The "14th Five-Year Plan for the Development of Shandong Provinc Chemical Industry" was issued.

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According to Polaris Environmental Protection Network, on November 18, the Shandong Provincial Department of Industry and Information Technology issued a notice on printing and distributing the "14th Five-Year Plan for the Development of Shandong's Chemical Industry ". The plan proposes that by 2025, the operating income of large-scale chemical enterprises in the province will reach about 2.65 trillion yuan, with an average annual growth of about 7%, maintaining the leading position in the country in terms of industry scale; the added value of high-end chemical industry will grow at an average annual rate of about 10%, accounting for more than 50% of the province's total chemical industry, basically building a strong chemical province, taking the lead in forming a modern chemical industry system in China, and building a world-class green chemical industry cluster.

—Strive to create 8 leading enterprises with a value of over 50 billion yuan, including 1-2 with a value of over 100 billion yuan, and more than 10 high-end chemical industry clusters with a value of over 100 billion yuan;

—The chemical industry's R&D investment accounted for more than 1.3% of its operating revenue, cultivated 30 national-level innovation platforms, achieved breakthroughs in core technologies in key areas, and comprehensively enhanced its innovation-driven capabilities;

—The rate of chemical enterprises entering the park has increased to over 45%, the output value of chemical parks and key monitoring enterprises has increased to over 80% of the industry, and there are 8 parks with operating revenue exceeding 50 billion yuan, including 3 parks with revenue exceeding 100 billion yuan.

—Safe, green, and circular production processes have reached the leading level in China; the sales revenue per unit of energy consumption in the chemical industry has increased to 30,000 yuan/ton of standard coal; the wastewater recycling rate in the industrial park is no less than 45%; the comprehensive utilization rate of general industrial solid waste is no less than 90%; and the comprehensive treatment and recycling of "three wastes" have been fully realized.

Details are as follows:

Notice from the Shandong Provincial Department of Industry and Information Technology on Issuing the "14th Five-Year Plan for the Development of Shandong's Chemical Industry"

To the Industry and Information Technology Bureaus of all cities:

The "14th Five-Year Plan for the Development of Shandong Province's Chemical Industry" is hereby issued to you. Please implement it conscientiously in light of your actual circumstances.

Shandong Provincial Department of Industry and Information Technology

September 29, 2021

(This document is publicly released)

Shandong Province Chemical Industry "14th Five-Year Plan" Development Plan

Foreword

The chemical industry is a vital energy and raw material industry, playing a comprehensive and fundamental supporting role in the economic industrial chain, national defense security, and people's health. As a traditional pillar industry of Shandong Province, after decades of accumulation and development, its total economic output has ranked first in the country for many consecutive years, occupying an important position in the national chemical industry layout and the province's economic structure, and making significant contributions to the sustained and stable development of the economy and society at various stages. During the 13th Five-Year

Plan period, the Provincial Party Committee and the Provincial Government earnestly implemented the spirit of the 19th National Congress of the Communist Party of China, adhered to the people-centered development philosophy, and carried out in-depth special actions for the transformation and upgrading of the chemical industry's safe production. They vigorously promoted the high-end, high-quality, and high-efficiency development of the chemical industry as an inherent requirement of implementing the strategy of transforming old growth drivers into new ones. The overall landscape of Shandong's chemical industry has undergone significant changes, and it is accelerating its transformation from a major chemical province to a strong chemical province.

The 14th Five-Year Plan period is a crucial period for the transformation and restructuring of Shandong's chemical industry, facilitating a shift in its growth drivers. As a fundamental industry of the national economy, the chemical industry will become even more important, facing stricter requirements under the new circumstances of "dual carbon" (carbon dioxide, carbon emissions, and carbon sequestration), and making high-quality development even more urgent. Guided by General Secretary Xi Jinping's speech that "achieving carbon peaking and carbon neutrality is a broad and profound systemic transformation of the economy and society," Shandong's chemical industry is developing with a focus on systemic structural reform, resolutely eliminating outdated growth drivers, upgrading traditional drivers, and cultivating and expanding new drivers. Accelerating the optimization and upgrading of the chemical industry system is of great significance for promoting Shandong's development into a strong province in advanced manufacturing and new energy and new materials, and achieving the strategic goal of "leading the way and creating a new era." To clarify development goals and guide and promote the high-end, green, and sustainable development of Shandong's chemical industry, this plan is formulated in accordance with relevant national industrial policies and the requirements of the "14th Five-Year Plan for National Economic and Social Development of Shandong Province and the Outline of Long-Term Goals for 2035," and in line with the "Shandong Province High-End Chemical Industry Development Plan (2018-2022)" and the "Lubei High-End Petrochemical Industry Base Plan." This plan is a guiding plan to promote the high-quality development of the chemical industry in the province, and the planning period is from 2021 to 2025.

I. Basic Environment

(I) Current Development Status. The "13th Five-Year Plan" period was a time when the province's chemical industry experienced both incremental growth and transformation of existing assets, and emphasized both safe and green development and transformation and upgrading. Guided by the special action for safe production transformation and upgrading, the province's chemical industry focused on the overall,

fundamental, and essential issues of the industry, vigorously promoted the transformation of old and new growth drivers, adhered to the principles of addressing urgent needs first, tackling both symptoms and root causes, and focusing efforts precisely. It steadily advanced the investigation and rectification of hidden dangers, the governance of scattered and disorganized enterprises, the improvement of industrial parks, and the enhancement of industrial quality and efficiency. As a result, the industry's development level significantly improved, and the high-quality development of the chemical industry took a new step forward.

1. Maintaining Leading Overall Strength. In 2020, the province had 2,844 large-scale chemical enterprises, achieving operating revenue of 1.9 trillion yuan, accounting for 22.5% of the province's total industrial output above designated size and 17.1% of the national petroleum and chemical industry, maintaining its leading position in the country in terms of economic output. The province's output of crude oil processing, tires, fertilizers, pesticides, caustic soda, and other products ranked among the top in the country, with a complete range of products and continuously strengthening competitiveness of key products. 43 enterprises had operating revenue exceeding 10 billion yuan, and 6 enterprises, including Dongming Petrochemical, Lihuayi, Wanhua Chemical, Haike Group, Jingbo Group, and Qilu Petrochemical, exceeded 50 billion yuan. In the 2020 China Top 500 Chemical Enterprises, 105 were from our province, ranking first in the country; 26 enterprises were awarded the title of Manufacturing Single Champion Demonstration Enterprise, the most of any province in the country, and the leading role of key enterprises has significantly improved.

Output of major chemical products of enterprises above designated size in Shandong Province in 2020

(10,000 tons, %)

名　称	数量	占全国比例	全国排名
一、无机化工原料			
硫酸（折100%）	541.1	6.5	4
浓硝酸（折100%）	27.3	11.8	4
盐酸（氯化氢，含量31%）	83.5	10.8	1
碳酸钠（纯碱）	383.7	13.6	4
氢氧化钠（烧碱，折100%）	982.4	27	1
离子膜法烧碱	873	26.1	1
二、化学肥料			
合成氨	584.3	11.4	1
化肥总计（折纯）	353.9	6.6	6
氮肥（折含氮100%）	332	9	4
磷肥（折含P2O5100%）	4.3	0.4	17
钾肥（折含K2O100%）	17.6	2.5	4
三、有机化工原料			
乙烯	119.9	5.6	9
纯苯	160.6	15.4	2
精甲醇	412.3	8.3	4
冰醋酸	163.1	22.7	2
四、合成材料			
初级形态塑料	941.1	9.1	3
低密度聚乙烯树脂（LDPE）	22.6	5.1	7
高密度聚乙烯树脂（HDPE）	44.3	6.4	6
线性低密度聚乙烯树脂（LLDPE）	9.3	1.2	18
聚丙烯树脂	200.6	7.6	6
聚氯乙烯树脂	232.6	11.2	3

合成橡胶	111.6	15.1	2
合成纤维	35.3	0.6	9
五、精细化工			
涂料	79.7	3.2	13
化学农药原药	28.5	13.3	2
化学试剂	545.5	19.3	1
六、轮胎制造（万条）			
橡胶轮胎外胎	38509	47	1
子午线轮胎外胎	32370.3	53.8	1

2. Orderly withdrawal of outdated production capacity. Adhering to the principles of safety first and ecological priority, the province's chemical enterprises underwent a "four-level rating and one-evaluation" system, assessing safety, environmental protection, energy conservation, quality, and transformation and upgrading. More than 2,300 unqualified production enterprises were closed down. Capacity reduction and consolidation were effectively and orderly promoted, eliminating 44.47 million tons of outdated and relocated local refining capacity; the coking industry implemented list management and "production based on coal availability," reducing capacity by 13.56 million tons; the nitrogen fertilizer industry eliminated 255 fixed-bed gasifiers, reducing synthetic ammonia capacity by 1.47 million tons; the tire industry eliminated low-end rubber mixing and vulcanization equipment, reducing low-end bias tire capacity by 22 million units; chlor-alkali enterprises accelerated energy-saving renovations of electrolytic cells, with 13 enterprises achieving energy consumption per ton of alkali below the national advanced value.

