

Development Strategy of Emerging Industries (2035)

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Abstract: Strategic emerging industries are an important force guiding future economic and social development. Accelerating their development is an important measure to promote the upgrading of industrial structure and speed up the transformation of economic development mode in China. It is of great strategic significance to China's modernization. This paper focuses on the 14th Five-Year Plan and the development of strategic emerging industries by 2035. It also systematically analyzes their international environment, trend, present situation, experiences, and problems. It proposes general development ideas and key directions for the emerging industries in the future. The paper also offers relevant measures and suggestions with a view to provide a theoretical reference for the high-quality development of strategic emerging industries in China. This includes (1) promoting the overall coordination and optimizing top-level design to strengthen strategic guidance, (2) strengthening the foundation for innovation and improving the innovation system for the strategic emerging industries, (3) stimulating market vitality and encouraging the dominant position and leading role of enterprises in innovation, and (4) promoting openness and integration and insisting on the combination of "going global" and "bringing in."

Keywords: emerging industries; characteristics and strategic positioning; direction of development; 14th Five-Year Plan; 2035

1 Introduction

In 2010, the State Council decided to accelerate the cultivation and development of strategic emerging industries as an important measure to promote the upgrading of industrial structure and speed up the transformation of economic development mode [1]. After 10 years of development, the leading and driving role of emerging industries has become increasingly obvious, representing a new pillar in the construction of China's modern industrial system [2,3].

To promote the high-quality development of strategic emerging industries under the new situation, the Chinese Academy of Engineering launched the "Strategic Research on the Development of Emerging Industries (2035)" consulting project in 2018. As the fourth in a series of studies, the project aims to implement the spirit of the 19th National Congress of the Communist Party of China (CPC), adopt the innovation-driven development strategy and the Belt and Road initiative as guidelines, and study the new trends in the development of emerging international industries. By sorting out the systematic technologies in various key areas, the technologies needed for breaking industrial bottlenecks, and the cross-sectoral technologies, and condensing the problems facing the development of strategic emerging industries in the 14th Five-Year Plan, we will conduct research on technology foresight and the industrial system of emerging industries in the year 2035. The project strengthens top-level design, organization coordination, and method innovation, and conducts deep research on the Policy Group and the Comprehensive Group

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structures in accordance with six thematic groups of new generation of information technology industry, biological industry, high-end equipment manufacturing industry, new material industry, green low-carbon industry, and digital creative industry. It also proposes the 14th Five-Year Plan and the medium- and long-term strategic emerging industry development mentality, the key direction, and the countermeasure proposal.

As an academic presentation of the project “Strategic Research on the Development of Emerging Industries (2035),” this paper analyzes the development trend, current situation, and the existing problems of the industry, and refines the characteristics and orientation of its development. It proposes an overall thought on 14th Five-Year plan for strategic emerging industry development, the development principles for the plan, the major development direction of 2035, and policy measures and other interventions in the key areas of the industry, with a view towards emerging strategic industries for the scientific development of theoretical reference.

2 International environment and domestic situation

2.1 International environmental change and development trend

2.1.1 International macro environment

China’s strategic emerging industries face long-term challenges and opportunities in a complex international environment. On one hand, the development of emerging industries is directly facing fierce competition between advanced and underdeveloped countries. In particular, since 2018, as trade frictions between China and the United States have continued to escalate, the United States has intensified its efforts to curb the development of China’s emerging industries and seize control of technology. On the other hand, China’s Belt and Road Initiative has brought new opportunities and space for the development of emerging industries. Since 2013, its international cooperation with emerging industries in the countries along the belt and road has continuously strengthened. Its diversified investment, tripartite market cooperation, and international production capacity cooperation has also grown steadily. In the future, China will continue to deepen innovation cooperation, policy communication, and financial communication.

2.1.2 Industry trends

The new generation of information technology has become an important aspect of international competition. Technology has come to evolve and merge with traditional industries. The endowment of artificial intelligence (AI) with great energy has given birth to new technologies, new products, and new industries. Fifth Generation Mobile Communications (5G) + AI will start a major industry cycle.

Bio-industry is at the beginning stage of large-scale industrialization of biotechnology and will enter a period of rapid development around 2020. It is expected to gradually become one of the new leading industries in world economy.

