance with the law. Make full use of the existing funding channels to support the major projects involved in the planning. Deepen the cooperation between industries, give full play to the role of the national platform for cooperation between industries, and actively support projects in line with the plan through financial services and equity investment. Actively apply internationally accepted rules to create a fair competitive market environment. Strengthen intellectual property

protection and services.

(iii) Strengthening human resources

Guiding colleges and universities to optimise the layout of disciplines and specialties in accordance with the development needs of the raw materials industry, and expanding the scale of personnel training in mining, metallurgy, materials, chemistry and other disciplines. Deepen the construction of new engineering disciplines and optimise the professional structure of related fields. Carry out the mapping of talent needs in key areas of the raw materials industry, and build a big data platform for industrial talents and an expert information database. Strengthen the cultivation of engineers and technical and skilled talents in urgent need, and implement the plan to improve the quality and excellence of vocational education. Increase the introduction of overseas high-level teams and talents and service guarantee. Implement the new material talent training programme, and continue to organise overseas and domestic training for talents in the field of new materials.

(iv) Increasing publicity and guidance

Make full use of various media and adopt various forms to strengthen publicity and reporting on the content, implementation progress and typical experience of the plan. Formulate refined industrial policies to eliminate the

misconception that the raw materials industry is included in the "two highs and one capital" industry across the board, effectively strengthen the industry's self-confidence, guide the development of industry-city integration, and create a favourable public opinion atmosphere for the high-quality development of the raw materials industry. Give full play to the role of industry associations and professional organisations to strengthen the implementation of the plan.