3. Emerging growth drivers are accelerating. Active efforts are being made to build, supplement, extend, and strengthen industrial chains. Projects such as Yantai Wanhua's million-ton ethylene project, Dongying Weilian Chemical's 2 million-ton PX project (phase one), Qingdao Haiwan Chemical's 400,000-ton/year ethylene-based polyvinyl chloride project, Qixiang Tengda's 200,000-ton/year MMA project (phase one), Lianhong Xinke's 1 million-ton methanol-to-olefins project, and Luxi Chemical's 200,000-ton/year caprolactam-nylon 6 and 200,000-ton/year polycarbonate projects have been successively put into operation, clearing "bottlenecks" and "blockages" in the industrial chain. A number of major projects, including Yulong Island's 20 million-ton integrated refining and chemical project, Tianchen Qixiang Nylon 66 new materials project, Hualu Hengsheng Nylon 6 project, and Jingbo Zhongju brominated butyl rubber project, have commenced construction, which will strongly drive the high-end development of the industrial chain.

4. Innovation level continues to improve. The province's chemical industry added 12 provincial-level engineering technology research centers, bringing the total to 6 national-level and 76 provincial-level engineering technology research centers. A total of 66,000 invention patents and 27,000 utility model patents were applied for. Three projects, including "Development and Application of Complete Technology for Ultra-Low Sulfur Emission and Resource Utilization of Sulfur-Containing Waste Gas from Refining and Chemical Industry," won the second prize of the National Science and Technology Progress Award. The Zhongya Tire Test Ground built by Linglong Group

Technology Progress Award. The Zhongya Tire Test Ground built by Linglong Group was completed and put into operation. A number of high-tech products, such as the hydrogen fuel cell membrane from Dongyue Group, the EVE liquid rubber compounding from Sailun Group, and the special oil for vaccines from Qingyuan Group, filled domestic gaps.

5. The agglomeration effect is more pronounced. Yantai took the lead nationwide in issuing management measures for the recognition of chemical industrial parks, standardizing the recognition of 74 chemical industrial parks, 10 specialized chemical industrial parks, and 125 key monitoring points. The rate of chemical enterprises entering these parks increased from less than 20% to 34%, and the output value of these parks accounted for over 70% of the industry's total output value. Five parks, including Qilu Chemical Industrial Park, Dongying Port Chemical Industrial Park, Jining Chemical Industrial Park, Yantai Chemical Industrial Park, and Liaocheng Chemical Industrial Park, entered the top 30 chemical industrial parks nationwide in 2020. The city has cultivated and strengthened industrial clusters and leading enterprises. Eight chemical clusters, including the Yantai High-end Chemical Industrial Cluster, the Zibo High-end Fine Chemical Industrial Cluster, and the Guangrao County Rubber Tire Industrial Cluster, have become "top ten" industrial clusters, playing a leading role in industrial development.

6. Smart empowerment is gradually deepening. The construction of "smart factories" and "digital workshops" is being promoted, and a number of smart manufacturing demonstration enterprises, such as Tianhong Chemical, Haikeruilin, Jingbo Petrochemical, and Binhua Group, are being cultivated. The construction of smart industrial parks has fully commenced. Liaocheng Chemical Industrial Park, Dongying Port Chemical Industrial Park, and Jining Chemical Industrial Park have been selected as pilot demonstration units for smart chemical industrial parks in China, accounting for one-quarter of the national total; 10 parks have entered the national pilot creation units for smart industrial park construction, accounting for one-fifth of the national total. Construction of the Shandong Provincial Smart Chemical Industry Comprehensive Management Platform has been launched. The intelligent monitoring access rate of major hazard sources in the province's chemical industry has reached 100%, and the province's hazardous chemicals safety production risk monitoring and early warning system has been completed and put into operation.

(II) Problems and shortcomings.

First, the industrial level remains low. Products are still mainly low-end, bulk basic varieties, with insufficient refinement. The development of high-tech new chemical materials and high-end specialty chemicals is inadequate, and the industrial chain is short with weak key links. Second, the concentration of industrial layout remains unreasonable. The rate of enterprises entering industrial parks needs further

improvement, the synergistic effect of industrial clusters is weak, and there are only 27 parks with an output value exceeding 10 billion yuan, accounting for only 32% of the total number of chemical industrial parks in the province. Third, there is insufficient impetus for innovative development. Enterprises invest little in R&D, have weak original innovation capabilities, and lack the ability to tackle key common technologies in the industry. Solving the "bottleneck" products and technologies remains a long and arduous task, and the soft environment for attracting high-level R&D institutions and talents is not optimized enough. Fourth, enterprises' main responsibility for safe and green development is not in place, and investment is insufficient. Some enterprises have low levels of safety in their technical routes and process equipment, failing to meet the requirements of sustainable development.

(III) Situation and Environment.

The international macroeconomic situation is complex and severe. The outbreak and spread of the COVID-19 pandemic has disrupted international trade, caused financial market turmoil, escalated regional conflicts, and fueled the rise of trade protectionism. Furthermore, the destructive effects of the US-China trade friction on global industrial, supply, and value chains are gradually amplifying, severely impacting the process of global economic integration. Developed countries are implementing "reindustrialization" and "manufacturing reshoring" strategies, with a clear "reverse transfer" trend of high-end manufacturing returning to developed countries. This intensifies global competition for high-end supply chains and will continue to influence global industrial development and the division of labor. Simultaneously, a new round of technological revolution and industrial transformation is emerging, and the green, low-carbon, and digital economy are bringing transformative opportunities for the economic and social development of various countries.

The domestic economy remains stable and positive. my country has achieved a moderately prosperous society in all respects, demonstrating significant institutional advantages, social stability, strong development resilience, and a vast market, laying a solid foundation for high-quality economic and social development. The CPC Central Committee's strategic decision to build a new development pattern of "dual circulation" and the "Belt and Road" Initiative will accelerate the tapping and release of the potential of the domestic super-large market, seek win-win cooperation in the international market, and enhance the stability of industrial and supply chains. The integrated development of new industrialization and informatization, along with the widespread application of digital technologies such as 5G, big data, cloud computing, and mobile internet, continues to drive high-quality economic growth. New infrastructure construction, public service system development, and consumption upgrading are creating huge demand for industries such as new energy, new materials, and high-end equipment.

The chemical industry faces both opportunities and challenges. International economic restructuring and my country's high-quality economic development present rare opportunities for the transformation and development of the chemical industry. Sectors such as automobiles, rail transportation, aerospace, electronics and information, high-end equipment, energy conservation and environmental protection, and modern agriculture will provide broad development space for new chemical materials, new energy, and specialty chemicals. my country's commitment to "peak carbon and carbon neutrality" will place higher demands on the development mode of the chemical industry, forcing industrial restructuring and high-quality economic development, and providing strong impetus for energy efficiency improvement and energy structure adjustment. With increasingly stringent safety and environmental standards, the tasks of industry transformation, upgrading, and green development remain heavy. Faced with trade protectionism and changes in the global petrochemical market's supply and demand pattern, the need to stabilize and strengthen the industry's industrial and value chains is more urgent. The strong momentum and rapid development of the chemical industries in the Pearl River Delta and Yangtze River Delta regions will pose a strong competitive challenge to the chemical industry in our province. During the 14th Five-Year Plan period, the chemical industry in our province should seize opportunities amidst crises and create new prospects amidst changes, accelerate supply-side structural reforms, and achieve high-quality industrial development.