Smart manufacturing is an important direction of global industrial transformation. As the fierce competition among developed countries in the field of high-end manufacturing equipment and high-tech equipment continues, traditional industrial powers will remain the leaders of smart manufacturing.

With the rapid development of key materials products, the acceleration of industrial upgrading, and the increasing demand for information-based materials, the supporting materials for high-end equipment manufacturing have become the core of development of the new materials industry.

Coal remains the main source of energy in many countries and the core of the current global energy system. Clathrate hydrate will continue to receive attention in the future, as nuclear power technology has upgraded from the second generation of nuclear power into the third generation of nuclear power, as well as to the R & D and demonstration application of the fourth generation of nuclear technology.

The international energy conservation and environmental protection industry has stepped into a technologically mature period, with industrial development focus shifting from end treatment to source reduction.

The new energy automobile grows and realizes electrical, intelligent, networked, and coordinated development. New energy vehicle technology research and development are highly active, contributing to the rapid development of infrastructure and service platform. The new charging technology has become a research hotspot.

The rapid development of mobile Internet and digital technology has come to drive the explosive growth of the digital creative industry: AI, big data, cloud computing, virtual reality, super-perception, and other next-generation technological revolutions have pushed it to new heights.

2.2 Current situation of domestic development

The *State Council's Decision on Accelerating the Cultivation and Development of Strategic Emerging Industries* unveils China's conception of them. The key directions of cultivation and development are energy conservation and environmental protection, new-generation information technology, biology, high-end equipment manufacturing, new energy, new materials, and new energy vehicles.

The 12th Five-Year Plan was a key period for China's strategic emerging industries to lay a solid foundation for development and enhance their core competitiveness. According to the *National Strategic Emerging Industries Development Plan For the 12th Five-Year Plan*, by 2015 the value added to the strategic emerging industries will account for 8% of China's GDP [4]. During the period of the 12th Five-Year Plan, the industrial scale continued to grow steadily, and the technical level of the industry continued to improve; by the end of it, the industrial added value accounted for 8% of GDP, which laid a solid foundation for the further development of the 13th Five-Year Plan. In 2015, the enterprises with more than 27 key industries earned 16.9 trillion yuan in revenue, accounting for 15.3% of the total industrial revenue [5].

The 13th Five-Year Plan was a strategic opportunity period for the cultivation and development of emerging industries. The *National Strategic Emerging Industries Development Plan for the 13th Five-Year Plan* proposed that the value added to strategic emerging industries would account for 15% of GDP by 2020, forming a new generation of information technology, high-end manufacturing, biology, green low-carbon industry, and digital creativity—five new pillar industries with a production value of 10 trillion yuan [6]. During the implementation period of the 13th Five-Year Plan, under the background of the gradual slowdown of China's economic growth, the strategic emerging industries achieved sustained and rapid growth, the overall development maintained a strong momentum, and the key industries steadily increased. In 2016 and 2017, the industry value added increased by 10.5% and 11.0%, respectively, greater than the 40% increase in the industrial value added by the whole country over the same period. In 2018, the industrial sector continued its fast growth trend, with its industrial value added increasing by 8.7% yearly—two percentage points faster than the industry above its scale in the same period [7].

2.3 China's development experience

The experience accumulated in the development of China's strategic emerging industries over the years is to enhance the innovation capacity of industries, improve the quality of development, expand new-type industrial clusters, and promote the openness and integration of industries [8].

(1) Accelerating the promotion of industrial innovation ability is the core of the development of emerging industries. Implementing the strategy of innovation-driven development, strengthening the strategic support of a modernized economic system, and promoting deep integration of scientific and technological innovation with economic and social development are the comprehensive requirements of economic and social development in the new era, and the key features for the emerging industries to move to the high end of the industrial value chain and speed up the creation of a source of industrial development.

(2) Promoting supply-side structural reform and improving the quality of development is the main direction of emerging industries. The development of China's strategic emerging industries is not balanced, and the key technologies and raw materials needed for high-quality industrial development depend on imports in a considerable proportion. China should actively promote supply-side structural reform, expand quality and incremental supply, cultivate new growth areas, and generate new growth drivers and supplies.

