China's Green Development in the New Era (II)
新时代的中国绿色发展（下）

III. Adjusting and Improving the Industrial Structure

China is committed to the philosophy of innovative, coordinated, green, open and shared development, and takes innovation-driven development as the driving force to create new momentum and build new strengths for economic development. China has placed rigid constraints on the exploitation of resources and the environment to promote comprehensive adjustment of the industrial structure, and strengthened regional cooperation to optimize the spatial configuration of industry. As a result, China's economy has registered a steady improvement in the quality of development while maintaining a reasonable pace of growth.

1. Vigorously developing strategic emerging industries

China implements the innovation-driven development strategy. It takes scientific and technological innovation as the driving force and guarantee for adjustment of industrial structure and green and low-carbon transition of the economy and society and regards strategic emerging industries as a key driver for economic development, reaping remarkable economic and social benefits as a result.

China has intensified investment in scientific and technological innovation. The nation's gross domestic research and development (R&D) spending grew from RMB1.03 trillion in 2012 to more than RMB2.8 trillion in 2021. Its R&D spending intensity, or the expenditure on R&D as a percentage of its GDP, rose from 1.91 percent in 2012 to 2.44 percent in 2021, approaching the average level of the Organization for Economic Cooperation and Development (OECD) countries. Chinese enterprises' investment in R&D has continued to increase, accounting for more than 76 percent of the country's total R&D investment. By the end of 2021, China's energy conservation and environmental protection industry owned 49,000 valid invention patents, and the new energy industry held 60,000, 1.6 and 1.7 times more than in 2017. From 2011 to 2020, the number of patent applications filed by China for environment-related technology inventions was close to 60 percent of the world total, making it the most active country in environmental

三、产业结构持续调整优化

中国坚持创新、协调、绿色、开放、共享的新发展理念，以创新驱动为引领塑造经济发展新动能新优势，以资源环境刚性约束推动产业结构深度调整，以强化区域协作持续优化产业空间布局，经济发展既保持了量的合理增长，也实现了质的稳步提升，开创了高质量发展的新局面。

（一）大力发展战略性新兴产业

实施创新驱动发展战略，把科技创新作为调整产业结构、促进经济社会绿色低碳转型的动力和保障，战略性新兴产业成为经济发展的重要引擎，经济发展的含金量和含绿量显著提升。

科技创新投入力度逐步加大。全社会研发投入由2012年的1.03万亿元增长到2021年的2.80万亿元，研发投入强度由1.91%提高到2.44%，已接近经合组织国家平均水平。企业研发投入力度不断加大，占全社会研发投入比例达到76%以上。截至2021年底，中国节能环保产业有效发明专利4.9万件，新能源产业有效发明专利6万件，分别是2017年底的1.6倍、1.7倍。2011年至2020年，中国环境技术发明专利申请总量接近全球60%，是全球布局环境技术创新最积极的国家。

新兴技术成为经济发展重要支撑。人工智

technology innovation.

Emerging technologies have become the main props of China's economic development. Thanks to accelerated efforts to implement emerging technologies such as artificial intelligence (AI), big data, blockchain, and quantum communication, new products and business forms including intelligent terminals, telemedicine, and online education have been cultivated, and their role in boosting growth has continued to increase. China's digital economy ranks second in the world. During the 13th Five-year Plan period (2016-2020), the average annual growth rate of the added value of information transmission, software and information technology services reached 21 percent. The internet, big data, AI, 5G and other emerging technologies are deeply integrated with traditional industries, facilitating the integration of advanced manufacturing with modern services. The value-added output of high-tech and equipment manufacturing in 2021 accounted for 15.1 and 32.4 percent of that of industries above designated size, up 5.7 and 4.2 percentage points from 2012 respectively. China is on the way to realize the transformation and upgrading from "made in China" to "intelligent manufacturing in China".

China's green industries continue to grow. The renewable energy industry is growing rapidly, and China leads the world in the manufacture of clean energy generation facilities for wind and photovoltaic power. China produces more than 70 percent of the global total of polysilicon, wafers, cells and modules. The quality and efficiency of the energy-saving and environmental protection industries have continued to improve. China has developed a green technical equipment manufacturing system covering various sectors such as energy and water conservation, environmental protection, and renewable energy. The manufacturing and supply capacity of green technical equipment increases markedly while the cost keeps dropping. Technology in the fields of energy and water conservation equipment, pollution control, and environmental monitoring meets the highest international standards. New forms and models of business continue to grow, such as comprehensive energy services, contract-based energy and water management, third-party treatment of environmental pollution, and comprehensive carbon emissions management services. In 2021, the output value of China's energy conservation and environmental protection industries exceeded RMB 8 trillion. Extensive pilot projects have been carried out at local level to explore methods and pathways to realize the value of eco-environmental products. New models of eco-friendly industry such as urban modern agriculture, leisure agriculture, eco-environmental tourism, forest healthcare, boutique homestays, and pastoral leisure complexes have witnessed rapid development.