II. General Requirements

(I) Guiding principles.

Guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, and thoroughly implementing the spirit of the 19th CPC National Congress and the Second, Third, Fourth, and Fifth Plenary Sessions of the 19th CPC Central Committee, we will earnestly implement General Secretary Xi Jinping's important instructions and requirements for Shandong's work, adhere to the general principle of seeking progress while maintaining stability, accurately grasp the new development stage, fully implement the new development philosophy, accelerate integration into the new development pattern, take high-quality development as the theme, resolutely eliminate outdated growth drivers, resolutely transform and upgrade traditional growth drivers, resolutely cultivate and strengthen new growth drivers, continuously optimize the layout, expand clusters, improve the industrial chain, strengthen industrial parks, build a high-end chemical industry system, and accelerate the construction of a strong chemical province.

(II) Basic Principles.

1. Uphold safe and green development. Firmly grasp the people-centered development philosophy and regard safe production, energy conservation, and environmental protection as the lifeline of the chemical industry's development. With a view to "peak carbon and carbon neutrality," adhere to the low-carbonization of chemical production and the greening of chemical consumption, strengthen the rigid constraints and driving force of standards, pay attention to source control and precise management, continuously improve the inherent safety level and green development level of enterprises, and seek new opportunities and new impetus for development from safe and green development.

2. Uphold and promote innovation-driven development. Give full play to the core role of innovation in leading development, strengthen the leading role of enterprises in innovation, cultivate innovation R&D platforms and service institutions, support enterprises in strengthening basic research and applied innovation, cultivate and introduce talent teams, enhance innovation capabilities, accelerate the transformation of scientific and technological achievements, break through a number of key common technologies and complete sets of equipment, and enhance the core competitiveness of the chemical industry.

3. Adhere to the "dual circulation" development pattern. Deepen supply-side structural reform in the industry, improve effective supply capacity, accelerate efforts to address weaknesses and strengthen strengths, promote the development of the chemical industry towards the mid-to-high end, tap domestic consumption potential, and adapt to the growing market demand. Consolidate international competitive advantages and stabilize the foreign trade pattern. Actively respond to the "Belt and Road" initiative, support enterprises in carrying out international production capacity cooperation, and enhance international competitiveness.

4. Uphold the principle of optimizing and upgrading the industrial ecosystem. Comprehensively advance the upgrading of the industrial base and the modernization of the industrial chain, accelerate the exit of outdated and inefficient production capacity, and promote the development of chemical products towards functionalization, refinement, and differentiation. Guide enterprises to merge and reorganize, optimize resource allocation and industrial chain structure, and improve production efficiency and profitability. Vigorously develop producer services and encourage enterprises to transform from production-oriented to production-service-oriented. Strengthen the construction of supporting facilities and management service capabilities in industrial parks to enhance the development level of the parks.

(III) Main objectives.

By 2025, the operating revenue of enterprises above designated size in the

province's chemical industry will reach approximately 2.65 trillion yuan, with an average annual growth of about 7%, maintaining the province's leading position in the country in terms of industry scale; the added value of high-end chemical industry will grow at an average annual rate of about 10%, accounting for more than 50% of the province's total chemical industry, basically establishing the province as a strong chemical province, taking the lead in forming a modern chemical industry system in China, and building a world-class green chemical industry cluster.

—Strive to create 8 leading enterprises with a value of over 50 billion yuan, including 1-2 with a value of over 100 billion yuan, and more than 10 high-end chemical industry clusters with a value of over 100 billion yuan;

—The chemical industry's R&D investment accounted for more than 1.3% of its operating revenue, cultivated 30 national-level innovation platforms, achieved breakthroughs in core technologies in key areas, and comprehensively enhanced its innovation-driven capabilities;

—The rate of chemical enterprises entering the park has increased to over 45%, the output value of chemical parks and key monitoring enterprises has increased to over 80% of the industry, and there are 8 parks with operating revenue exceeding 50 billion yuan, including 3 parks with revenue exceeding 100 billion yuan.

—Safe, green, and circular production processes have reached the leading level in China; the sales revenue per unit of energy consumption in the chemical industry has increased to 30,000 yuan/ton of standard coal; the wastewater recycling rate in the industrial park is no less than 45%; the comprehensive utilization rate of general industrial solid waste is no less than 90%; and the comprehensive treatment and recycling of "three wastes" have been fully realized.

III. Development Priorities

(I) Focus on building six major bases to strengthen industrial clusters.

Relying on key industrial parks, we will optimize the allocation of resources, implement a number of major projects, guide the further agglomeration of industries, form distinctive regional characteristics, and create a high-end chemical industry development pattern with prominent technological advantages and orderly regional collaboration.

1. The Northern Shandong High-End Petrochemical Industrial Base. Relying on 10 chemical industrial parks in Yantai, Weifang, Dongying, and Binzhou along the southern coast of the Bohai Sea, the base will construct four petrochemical functional zones: the Yantai Petrochemical New Materials Zone, the Weifang Petrochemical-Salt

Chemical Coupling Zone, the Dongying Refining and Chemical Integration Zone, and the Binzhou Specialized Refining and Chemical Zone. Based on the Shandong Yulong Petrochemical Industrial Park and the Yantai Chemical Industrial Park, the base will accelerate the construction of projects such as the Yulong Petrochemical Refining and Chemical Integration Zone, constructing the Yantai Petrochemical New Materials Zone. This zone aims to become a model project for the high-quality development of the national petrochemical industry's transformation and upgrading, and a landmark project for Shandong Province's new and old kinetic energy conversion, striving to build a globally leading high-end petrochemical manufacturing base. Relying on parks such as the Weifang Binhai Chemical Industrial Park, the Changyi Xiaying Chemical Industrial Park, and the Shouguang Houzhen Chemical Industrial Park, and leveraging industrial foundations and pipeline transportation and storage advantages, the base will be built into a leading domestic integrated petrochemical, salt chemical, and fine chemical production base and an important crude oil pipeline gathering and transportation hub, constructing the Weifang Petrochemical-Salt Chemical Coupling Zone. Relying on industrial parks such as Dongying Port Chemical Industrial Park, Dongying District Chemical Industrial Park, and Guangrao Chemical Industrial Park, we will promote the construction of projects related to paraxylene (PX) and its downstream products, and build the Dongying Refining and Chemical Integration Zone. Relying on industrial parks such as Binzhou Port Chemical Industrial Park and Binzhou Lubei Chemical Industrial Park, and utilizing condensate gas field resources, we will expand the breadth and depth of the industrial chain, build the Binzhou Characteristic Refining and Chemical Zone, and create a large-scale integrated refining/gasification base and a distinctive refining and chemical industrial park integrating petrochemicals, salt chemicals, and new materials. We will strive to build a world-influential high-end petrochemical industrial base in Lubei, becoming a pioneering area for high-end chemical industries in the ecological protection and high-quality development of the Yellow River Basin.

2. The Eastern Peninsula Chemical New Materials Industrial Cluster. Leveraging the existing strengths of Yantai and Weihai's new materials industries, and highlighting the leading role of chemical industrial parks and key enterprises, the cluster will accelerate the development of a complete industrial chain from basic chemical raw materials to high-end chemical new materials. Relying on the Yantai Chemical Industrial Park and Laiyang Chemical Industrial Park, the cluster will focus on developing high-end polyolefins, polyurethanes, polyamides, and other distinctive and advantageous industries, as well as high-tech, high-value-added new materials such as functional membrane materials, electronic chemicals, new energy battery materials, high-performance resins, high-performance synthetic rubber, and high-performance fibers. It will also accelerate the construction of projects such as integrated isocyanate production, citral and its derivatives production, integrated hydroformylation, and high-

end TFT liquid crystal electronic materials. Relying on the Wendeng Chemical Industrial Park, the cluster will accelerate the industrialization of downstream products such as carbon fiber reinforced composite materials, extend the carbon fiber integrated products industrial chain, and build the largest carbon fiber and product production base in China. It will also accelerate the development of advanced polymer materials, focusing on polysulfone series resins, polymer nanomaterials, high-performance membrane materials, and special engineering plastics, aiming to create a nationally renowned advanced polymer materials industrial base.