(3) New industrial clusters speed up the development of emerging industries. At the historic juncture of the new round of scientific and technological revolution and industrial transformation in the world, and the transformation of the development mode in China, China ought to stress the leading and supporting nature of the emerging industries and enhance the sustainable innovation, development ability, and competitiveness of industrial clusters. We ought to develop industry chain and innovation chain in coordination, cultivate new-type industrial clusters with distinctive features, promote the transformation of regional economic development, and embody the pattern of innovation in economic cluster development.

(4) Insisting on open and integrated development is the objective requirement of the strategic emerging industry. In line with the country's requirements to build a modern economic system with a more open development philosophy and an inclusive development approach, we will accelerate the development of international innovation and cooperation platforms, the efficient use of global innovation resources, and the dissemination and international application of dominant technologies and standards.

2.4 The problems

Since the 13th Five-Year Plan, significant achievements have been made in the development of strategic emerging industries; however, when compared to the development trend of global industries and considering the demand for high-quality development of domestic industries, some problems still remain that restrict the development and upgradation of the industries.

(1) The phenomenon that key core technologies in some industrial fields are “controlled by others” has not been eliminated fundamentally; the external technological dependence on fields such as basic components, raw materials, core equipment, and high-grade industrial software is high, the high end of the value chain is missing, and stranglehold problems still exist.

(2) The top-level design and the overall coordination of industrial development still needs to be improved. The regional distribution of industry does not reflect the differentiation of labor, does not show regional characteristics, the comparative advantages are insufficient, the phenomenon of industrial convergence is obvious, and the coordination of the industrial chain is not complete.

(3) The system comprising relevant regulations and standards is not sound. National and industry standards, design standards, and quality control standards are fragmented, and some sub-areas of the industry access system have not yet been established. For example, the legislation on energy conservation and environmental protection is still lacking, and the energy efficiency standards for key energy-using products, energy consumption quota standards for key industries, and pollutant emission standards are obviously lagging.

(4) Industrial innovation environment and market mechanism needs to be improved. The effective industrial innovation mechanism of “production, education, research, and application” has not been formed, and the transformation efficiency of technological innovation is not high; in some industries, it is difficult for innovative products to enter the market, and market problems such as financing difficulty and high financing cost cannot be solved effectively.

3 Viewpoint of the 14th Five-Year Plan’s development

In response to the strategic goal set for 2020–2035, China’s economic strength and scientific and technological strength have surged, enabling it to become one of the leading innovative countries. During the implementation period of the 14th Five-Year Plan, the core tasks of strategic emerging industries will be able to enhance the innovation capacity of industries, adhere to the development direction of open and integrated development, consolidate the industrial security system, and solve the choke hold issue in industrial development, focusing on superior resources to tackle the key problems and build a world-class industrial cluster as the leading path.

3.1 Development orientation

Facing the 14th Five-Year Plan and longer-term cycle, strategic emerging industries will become the new pillar of China’s modern economic system construction as well as the key industry category to solve the problem of unbalanced and insufficient economic and social development.

During the 14th Five-Year Plan, we will fully implement the new philosophy of development, cultivate and expand strategic emerging industries, consolidate the foundation of a modernized economy, and propel emerging industries to become important forces in economic and social development, and industrial transformation and upgrading. The aim will be to guide a deeper integration of the Internet, big data, AI, and other information technologies with the real economy and promote the development of world-class industrial clusters in the key regions of the Guangdong–Hong Kong–Macao Greater Bay Area, the Yangtze River Economic belt, the Yangtze River Delta region, and the Beijing–Tianjin–Hebei region. Through the development of new and old momentum transfer, we will support regional coordinated development and promote economic development to a higher quality stage.

In the future, China’s strategic emerging industries may face long-term challenges. Ramming the industrial base, expanding the industrial scale, and ensuring industrial security and future leading edge are the priority direction and focus of emerging industrial development. We will intensify efforts to foster development, concentrate resources and strength, actively guide enterprises to grasp the commanding heights of industrial technology, make good use of innovative resources worldwide, and comprehensively raise the level of international cooperation.

3.2 Path of development

Breaking the choke hold of industrial development is of urgent necessity to facilitate a high-quality development

of China's industry in today's world. Guided by the strategy of innovation-driven development, we will work hard to consolidate the security basis for industrial development, strive to achieve independent control of key industrial core technologies by 2025, and shake off the disadvantageous situation in which industrial development is constrained by others, driving a high-quality development of the emerging industries.