能、大数据、区块链、量子通信等新兴技术加快应用，培育了智能终端、远程医疗、在线教育等新产品、新业态，在经济发展中的带动作用不断增强。数字经济规模居世界第二位，“十三五”期间（2016－2020年），信息传输、软件和信息技术服务业增加值年均增速高达21%。互联网、大数据、人工智能、5G等新兴技术与传统产业深度融合，先进制造业和现代服务业融合发展步伐加快，2021年，高技术制造业、装备制造业增加值占规模以上工业增加值比重分别为15.1%、32.4%，较2012年分别提高5.7和4.2个百分点，“中国制造”逐步向“中国智造”转型升级。

绿色产业规模持续壮大。可再生能源产业发展迅速，风电、光伏发电等清洁能源设备生产规模居世界第一，多晶硅、硅片、电池和组件占全球产量的70%以上。节能环保产业质量效益持续提升，形成了覆盖节能、节水、环保、可再生能源等各领域的绿色技术装备制造体系，绿色技术装备和产品供给能力显著增强，绿色装备制造成本持续下降，能源设备、节水设备、污染治理、环境监测等多个领域技术已达到国际先进水平。综合能源服务、合同能源管理、合同节水管理、环境污染第三方治理、碳排放管理综合服务等新业态新模式不断发展壮大，2021年节能环保产业产值超过8万亿元。各地方积极探索生态产品价值实现方式路径，都市现代农业、休闲农业、生态旅游、森林康养、精品民宿、田园综合体等生态产业新模式快速发展。

2. Taking well-ordered steps to develop resource-based industries

China continues to expand supply-side structural reform and reverse the extensive development model that relies heavily on resource consumption at the cost of high pollution and emissions. With environmental capacity as a rigid constraint, it has exerted tight control over the production capacity of energy-intensive industries and industries with high emissions or water consumption, in order to optimize its industrial structure.

Easing overcapacity and closing down outdated production facilities. While protecting industrial and supply chains, China has taken active and well-ordered steps to ease overcapacity and close down outdated production facilities. Measures have been taken to curb industries that over-exploit resources and cause environmental damage, such as steel, cement and electrolytic aluminum. A swap system has been introduced that allows producers to open equal or lower amounts of new capacity in return for closures elsewhere. During the 13th Five-year Plan period (2016-2020), China has removed more than 150 million tonnes of excess steel production capacity and 300 million tonnes of excess cement production capacity. Substandard steel products have been eliminated and almost all outdated production capacity in industries such as electrolytic aluminum and cement manufacturing has been removed.

China is resolved to stop the blind development of energy-intensive projects with high emissions and outdated production techniques. It has raised the entry threshold for some key industries in terms of land use, environmental protection, energy and water conservation, technology, and safety. A differentiated system has been introduced for energy-intensive industries, covering differentiated electricity pricing, tiered electricity pricing, and punitive electricity pricing. For energy-intensive projects with high emissions and outdated production techniques, China applies a list-based management approach involving classification and dynamic monitoring. It resolutely investigates and punishes all projects that violate laws or regulations. In areas with problems of water shortage or overconsumption, restrictions are imposed on various types of new development zones and projects requiring high water consumption.

3. Optimizing regional distribution of industries

Fully considering factors such as energy resources, environmental capacity, and market potential, China promotes the convergence of some industries in areas with more suitable conditions and greater potential for development. To expedite the formation of a modern and efficient industrial development configuration, it improves the distribution of productive forces and expands the division of industries and coordination across

（二）引导资源型产业有序发展

中国持续深化供给侧结构性改革，改变过多依赖增加资源消耗、过多依赖规模粗放扩张、过多依赖高耗能高排放产业的发展模式，以环境承载力作为刚性约束，严控高耗能、高排放、高耗水行业产能规模，推动产业结构持续优化。

化解过剩产能和淘汰落后产能。在保障产业链供应链安全的同时，积极稳妥化解过剩产能、淘汰落后产能，对钢铁、水泥、电解铝等资源消耗量高、污染物排放量大的行业实行产能等量或减量置换政策。“十三五”期间（2016－2020年），累计退出钢铁过剩产能1.5亿吨以上、水泥过剩产能3亿吨，地条钢全部出清，电解铝、水泥等行业的落后产能基本出清。

坚决遏制高耗能、高排放、低水平项目盲目发展。提高部分重点行业土地、环保、节能、节水、技术、安全等方面的准入条件，对高耗能行业实施差别电价、阶梯电价、惩罚性电价等差别化电价政策。对高耗能、高排放、低水平项目实行清单管理、分类处置、动态监控，严肃查处违法违规建设运行的项目。水资源短缺和超载地区，限制新建各类开发区和高耗水项目。

（三）优化产业区域布局

综合考虑能源资源、环境容量、市场空间等因素，推动相关产业向更具发展条件和潜力的地区集中集聚，优化生产力布局，深化区域间分工协作，加快形成布局合理、集约高效、协调协同的现代化产业发展格局。

推进原材料产业合理布局。统筹煤水资源和