3. Shandong Central High-End Specialty Chemical Industry Cluster. High-end salt chemical industry clusters will be established in Zibo, Guangrao (Dongying), and Shouguang (Weifang), leveraging the combined production capacity of caustic soda and chlorine/hydrogen. This will accelerate the vertical extension and horizontal coupling of the salt chemical industry, enhance the competitiveness of traditional industries such as chlor-alkali, soda ash, and bromine deep processing, and promote the upgrading and optimization of existing industries and the value-added of the value chain. Relying on the Huantai Maqiao Chemical Industrial Park and the Dongyue Fluorine-Silicon Materials Industrial Park, the fluorine and silicon industry sectors will be strengthened and optimized. The focus will be on developing high-end functional materials such as soluble polytetrafluoroethylene (PTFE) and ethylene/tetrafluoroethylene monomer copolymers, as well as fluorine-containing high-end functional chemicals such as fluorocarbon alcohols and methoxytetrafluoroethylene. The range of specialty silicon materials will be enriched and improved, and the development of silicon-containing high-end functional chemicals such as silicone-acrylic emulsions, electronic encapsulation adhesives, and silane coupling agents will be extended. The promotion and application of hydrogen fuel cell membranes will be accelerated. Relying on Dongying Guangli Chemical Industrial Park and Dongying Port Chemical Industrial Park, we will explore the potential for downstream functionalization of methane chloride, actively develop high-end green refrigerant products, accelerate the refined development of epichlorohydrin intermediate product allyl chloride, and focus on downstream development of high-end fine chemicals such as dibromopropanol, allylamine, allyl ester monomers, and silane coupling agents. We will also actively develop downstream industries using hydrogen-consuming products such as aniline and hydrogen peroxide as raw materials and encourage the development and utilization of hydrogen energy. Relying on Weifang Binhai Chemical Industrial Park, Shouguang Houzhen Chemical Industrial Park, and Shouguang Yangkou Chemical Industrial Park, we will promote the functionalization and high-end development of bromine deep processing industries, guide the refined extension of traditional chlor-alkali downstream industries, and plan and construct downstream deep processing projects for chlorine such as thionyl chloride, sucralose, and terephthaloyl.

4. Lunan Modern Coal Chemical Industry Cluster. Adhering to the principle of controlling new additions and optimizing existing resources, the Lunan Modern Coal Chemical Industry Cluster will be established in Zaozhuang, Jining, Heze, and Tai'an. Fully leveraging the advantages of the basic coal chemical industry, traditional coal chemical production capacity will be reduced. Utilizing coal-to-syngas and coal tar as raw materials, the research and development and production of downstream coal-based fine chemical products will be accelerated. Relying on the Tancheng Chemical Industrial Park, Lunan High-Tech Chemical Industrial Park, Xuecheng Chemical Industrial Park, Zoucheng Chemical Industrial Park, Ningyang Chemical Industrial Park, and Yuncheng Chemical Industrial Park, a coal chemical industry cluster will be created, with coal-based multi-product production as the main body and new materials and fine chemicals as its distinctive and differentiated development areas. Key development projects will focus on coal gasification technology research and demonstration projects, as well as projects such as comprehensive utilization of coke oven gas, deep processing of benzene, deep processing of coal tar, and downstream high-end chemicals from coal gasification. This will promote the coordinated development of coal chemicals, oil chemicals, and salt chemicals, creating a coal chemical industry base with circular economy characteristics and industrial structure advantages.

5. Northwest Shandong Chemical Enterprise Transformation Demonstration Zone. Fully leverage the demonstrative and driving effect of leading enterprises, promote new technologies, new products, and new business models, and accelerate the transformation and upgrading of traditional industries. Relying on the Liaocheng Chemical Industrial Park, Shenxian Chemical Industrial Park, Dezhou Canal Hengsheng Chemical Industrial Park, and Leling Chemical Industrial Park, accelerate the construction of downstream integrated projects such as caprolactam, adiponitrile, and ethylene, develop and expand high-value-added products such as new chemical materials and electronic chemicals, and further improve the quality of regional industrial development.

6. Yellow Sea Port Petrochemical Industrial Zone. A Yellow Sea Port Petrochemical Raw Material Distribution Zone will be established in Qingdao West Coast New Area and Rizhao Lanshan District, creating a nationally important logistics hub for chemical raw materials and finished products. Leveraging the advantages of Qingdao Dongjiakou Port's liquid chemical terminal, and focusing on imported ethane, propane, methanol, ethylene, C4, and C5 resources, the zone will promote the high-value-added transformation of imported petrochemical raw materials, accelerate the construction of projects such as propylene, polypropylene new materials, and functional new materials, and plan and develop integrated refining and chemical projects within the industrial zone. Utilizing the advantages of Rizhao Lanshan's deep-water port, and relying on its tank farms and pipeline storage and transportation

advantages, a national-level port petrochemical raw material and product distribution zone will be established, accelerating the development of a bulk petrochemical commodity trading center.

(II) Optimize and upgrade eight major industries and extend the industrial chain.

1. Petrochemicals. Leveraging existing high-quality enterprises as leaders, steadily promote integration and restructuring, strictly implement capacity replacement ratios, and ensure that refining capacity only decreases and does not increase. Shut down and withdraw the capacity of local refineries participating in the Yulong Island refining and chemical integration project. By 2022, a total of 15.2 million tons of capacity from six local refineries will be shut down and withdrawn. Based on the implementation of major petrochemical projects, promote the phased integration and transfer of refineries in densely populated urban areas and local refineries with a refining capacity of 3 million tons or less that have not yet achieved refining and chemical integration, improve the intensification and integration level of refining and chemical enterprises, promote the construction of major projects, and optimize basic refining and chemical products. Steadily and orderly promote the relocation of refining and chemical enterprises in urban areas such as Jinan and Qingdao to achieve safe, green, and high-quality development. Deploy the innovation chain around the industrial chain, break through key technologies and complete sets of equipment in a number of high-end functional materials, specialty chemicals, and functional chemicals, and focus on supporting the downstream high-end chemical new materials and specialty chemical industries of olefins and aromatics. Accelerate the creation of an "oil-to-chemicals, high-end-to-chemicals" industrial chain through chain extension and supplementation projects to achieve high-end and differentiated development of the petrochemical industry. Make rational use of overseas light hydrocarbon resources, adopt routes such as light hydrocarbons, condensate oil, and methanol as raw materials to produce olefins, and appropriately develop large-scale light hydrocarbon cracking projects to alleviate the contradiction of insufficient olefin raw materials, providing abundant basic raw materials for the extended development of new chemical materials, specialty chemicals, and fine chemical products. Focus on developing six major industrial chains: "ethylene-polyolefin/synthetic resin-end application", "propylene-polypropylene/engineering plastics and modified materials", "butene-C4 synthetic materials-rubber and plastic products", "toluene-isocyanate-high-performance polyurethane-end products", "benzene-polyamide-nylon new materials-textile and engineering materials", and "PX-PTA-polyester".