3.2.1 Concentrating superior resources to tackle key problems

By targeting key core technologies and key industries for breakthroughs, we will strengthen the integration of domestic resources, increase the concentration of talented people, highlight the urgent need for integrated circuits (IC), AI, biomedicine and other fields, adopt joint tackling forms of major projects, and faithfully implement the choke hold tackling plan. We will simultaneously strengthen basic research and applied basic research, and identify and carry out research breakthroughs in key common technologies, leading edge technologies, modern engineering technologies, and disruptive technologies, gradually alleviating and finally eradicating the problems that see industrial development constrained by others.

We will continue to improve the national innovation system, enhance our independent R & D capabilities, and accelerate the formation of an enterprise-based innovation mechanism for the integrated development of "production, education, research, and application." We will focus on the development of cutting-edge technologies and products, such as driverless cars, additive manufacturing, biotechnology, quantum computing, and communications; in addition, we will enhance the innovative development of high-speed railway, 5G, electric power, and other equipment to gain and maintain a leading position; push some fields to lead in technology, such as new energy vehicle, marine engineering equipment, robot, and more; and accelerate the development of key basic equipment such as large aircraft and aeroengines, high-grade CNC machine tools, high-performance medical equipment, and so on, narrowing the gap with the powerful countries.

3.2.2 Building world-class industrial clusters to strengthen international competitiveness

We will promote China's industries to the high end of global value chain and foster a number of world-class advanced manufacturing clusters [9]. In order to cope with this strategic deployment, we ought to correctly understand the development law of emerging industrial clusters, grasp its stage characteristics, and promote the formation of an innovation network. We ought to change the driving force of development, optimize the allocation of resources, scientifically create an innovative development environment for industrial clusters, and actively participate in international industrial cooperation and competition to enhance the international competitiveness of China's emerging industries.

We will further expand the openness of strategic emerging industries, strengthen cooperation and exchanges with the world's science, technology, and industry, and strive to develop in synergy. By promoting the implementation and further deepening of the "going global" strategy, guiding transnational cooperation among emerging industries within the framework of the Belt and Road Initiative and actively introducing advanced foreign technologies, talents, and management experience, we will seek the promotion of a new industry level through openness, cooperation, and win-win.

4 Development Direction for 2035

During the implementation period of the 14th Five-Year Plan, China's strategic emerging industries will face long-term challenges and a complex international environment, and should build an industrial safety system, upgrade industrial innovation capacity, and build world-class industrial clusters. It should focus on the key areas of industrial common technology, industrial bottleneck technology, and cutting-edge cross-sectoral technology, and build an innovative development system for the emerging industries to achieve a high-quality development of its emerging industries.

By 2035, China will be at the forefront of innovative countries, and the driving force for development will be fundamentally transformed. The levels of economic and social development and international competitiveness will be significantly enhanced. The development of strategic emerging industries needs to seize the historic opportunity of scientific and technological explosion and industrial transformation, lay out the frontier and subversive technology in an all-round way, and enter the middle and high end of the global value chain. China needs to classify the development direction of the six industries (Fig. 1), focus on IC, AI, biomedicine and other key fields, build an advanced technology system, lead basic research and cutting-edge research, synchronize with the world development at the industrial core technology breakthrough level, and construct emerging industrial clusters with multiple category, wide coverage, and organic contact.

4.1 Next-generation information technology industry

During the implementation period of the 14th Five-Year Plan, China will reach the international leading level in cloud computing, AI, big data, intelligent connected vehicles, Industrial Internet, and other fields, leading the high-end development of the industry and driving a high-quality development of the economy and society. It is estimated that the sales revenue of the new-generation information technology industry will be 35 trillion yuan by 2025, and the scale of information consumption will be 9.5 trillion yuan; moreover, an information technology comprehensive development system with a strong core competitive will be established, the integration among the primary industry, the secondary sector of the economy industry, and the tertiary sector of the economy industry will significantly deepen, and the pulling effect on real economy will be significantly enhanced. The international competitiveness of the products will be further enhanced, and several fields may reach an international advanced level.