2. Coal-based Fine Chemical Industry. Accelerate the reduction of coke production capacity within the province, eliminate coke ovens with a carbonization chamber height of less than 5.5 meters and heat recovery coke ovens, and promote the reduction and replacement of coke ovens with a carbonization chamber height of

5.5 meters and above. Organize the consolidation and withdrawal of independent coking enterprises with a capacity of less than 1 million tons in a single plant area. Promote the "steel-coke integration" layout, continue to implement "coke production determined by steel production" and "production determined by coal production," and ensure that the coke-to-steel ratio remains stable at around 0.4. Guide coking enterprises that meet the planning requirements to expand and extend their industrial chains and increase the proportion of chemical products by focusing on technologies such as comprehensive and efficient utilization of coke oven gas (hydrogen), deep processing of coal tar, and crude benzene refining. Continue to eliminate intermittent atmospheric pressure fixed-bed gasifiers, accelerate the implementation of clean coal gasification technology, control the total fertilizer production capacity, and promote weight reduction and efficiency improvement. Using clean coal gasification as a platform, we will diversify syngas products, strengthen and extend the industrial chain, and develop downstream deep-processed products such as acetate and adiponitrile, as well as coal-based new materials such as polyoxymethylene, ethylene-based polyvinyl chloride, polycarbonate, nylon 6, and nylon 66. We will increase product added value and refinement, and accelerate the formation of a coal-based chemical industry system with three main categories: coal-based oxygen-containing chemicals, coal-based chemical intermediates, and coal-based chemical new materials. We will focus on developing the coal-based fine chemical industry chain.

3. Salt Chemical Industry. Promote the reduction and replacement of chlor-alkali production capacity, and strictly control production capacity. Accelerate technological transformation, promote the application of new electrolyzers, reduce energy consumption per ton of alkali per electrolysis unit, and ensure that more than 50% of enterprises meet the advanced value of national energy consumption standards. Promote domestically produced ion-exchange membranes and focus on improving the performance and technological self-control of domestically produced ion-exchange membranes. Accelerate the integrated development of "green electricity and salt chemicals" to reduce carbon emissions in the salt chemical industry. Encourage the comprehensive utilization of waste hydrochloric acid to produce chlorine and hydrogen. Explore the coupling points between salt chemicals and related industries such as petrochemicals, coal chemicals, and fluorochemicals, and build related industrial sectors such as high-end polyvinyl chloride, green refrigerants, high-end fluorine materials, functional chemicals, and chlorinated polymers, based on chlorine. Accelerate the research and development of hydrogen purification, storage, and transportation technologies, and expand the utilization of hydrogen energy. Guide the salt chemical industry to extend towards strategic emerging industries such as new materials, new environmental protection, and new energy.

4. Tire Industry. Strictly implement industrial policies and standards, and integrate and phase out enterprises with an annual production capacity of less than 1.2 million

and phase out enterprises with an annual production capacity of less than 1.2 million all-steel radial tires (excluding engineering tires, aviation tires, and wide-section tubeless tires) and less than 5 million semi-steel radial tires (excluding run-flat tires, high-end racing tires, and ultra-low profile tires). Expired capacity can be replaced through capacity reduction. Eliminate rubber mixing mills that cannot achieve closed-loop automatic feeding and vulcanizing equipment in the radial tire industry that cannot achieve nitrogen filling processes. Focus on high-end and niche markets, develop high-end products such as ultra-low profile, low-profile, low rolling resistance, low noise, and run-flat tires. Increase R&D and production of high-performance radial tires such as smart tires, safety tires, low rolling resistance tires, and ultra-wear-resistant tires, as well as aviation tires, giant all-steel engineering tires, and high-performance motorcycle radial tires, to improve product added value and market share. Strengthen the Shandong Peninsula tire industry cluster and the Lubei tire industry cluster, enhance industrial supporting connections, refine the Luxi rubber additives industry cluster, and expand the Ludong rubber processing equipment industry cluster. We will comprehensively upgrade the digitalization, networking, and intelligentization of the tire industry, promote the construction of smart factories in the province's tire industry, and create an industrial internet cloud platform for tire manufacturing. We will actively promote green tire production processes such as chemical rubber refining and radiation pre-vulcanization technology, encourage tire reuse, and promote green pyrolysis and carbon black recycling technologies for waste tires to promote the green and circular development of the industry. We will fully leverage the role of tire and automotive proving grounds within the province to enhance the integrated design, R&D, inspection, and testing service capabilities for tires and automobiles, and create an internationally advanced inspection and testing platform. We will promote the establishment of a high-end, green tire series standard system, focusing on increasing variety, improving quality, and creating brands to build internationally competitive tire brands. By 2025, the tire industry's output value will reach 200 billion yuan; there will be 8 tire companies with sales revenue exceeding 10 billion yuan, including at least 2 companies exceeding 20 billion yuan, and 1-2 companies will be among the top 10 in the global tire industry.

5. New Chemical Materials. Focusing on three major directions—advanced basic materials, cutting-edge new materials, and key strategic materials—we will strengthen and upgrade the product grades and performance of existing new chemical materials, with a focus on breakthroughs in a number of "bottleneck" key technologies and major complete sets of equipment, achieving diversified and serialized development. We will increase the production ratio and level of high-end products such as general-purpose engineering plastics like polycarbonate, polyamide, polyoxymethylene, and polyphenylene ether, as well as specialty engineering plastics represented by polyphenylene sulfide, polyetheretherketone, polyimide, and polysulfone. We will break through the production technologies of high-carbon α-olefins, polyolefin

elastomers (POE), and ethylene-vinyl alcohol copolymers, and develop general-purpose and specialty engineering plastics such as polyphenylene ether and thermoplastic polyester (PBT). We will break through key technologies for specialty rubber production, expand the scale of specialty rubbers such as brominated butyl rubber, nitrile rubber latex, and hydrogenated nitrile rubber, and develop a series of products such as fluorosilicone rubber, hydrogenated nitrile rubber, acrylate rubber, liquid rubber and latex, and integrated rubber (SIBR) for use in the automotive, high-speed rail, and electronics industries under harsh conditions such as high temperature resistance, oil resistance, and strong oxidant resistance. Strengthen the research and development of high-strength, high-modulus, and high-thermal-conductivity carbon fiber materials and their application in aerospace, electronics, and other fields. Develop high-performance fibers and composite materials such as high-temperature resistant polyphenylene sulfide fiber, polyimide fiber, high-performance aromatic fiber, and ultra-high molecular weight polyethylene fiber. Develop high-end fluorosilicone materials such as polytetrafluoroethylene, ethylene-tetrafluoroethylene copolymer, perfluoroethylene propylene, polyvinylidene fluoride, as well as heat-cured silicone rubber and room-temperature vulcanized silicone rubber for aerospace, high-speed rail, new energy vehicles, chips, and 5G communications. Optimize the performance of hydrogen fuel cell membranes, focusing on the development of membrane materials such as high-flux nanofiltration membranes, high-performance reverse osmosis membranes, medical selective permeation membranes, and barrier gas packaging membranes for water treatment, photovoltaics, batteries, and medical applications. Strengthen scientific and technological research, achieving breakthroughs in the research and development of photoresists, high-purity electronic gases, ultra-large-scale integrated circuit packaging materials and substrates, and ultra-high purity electronic cleaning additives in the semiconductor integrated circuit field; and in the field of new display devices, achieving breakthroughs in high-performance photoresist materials, liquid crystal display materials, capacitive touch screen conductive films, and polyester substrates. Focus on developing the high-end functional chemical industry chain, the fluorine material industry chain, and the silicon material industry chain.

6. Marine Chemicals. Increase investment in technological research and development and product innovation, optimize the structure of marine chemical products, and accelerate the development of the marine chemical industry. Accelerate the research and development of technologies for the comprehensive development and utilization of seawater chemical resources and brine resources; expand the extraction and deep processing of potassium, bromine, magnesium, boron, iodine, lithium, strontium, rubidium, cesium, and other related products; and develop new flame-retardant materials, pharmaceutical intermediates, electronic materials, and other products. Strengthen and refine the seaweed chemical industry, develop high-value-added products for medical, health, and cosmetic applications, build a

comprehensive industrial chain for seawater utilization and desalination, and realize the transformation from traditional salt production to marine fine chemicals. Focusing on major marine engineering projects and equipment, prioritize the development of new chemical products such as anti-corrosion and antifouling coatings, marine engineering materials, marine environmental protection materials, and marine testing reagents, and accelerate the expansion of the marine new materials industry market.