During this period, the key development direction will comprise of the Internet of Things, communication equipment, intelligent connected vehicles, space-ground integrated information network, IC, operating system and industrial software, and core information equipment for intelligent manufacturing.

The key directions for 2035 will focus on next-generation mobile communications, next-generation network technology, information security, semiconductors, new displays, electronic components, cloud computing, edge computing, operating systems and software, AI, and big data.

4.2 Biological industry

In the same period, the ability of the whole industry chain—from scientific research to patent medicine—will be formed and strengthened in the field of new drug creation, laying the foundation for a continuous production of new drugs and therapies. Focusing on the capability goal of innovative drug construction and its R & D technology system, an original drug discovery system will be established by integrating modern biology, information technology, and materials sciences with precise drug design as the core. China should strengthen the in-depth research, development and universal application of gene therapy, cell therapy, immunotherapy, and metabolic regulation, highlighting the “original, innovative drugs” and “leading technology” stages of the development goals as soon as possible to promote China as a “country with strong innovation in medicine,” rather than a “big pharmaceutical country.”

The key development directions will be disease prevention, early diagnosis, treatment techniques and drugs, rehabilitation and reconstruction, Chinese traditional medicine, biorefinery, biomanufacturing of chemicals and materials, and bioreactor and equipment technology.

By 2035, China will strive to become the world center of biological science and technology, and the innovation highland of the biological industry. Major original scientific achievements and world-class scientific masters will emerge in many fields, and the country will become an important gathering place for high-end talents to innovate and start up in biotechnology.

Next-generation information technology industry		Biological industry		New materials industry		Digital creative industry	
<ul style="list-style-type: none"> Internet of Things Communication equipment Intelligent connected vehicles Integrated information network Integrated circuit Operating system and industrial software Intelligent manufacturing core information equipment 		Biomedicine <ul style="list-style-type: none"> Disease prevention Early diagnosis Treatment techniques and drugs Rehabilitation and reconstruction Chinese traditional medicine 	Biomanufacturing <ul style="list-style-type: none"> Biorefinery Biomanufacturing of chemicals and materials Bioreactor and equipment technology 	<ul style="list-style-type: none"> Advanced inorganic non-metallic materials Advanced metal materials for major engineering Polymer and composite materials High-performance rare earth materials New energy and energy-saving and environmental protection materials Information functional materials High-end biomedical materials Advanced new materials and material's genetic engineering 		Digital creative technology equipment <ul style="list-style-type: none"> Ultra-high-definition industry VR/AR industry Digital content production and innovative design software 	Digital content innovation <ul style="list-style-type: none"> Digital cultural content creation Intelligent content production platform Cultural resources transformation
Innovative design <ul style="list-style-type: none"> Innovative design of manufacturing Innovative design of service industry Innovative design of human settlement 							
High-end equipment manufacturing industry				Green low-carbon industry			
Aviation equipment	<ul style="list-style-type: none"> Large passenger aircraft Military fighters Large transport aircraft Regional aircraft Utility aircraft and helicopters Aeroengine Aviation equipment 	Marine equipment	<ul style="list-style-type: none"> Offshore oil and gas development High-tech ship Marine resources development Medium-and high-grade ice equipment Equipment and technical system of marine environment stereoscopic observation 	Intelligent manufacturing equipment	<ul style="list-style-type: none"> Aerospace and aeroengine manufacturing process equipment Key manufacturing process equipment such as new-type marine ship and deep-sea exploration Complete equipment and production line for processing key parts of new energy automobile gearbox Ultra-precision machining equipment urgently needed in national key fields 	Energy new technology industry	<ul style="list-style-type: none"> Clean and efficient coal utilization industries Unconventional natural gas industry Comprehensive energy service industry Nuclear energy industry Wind power industry, solar photovoltaic industry, biomass energy industry and geothermal industry
Space equipment	<ul style="list-style-type: none"> Remote sensing Communications and broadcasting Navigation and positioning functions 	Equipment for people's livelihood	<ul style="list-style-type: none"> Agricultural equipment Food equipment Textile equipment Medical equipment 		Energy conservation environmental protection	<ul style="list-style-type: none"> Energy saving industry Environmental protection industry Resource recycling industry 	New energy vehicle industry

Fig. 1. The development direction of China's strategic emerging industries.

4.3 High-end equipment manufacturing industry

In response to the upgrades of capabilities for the new-generation major equipment in fields like heavy-lift launch vehicle, large aircraft, marine engineering, and people's livelihood, and the urgent need for high-grade manufacturing equipment, China should make full use of the advantages of the new nationwide system for tackling key core technologies and pool all kinds of innovative resources to carry out frontier layout and application demonstration of major national scientific and technological projects.

(1) In the field of aviation equipment, the focus is on developing large transport aircraft, large passenger aircraft, military unmanned aerial vehicles, and other standard equipment, taking into account small and low-cost general aviation equipment.

(2) In the field of space equipment, China will coordinate the building of space and ground systems, and build an integrated system which integrates remote sensing, communications and broadcasting, and navigation and positioning functions.

(3) In the field of marine equipment, the level of information and intelligence will be raised. In response to the urgent need for the development of offshore oil and gas and the construction of high-tech ships, it is imperative to look forward to deploy new equipment for the development of marine resources, improving the equipment and technical system for the three-dimensional observation of the marine environment.

(4) In the field of intelligent manufacturing equipment, it is urgent to accelerate the development of equipment in key areas of the state, such as aerospace aircraft and aero-engine manufacturing process equipment, new ships and deep-sea exploration and other marine key manufacturing process equipment, and the new energy vehicle transmission key parts processing equipment and their production lines.

(5) In the field of high-end equipment for people's livelihood, China needs to encourage the scientific and technological innovation of new-generation, intelligent agricultural equipment, accelerate agricultural mechanization, and transform and upgrade the agricultural machinery industry. China should focus on smart manufacturing and green manufacturing of the textile industry, and the development of food equipment will emphasize flexible automation, integration, synthesis, systematization, agility, and intelligentization. Regarding medical equipment, China should stress its foundation and standard-matching application, speeding up the industrialization of the high-end domestic type.

4.4 New materials industry

We aim to achieve the goal of reaching the international advanced level, building an innovative system for the new material industry system, promoting large-scale green manufacturing enablement and recycling, ensuring the basic needs of the national economy, national security, and sustainable social development, and ultimately transforming China's material industry from big to strong.

During the implementation period of the 14th Five-Year Plan, the key development direction will focus on advanced inorganic non-metallic materials, advanced metal materials, polymer and composite materials, high-performance rare earth materials, new energy and energy-saving and environmental protection materials, information functional materials, high-end biomedical materials, advanced new materials, and materials' genetic engineering.

The key development goals for 2035 are: improve the innovation system of electronic information materials to support the large-scale utilization of new energy sources and the development of energy-saving and environmental protection industries; transform the inorganic non-metallic materials industry from big to strong; and achieve international leadership in metal materials engineering technology. The technical system and product series of carbon fiber materials will meet the needs of the army and the people, and a modern biomedical materials industrial system—with a main body of biomedical materials for renewable tissues and organs—will have been completed. Moreover, we will have a breakthrough in the core patent group of rare earth materials and their preparation.

4.5 Green low-carbon industry

4.5.1 Energy new technology industry

Based on the law of energy development, the current situation of the country's energy, and the development trend of new energy technologies during the period of the 14th Five-Year Plan and its development stage toward 2035, we will deal with outstanding issues such as the clean and efficient use of energy resources, energy security under carbon constraints, and new energy technologies and related industries to effectively support economic growth; in addition,

we will focus on developing clean and efficient coal utilization industries, an unconventional natural gas industry, the comprehensive energy service industry, the nuclear energy industry, the wind power industry, the solar photovoltaic industry, the biomass energy industry, and the geothermal industry.

4.5.2 Energy conservation and environmental protection industries

During the period of the 14th Five-Year Plan, we will focus on improving the environmental quality (a core requirement of the energy-saving and environmental protection industry), strengthening the prevention and control of air, water, and soil pollution, and giving full play to the key role of scientific and technological innovation in the whole process of pollution prevention and control, such as source reduction, process control, and recycling. Breakthroughs should be made in key technologies regarding areas such as major pollution factors, major point sources of pollution, major types of ecological damage, and pollutant monitoring to establish a scientific and technological system of environmental engineering that promotes fundamental improvement in China's ecological and environmental governance.