7. Fine Chemicals. Leveraging the province's advantages as a chemical raw material base, we will deeply develop the fine chemical industry, create distinctive products with outstanding advantages, and promote the differentiated development of fine chemicals. We will strive to create nationally renowned and world-class flagship products, primarily amino acids, fragrances and flavors, vitamins, D-ethyl ester, hydroxymethoxyethylbenzene, biphenyl nitrile, diallyl phthalate (DAP), butyl sulfonyl chloride, p-toluenesulfonyl chloride, trimethyliodosilane, potassium iodide, and potassium iodate, further enhancing the industry's brand influence and cohesion. We will consolidate our advantages in alkyd anti-corrosion coatings and develop new varieties of industrial anti-corrosion coatings such as nano-marine anti-corrosion and graphene marine anti-corrosion coatings; we will focus on developing low-emission and low-pollution environmentally friendly industrial coatings; we will address the shortcomings in coating product segments, including coating resins, powder coatings, and UV coatings; we will accelerate the development of new building interior and exterior wall coatings to improve product competitiveness and market share. Strengthen the research and development and production of high-performance, functional dyes and pigments in key areas such as new fibers, electronic liquid crystals, medical devices, and aerospace. Utilize advanced processes and equipment such as microchannel reactors to develop green dyes and pigments and high-value-added fine chemical products that meet the needs of ecological safety and environmental protection upgrades. Vigorously develop environmentally friendly rubber accelerators, antioxidants, carbon disulfide, insoluble sulfur, and high-quality carbon black. Focus on developing environmentally friendly water treatment additives such as dispersible polyacrylamide, dispersible polyacrylic acid copolymers, maleic acid copolymers, scale and corrosion inhibitors, polycarboxylic acid scale and dispersants, and quaternary ammonium salt bactericides and algaecides. Accelerate the development of high-end daily chemicals, electronic chemicals, and catalysts.

8. Biochemical Engineering. Focusing on bio-based materials such as corn and straw, key development areas include furfural, pregelatinized hydroxypropyl starch, bio-based lactic acid and polylactic acid, functional sugar alcohols derived from glucose via sorbitol, pharmaceutical-grade hydroxypropyl methylcellulose (HPMC), industrial-grade cellulose ethers and other cellulose derivatives, bio-based pentanediamine, bio-based amino acids and their polymeric materials, etc. Extending

development will include biodegradable polymers such as butylene glycol and butylene adipate/butylene terephthalate copolymer (PBAT), bio-based pharmaceutical intermediates, nylon 56 fiber, nylon 56 engineering plastics, etc. Projects will be developed to produce bio-based monomers and polyester materials from biomass via furfural, 5-hydroxymethylfurfural, etc., as well as ethanol and ethylene glycol from cellulose. The promotion of biocatalytic conversion technologies such as long-chain dicarboxylic acids via bio-processes and microbial enzymatic acrylamide will establish a new green economic model for carbon recycling.

(III) Organize and implement five projects to strengthen the industrial park.

Benchmarking against world-class chemical industrial parks, we will further improve the overall planning and industrial planning of the chemical industrial park, implement the "three lines and one list" ecological environment zoning control requirements, clarify the park's positioning, enhance and strengthen its main businesses, optimize the industrial ecosystem, and promote the coordinated development of enterprises in the park. Following the "six integrations" development concept—integration of raw material and product projects, public works and logistics, safety, fire protection and emergency response, ecological environment protection, intelligent data, and management services and scientific and technological innovation—we will organize and implement five upgrading projects: infrastructure, industrial development, safety and green development, intelligent and smart development, and management services, to promote the growth and strengthening of the chemical industrial park.

1. Infrastructure Upgrading Project. Continuously improve the infrastructure of the chemical industrial park and enhance its service and support capabilities. Construct public utility corridors, dedicated roads, and facilities such as water, electricity, heating, fire protection, parking lots, and flood control to support the park's leading industries. Implement closed management of the park, accelerate the rerouting of roads crossing the park, and establish comprehensive checkpoints, general checkpoints, emergency checkpoints, and dedicated checkpoints for hazardous chemicals using existing facilities or self-built boundary fences, creating a comprehensive boundary closure system. Construct dedicated parking lots for hazardous chemical road transport vehicles. Accelerate the construction of a 5G information network to achieve full coverage of the park. The chemical industrial park's wastewater treatment plant has the capacity and facilities for differentiated wastewater treatment. New projects in the park will be constructed with public utility corridors, and independent wastewater pipelines will be built according to the requirements of rainwater and sewage separation and "one pipeline per enterprise." Existing areas will be gradually upgraded within a specified timeframe to comprehensively strengthen the park's and surrounding area's infrastructure carrying capacity and public works support capabilities.

2. Industrial Development and Upgrading Project. Enhance industrial positioning, cultivate leading and distinctive industries, strengthen supporting collaboration, and guide industrial agglomeration. Strictly implement regulations on investment management for chemical projects, rigorously control project access, and improve the quality of projects entering the park. Establish and improve the "Four Batches" project database for the chemical industrial park, forming a tiered project advancement pattern, and promote the implementation of a number of major projects with industry representativeness to enhance the park's development potential. Increase technological upgrading of existing enterprises, improve energy and resource utilization efficiency, and enhance the core competitiveness of enterprises. Establish an exit mechanism for enterprises in the park, resolutely withdraw from obsolete production capacity, strictly control restricted production capacity, and force enterprises to transform and develop through differentiated policies and measures for the allocation of resources such as land, electricity, and water.

3. Safety and Green Improvement Project. Strictly implement the "Guidelines for Safety Risk Investigation and Management in Chemical Industrial Parks (Trial Implementation)," and conduct regular safety risk assessments. Strengthen special safety rectification efforts in the park to prevent various production safety accidents. Enhance the standardization of safety production in hazardous chemical production enterprises and the construction of a hazardous chemical safety production risk monitoring and early warning system. Construct supporting training bases in the chemical industrial park to strengthen the skills and safety awareness of employees. Improve the park's environmental safety early warning system, focusing on online monitoring, source tracing, and evaluation management of characteristic pollutants and odors. Strengthen the construction of hazardous waste disposal facilities to achieve full-process tracking management of hazardous waste. Actively develop a circular economy and strengthen the comprehensive utilization of waste. Regularly organize emergency drills to improve emergency response capabilities. Guide the park and enterprises to strengthen social responsibility and create a harmonious and inclusive chemical industrial park culture.

4. Smart and Intelligent Upgrading Project. Accelerate the construction of smart chemical industrial parks, improve and upgrade the park monitoring and management platform, and enhance the digital and refined management level of chemical industrial parks. Promote the deep integration of 5G+artificial intelligence technology and the industrial internet with chemical industrial parks, build a provincial-level smart chemical comprehensive management platform, and promote three-level linkage among the provincial government, parks, and enterprises to achieve interconnection and sharing of park data, government data, and public data. Promote the construction of smart factories to achieve intelligent management of the entire process, including production

and manufacturing, equipment management, safety and environmental monitoring, warehousing and logistics, procurement and sales, and operation management.

5. Management and Service Improvement Project. Accelerate the improvement of management systems and mechanisms, promote innovation in management and operation models, and encourage parks to hire professional organizations to implement concierge-style services. Strengthen institutional development, establishing systems for project entry and exit, dynamic enterprise evaluation, expert consultation, professional services, and information disclosure. Enhance industry operation trend analysis to guide the healthy development of the industry. Strengthen the training of park management personnel to improve their professional level. Strengthen the construction of public service platforms and improve functions such as R&D design, testing and inspection, e-commerce, and logistics distribution. Implement the policy of "factors following projects" to promote the optimal allocation of resources.

IV. Special Operations

(I) Special Action for Technological Innovation. Vigorously implement the strategies of strengthening Shandong through science and education, revitalizing Shandong through talent, and driving development through innovation. Guide enterprises to increase R&D investment, cultivate a number of innovation platforms such as national key laboratories and provincial/ministerial-level laboratories, and encourage enterprises to establish industry-university-research collaborative platforms such as research institutes. Target the needs of strategic emerging fields, compile a list of industry-specific "bottleneck" technologies, organize and implement joint research efforts, break through a number of key common technologies, and develop a number of new products that fill gaps. Accelerate the construction of pilot-scale production bases to provide support for the industrialization of innovative achievements. Strengthen military-civilian integration innovation, deepen strategic cooperation with large military industrial groups, and carry out project development, technology transfer, and talent exchange. Relying on provincial and national talent programs, implement the "Shandong Province Chemical Industry Talent Development Roadmap," introduce and cultivate leading innovative talents in the high-end chemical industry, and provide intellectual support for industrial technological innovation.

(II) Special Action for Upgrading the Industrial Chain. Fully implement the chain leader system, adhering to the principles of "focusing on the forefront, planning along the chain, leading enterprises, nurturing and strengthening, building an ecosystem, and developing clusters." Leverage the agglomeration effect of leading enterprises, establish a cooperative mechanism for the industrial chain led by "chain leader" enterprises, with upstream and downstream enterprises supporting each other, large, medium, and small enterprises integrating, and associations, universities, research institutes, and financial institutions participating, to build a superior industrial

institutes, and financial institutions participating, to build a superior industrial ecosystem. Targeting the strengths and weaknesses of the industrial chain, conduct special matchmaking between upstream and downstream enterprises, and plan and implement a number of projects to build, extend, supplement, and strengthen the chain. Support leading enterprises to grow stronger and enhance their guiding role in the development of the industrial chain. Actively cultivate specialized, refined, and innovative SMEs to enhance the core competitiveness of the entire industrial chain.

(III) Smart Empowerment Special Action. Focusing on safety and environmental protection, energy conservation and emission reduction, and quality and efficiency improvement, this action will fully utilize next-generation information technologies such as big data, cloud computing, 5G, blockchain, the Internet of Things, and artificial intelligence to explore new application scenarios for the transformation of scientific and technological achievements. It will create smart chemical technology application demonstration projects to promote intelligent production, smart management, and networked collaboration in chemical enterprises and chemical industrial parks. A sound standard system for intelligent transformation of subdivided industries will be established, diagnostic assessments will be conducted on key enterprises and chemical industrial parks, a number of key projects will be implemented, a number of benchmark demonstrations will be established, industry and park internet platforms will be built, the province's comprehensive smart management platform for the chemical industry will be improved, and support will be provided for the construction of digital workshops, intelligent factories, and smart industrial parks.

(IV) Special Action for Optimizing Industrial Parks. Regular assessments of industrial parks will be conducted, implementing tiered and categorized dynamic management. A number of advantageous parks will be strengthened, a number of distinctive parks will be specialized and refined, a number of potential parks will be optimized and upgraded, and a number of unqualified parks will be phased out and transformed. A benchmark-setting and demonstration action will be carried out to cultivate a number of benchmark parks with standardized management, safety and green practices, strong innovation capabilities, and distinctive industrial characteristics. National chemical industrial park construction standards and norms will be strictly implemented, and efforts will be made to create national standardized parks. Support will be provided for the creation of national-level smart chemical industrial parks and green chemical industrial parks, striving to have more parks rank among the top chemical industrial parks nationwide.

(V) Special Action to Eliminate Inefficient and Outdated Production Capacities. Fully implement the "Three Resolute Actions" plan, focusing on key areas such as chlor-alkali, synthetic ammonia, and synthetic materials. Compare with advanced industry standards, accelerate the research, formulation, and revision of industry norms and standards, organize comprehensive reviews and investigations, and

norms and standards, organize comprehensive reviews and investigations, and include chemical enterprises that do not meet relevant standards and have no hope of upgrading or transformation, or whose procedures are incomplete and cannot be completed, in the closure and elimination list, closing them down in accordance with laws and regulations. Implement a list-based management system for the production capacity of key industries, strengthening government supervision and social oversight. Improve the capacity exit mechanism, make full use of fiscal and tax policies, energy consumption and emission quota trading, and legally protect the legitimate rights and interests of employees, supporting enterprise transformation and development and the construction of follow-up projects.

V. Special Chapter on Production Safety

(a) Safety risk analysis.

Safety risks in the chemical industry mainly involve key regulated hazardous chemical processes, key regulated hazardous chemicals, and major hazard sources (hereinafter referred to as "two key points and one major hazard source"). Safety risks associated with special operations in the chemical industry are particularly prominent and are a significant cause of safety accidents. Enterprises have failed to fulfill their primary responsibilities, and their management level and personnel qualifications are inadequate to meet safety requirements, necessitating urgent improvement.

(ii) Safety precautions.

1. Strengthen corporate responsibility. Reinforce the primary responsibility for safety production held by the legal representatives, actual controllers, and other key decision-makers of chemical enterprises, and appoint full-time safety directors in accordance with the law. Promote the improvement and perfection of safety production management systems in chemical enterprises, strictly implement the all-employee safety production responsibility system, allocate and use safety production funds as stipulated, and increase investment in safety facilities, equipment, and personnel.

2. Prevent and mitigate major safety risks. Strengthen source control of safety production in chemical industrial parks, conduct comprehensive safety risk assessments of chemical industrial parks, and orderly promote closed-loop management of parks. Formulate a "prohibited, restricted, and controlled" catalog, improve the "three simultaneous" system for safety facilities in construction projects, clarify project access conditions, and strictly approve chemical construction projects. Strictly enforce mandatory safety requirements, eliminate processes, technologies, equipment, and materials that do not meet safety standards, strengthen equipment maintenance, and accelerate the upgrading of technology and equipment. Emphasize prevention first and move the control point forward, implement standardized

construction of safety production, and continuously deepen the construction of a dual prevention system for enterprise risks and hidden dangers. Reinforce the concept that "hidden dangers are accidents," and strengthen the investigation and rectification of hidden dangers. Establish and improve an emergency management system, improve the rapid emergency response mechanism, and conduct regular and standardized emergency drills. Complete the relocation and transformation of hazardous chemical production enterprises in densely populated areas.

3. Enhance the level of intelligent management and control. Promote the deep integration of information technology and intelligent technology with safe production, and improve the mechanization and automation level of hazardous processes and equipment in safe production. Vigorously implement intelligent transformation, and implement "mechanization to replace manpower, automation to reduce manpower, and intelligent unmanned operation" at key risk locations to improve the level of safe production assurance. Strengthen the construction of intelligent control systems for "two key points and one major hazard source," and implement online monitoring and control of major hazard sources. Strengthen the information-based supervision of the entire chain of hazardous goods transportation. In accordance with the unified deployment of relevant national departments, build an information sharing platform for the full life cycle supervision of hazardous chemicals.

4. Enhance the safety awareness and safety literacy of employees. Improve the occupational safety skills of personnel in key positions, strictly implement the enterprise's primary responsibility for safety training of all employees, scientifically formulate training content, ensure training investment and time, and guarantee training effectiveness. Strengthen the construction of supporting training bases in chemical industrial parks, establish a long-term training mechanism, cultivate and build a group of highly skilled personnel, and effectively improve the safety production management level of chemical enterprises and the safety literacy of employees.

(III) Expected results of safe production.

After the implementation of the plan, the level of safety production accident risk prevention and control in the province's chemical industry will be comprehensively improved, the inherent safety assurance capability will be comprehensively enhanced, the safety awareness and ability of personnel will be comprehensively strengthened, the dual prevention system of safety risk control and hidden danger investigation and management will be effectively operated, the long-term mechanism for safety production will be continuously improved, safety risks will be effectively controlled, and the occurrence of major and serious accidents will be resolutely curbed.

VI. Environmental Protection Section

(I) Environmental impact analysis.

The environmental impact of the chemical industry is mainly reflected in the generation of wastewater, waste gas, solid waste, and noise during the production process. Wastewater from the chemical industry has a complex composition and large discharge volume; waste gas contains pollutants such as nitrogen oxides, sulfides, soot, and VOCs; solid waste mainly includes acid slag, alkali slag, heavy metals, salt mud, and sludge; some large equipment and high-power units also generate noise pollution. Leaks in chemical industry production, storage, wastewater treatment, and solid waste storage, transportation, and treatment facilities can cause pollution to the surrounding environment. The chemical industry involves numerous flammable, explosive, toxic, and hazardous chemicals, making it prone to secondary environmental emergencies due to safety accidents, resulting in significant pressure in preventing and mitigating sudden environmental risks. After years of development, the pollution control level of the chemical industry has continuously improved, but adverse environmental impacts still exist, especially for scattered and outdated petrochemical enterprises, which pose a higher environmental risk.