Facing the year 2035, the focus of industrial development is to make breakthroughs in key areas such as prevention and control of air, water, and soil pollution, soil remediation, and recycling of solid wastes to achieve universal application and benefit from good environmental quality.

4.5.3 New energy vehicle industry

During the period of the 14th Five-Year Plan, we will strengthen core technological innovation, encourage large-scale construction and market-oriented development of infrastructure, establish a public service platform, and form an independent and complete industrial chain. Sales of pure electric vehicles and plug-in hybrid vehicles will reach seven millions annually, with more than 20 millions in total ownership; the accumulative ownership of fuel cell vehicles will reach 50 thousands.

By the year 2035, major progress will be made in the commercialization and high-quality development of the industry as well as the electrification, intelligentization, networking, and sharing of automotive technology. Pure electric and plug-in hybrid electric vehicles will account for more than 70% of the total sales of vehicles, and the fuel cell vehicle technology and industry will fully mature, entering the stage of large-scale application.

4.6 Digital creative industry

The rapid development of information technology and the integration of related industries have brought new opportunities and formed new models for the digital creative industry. Through the 10–15-year development, it will make great progress in the following five aspects: innovative design system, digital content production system, digital content dissemination system, pan-information consumption system, and pan-communication interaction system.

During the 14th Five-Year Plan, the key development directions will focus on the ultra-high-definition industry, the Virtual Reality/Augmented Reality (VR/AR) industry, digital content production and innovative design software, digital cultural content creation, intelligent content production platform, cultural resources transformation, and the innovative designs of the manufacturing industry, the service industry, and the environment for human settlement.

The key directions for development in 2035 are: accessibility of information in the Internet of everything; wired/wireless digital content transmission with a 1 Gbps rate; accurate distribution of digital contents; audio-visual contents with real-world experience; real-world and virtual-world mixed experience; holographic images and immersive experience; barrier-free creative collaboration, idea design transfer, and design production linkage; customized digital content consumption; intelligent production and personalized customization of contents; and the innovative designs of the manufacturing industry, the service industry, and the environment for human settlement, which have achieved the world's advanced level.

5 Proposals for policy and measures

5.1 Strengthening overall planning and coordination, as well as strategic leadership, and optimizing top-level design

In view of the bottleneck in the development of emerging industries, the establishment of national major scientific and technological projects will continue to tackle key problems. We will strengthen the effective alignment of national plans, eliminate information segregation, beggar-thy-neighbor practices and sectoral competition, and improve the efficiency of the use of national resources. We will coordinate and improve support policies for the

biotechnology industry to equip people's livelihood and establish an interministerial coordination mechanism for key industries and national strategic advisory committees.

5.2 Perfecting innovation foundation and strengthening the industrial innovation system

We will promote the emergence of mass technology and applied basic research; a national innovation center for strategic emerging industries will be set up to explore a coordinated innovation model for the entire industrial chain. We will accelerate the building of common technology platforms and improve the sharing mechanism for major national research infrastructure as well as the establishment and improvement of industry standards for emerging industries, so that the development process for the emerging industries are "law-based" and showcase "law enforcement evidence."

5.3 Stimulating market vitality and placing enterprise innovation in the main role

In accordance with the principle of competitiveness, the layout for several national technological innovation centers will rely on the operation of leading enterprises; we then ought to reasonably increase stable and necessary financial support to innovative small and medium-sized enterprises via market-oriented means. We will improve the diversified investment mechanism for industrial development, encourage and standardize investment in industrial mergers and acquisitions, and foster leading enterprises in the industry. In this respect, we ought to carry out the technological transfer mechanism of "industry–university–research–application" cooperation and marketization, turn the evaluation of innovation achievements to actual output, and expand application.

5.4 Increasing openness and integration, and attaching equal importance to "going global" and "bringing in"

China should consolidate the core of industrial chain's "long board" and adapt a global layout. We will encourage international cooperation in R & D and in the application of industry platform technologies, establish an innovation policy system in line with international rules, and implement differentiated policy management in accordance to the characteristics of industry technologies. Finally, we will make good use of global scientific and technological achievements, intellectual resources, and high-end talent, and encourage an orderly two-way flow.

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