(ii) Environmental protection measures.

1. Strictly enforce ecological and environmental access standards. Implement the "three lines and one list" ecological and environmental zoning control requirements, and conduct follow-up evaluations of park planning environmental impact assessments. Strictly control project environmental access, and in accordance with the "three simultaneous" system for environmental protection of construction projects and the rigid requirements for controlling total pollutant emissions and total production capacity, strictly enforce the "five reductions and substitutions" requirements for production capacity, coal consumption, energy consumption, carbon emissions, and pollutant emissions for "high energy consumption and high pollution" projects.

2. Promote coordinated pollution and carbon reduction. Accelerate the clean, circular, and low-carbon transformation of the entire process in industries such as petrochemicals and coal chemicals, and further promote the circular transformation of chemical industrial parks. Actively promote energy performance contracting and water conservation contracting, and vigorously promote cleaner production. Actively carry out the "carbon peaking" action, formulate a carbon dioxide peaking action plan, implement carbon emission reduction demonstration projects, and carry out low-carbon technology innovation. Explore and implement pilot and demonstration projects for coordinated pollution and carbon reduction governance and carbon capture, storage, and comprehensive utilization.

3. Strengthen pollution control systems. Strictly enforce VOCs industry and

product standards, vigorously promote VOCs treatment in the chemical industry, and establish a comprehensive control system. Focus on key areas with significant fugitive emissions, such as organic liquid storage tanks, loading and unloading, open liquid surfaces, and leak detection and repair (LDAR), strengthening the control of VOCs emissions from the source through closed or sealed systems, improving VOCs collection efficiency, and adopting efficient methods such as oil and gas recovery and combustion for treatment. By 2023, each chemical industrial park and chemical cluster in the province should have at least one volatile organic compound (VOC) component monitoring station connected to the ecological and environmental protection department's network. Strengthen centralized wastewater treatment in chemical industrial parks, implementing a "one enterprise, one pipe, open pipe transportation, real-time monitoring" system for enterprise wastewater. Strengthen the collection, utilization, and disposal of hazardous waste, and encourage chemical industrial parks and large enterprises to construct high-standard centralized storage, pretreatment, and disposal facilities for hazardous waste. Strengthen the promotion and application of green alternatives and technologies, and strictly manage the environmental risks of new pollutants.

4. Enhance risk prevention and control capabilities. Improve the park's environmental risk early warning system, conduct environmental risk hazard investigations and risk assessments, and update the basic database in a timely manner. Strengthen the construction of the park and enterprise environmental emergency response system, and improve emergency plans for various types of sudden environmental incidents. Establish a centralized monitoring and emergency command platform for units with major environmental risks, and gradually build an efficient environmental risk management and emergency rescue system. Conduct targeted environmental safety hazard investigations, emergency training, and drills to comprehensively improve the park's risk prevention and control and accident emergency response capabilities.

(III) Environmental protection effect.

By rationally adjusting the industrial layout, centralizing the management of chemical industrial parks, accelerating the relocation of hazardous chemical production enterprises from environmentally sensitive and densely populated areas to industrial parks, and ensuring that all new chemical projects are located in compliantly established industrial parks, a series of major tasks have been implemented to significantly improve the resource and energy utilization efficiency and clean production level of the chemical industry. Energy consumption per unit of industrial added value, waste disposal, and resource utilization rates have all significantly increased. After the implementation of the plan, the environmental protection level of the province's chemical industry has been comprehensively improved; wastewater,

waste gas, and solid waste have achieved comprehensive treatment and recycling, and are discharged in compliance with standards. The utilization rate of reclaimed water in industrial parks has reached 45%, and the comprehensive utilization rate of general industrial waste has reached 90%.

VII. Safeguard Measures

(I) Strengthen Organizational Leadership and Overall Planning. Improve and refine the provincial, municipal, and county-level chemical industry special action system linkage mechanism, further refine the long-term supervision mechanism for safety and environmental protection, clarify work responsibilities, increase staffing, strengthen overall coordination, and solidly promote the implementation of the work. Optimize the management model of chemical industrial parks, clarifying the management responsibilities, powers, and boundaries of park management agencies and local governments. Implement the "chain leader system," establish and improve mechanisms such as the leading role of "chain leader" enterprises, collaborative promotion of industry, academia, and research, and factor guarantee services, and effectively promote the solid progress of industrial chain cooperation. Strengthen planning alignment, enhance policy coordination, and adhere to the integrated implementation and advancement of land, environmental protection, and safety plans. Adhere to the rule of law, strengthen legal safeguards, and insist on using legal thinking to promote the resolution of difficulties and problems in industrial development.

(II) Strengthening Talent Support and Guarantee. Based on the construction of industry-university-research platforms by leading enterprises, we will promote the improvement of professional personnel's quality, accelerate the development of the technology factor market, and encourage the targeted flow and diversified employment of scientific and technological personnel. We will focus on attracting and cultivating leading enterprise talent, innovative scientific and technological talent, and application-oriented technical talent. We will promote the integration of industry, academia, and research, and jointly cultivate key technical professionals for enterprises. We will improve the assessment and evaluation system and salary management system for scientific and technological research personnel and enterprise managers, effectively implement the benefits of scientific research personnel's achievement transformation, and enhance their enthusiasm for scientific and technological innovation. We will attach great importance to the development of the entrepreneur team, strengthen precise training for entrepreneurs and the succession cultivation of young entrepreneurs, and prepare a talent pool for the hierarchical development of the industry.

(III) Increase financial support. Strengthen fiscal policy incentives, coordinate the

role of special funds, and support chemical enterprises in accelerating technological transformation, intelligent transformation, industrial transfer, relocation to industrial parks, and elimination of outdated equipment. Implement policies such as tax exemption for imported major technical equipment, VAT refund for excess input tax credits, additional deduction for research and development expenses, and insurance compensation for the first set of technical equipment. Actively guide various financial institutions and social capital to invest in the chemical industry, leverage the advantages of policy-based finance, development finance, and commercial finance, and increase financial support for key areas of chemical technology.

(IV) Advance reforms to ensure resource availability. Vigorously promote the "output per mu" evaluation reform, thoroughly implement differentiated resource allocation policies, and continuously improve total factor productivity. Implement policies related to land, environmental protection, work safety, and energy conservation, strengthen supervision and enforcement, and strictly manage binding indicators. Rationally plan the construction land for chemical enterprises and chemical industrial parks, strictly enforce industry energy consumption access standards, environmental protection standards, and work safety standards, improve energy conservation standards and measurement systems, refine energy conservation assessment systems, achieve total energy consumption control, and improve energy utilization efficiency.

(V) Deepen International Exchange and Cooperation. Actively integrate into the "Belt and Road" initiative and the domestic and international "dual circulation" development pattern, proactively connect with global industrial, value, and innovation chains, adhere to high-quality "bringing in" and high-level "going out" strategies, and cultivate new advantages for Shandong's chemical industry. Guide enterprises to effectively address trade protectionism, scientifically select investment targets, and support chemical enterprises to collaborate with engineering companies and manufacturing enterprises in other sectors to expand overseas. Relying on leading enterprises in Shandong, make good use of both domestic and international resources and markets, focus on building, supplementing, extending, and strengthening industrial chains, strengthen cooperation with large international chemical companies, expand cooperation models, enhance the level and scope of cooperation, and enhance the international competitiveness of enterprises.

(VI) Give full play to the role of associations. Further strengthen the construction of industry associations, increase support, enrich the talent pool, and improve their capabilities in data statistics, research and analysis, results evaluation, and technical guidance, so as to provide two-way services to the government and enterprises. Give full play to the bridging role of industry associations, assist enterprises in effectively responding to industry changes, and improve their market adaptability. Play the role of

advisors and assistants, and assist government departments in formulating technical product standards and industry norms. Strengthen and improve industry management, promote industry self-discipline, and pay attention to the promotion of the industry's image.

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