



Science and Technology Daily

VOL.5-NO.216

NOVEMBER 15-16, 2025

Innovation Pathway

New Quality Productive Forces Rely on Innovation

By Staff Reporters

China's efforts to highlight the leading role of scientific and technological innovation in fostering new quality productive forces were clearly signaled in the *Recommendations of the Central Committee of the Communist Party of China (CPC) for Formulating the 15th Five-Year Plan for National Economic and Social Development*, adopted at the fourth plenary session of the 20th Central Committee of the CPC.

To advance Chinese modernization, science and technology must take the lead. The Recommendations' emphasis on innovation resonates strongly with academicians at the forefront of research, who see the next five years as a decisive period for building China into a science and technology powerhouse. They stress strengthening basic research, tackling key core technologies, and integrating scientific and industrial innovation to unleash new drivers of growth.

Strengthening the foundations

The scope of scientific innovation and research is vast. Examples are vital questions such as, where does lunar water come from and could materials from the outer solar system reach Earth?

Recent findings from Chang'e-6 lunar samples, reported in the top scientific journal *Proceedings of the National Academy of Sciences (PNAS)* on October 21, offer crucial clues. Chinese scientists discovered rare impact residues that confirm asteroid fragments can travel from the outer to the inner solar system — providing new insights into the Moon's water origins.

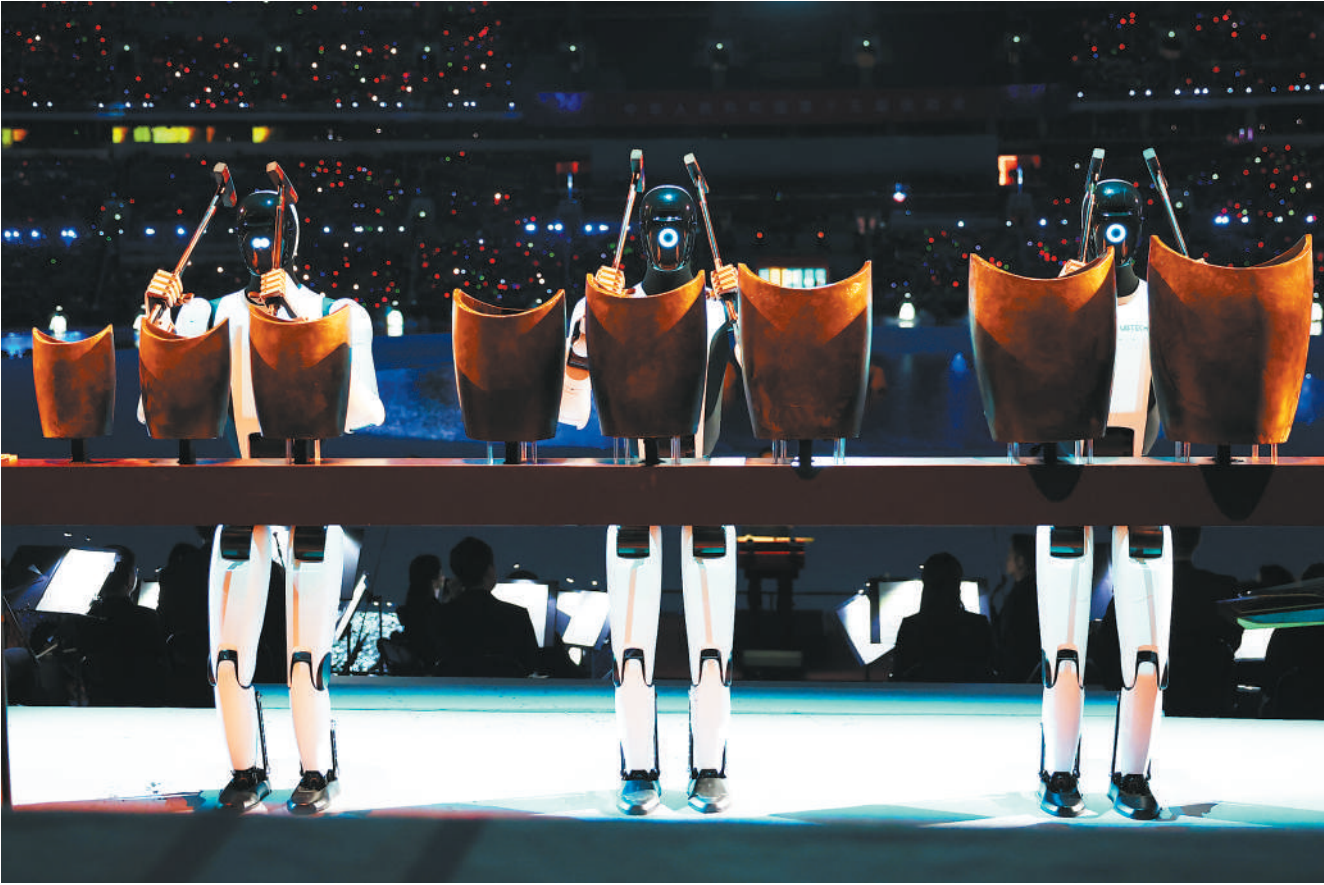
Such breakthroughs reflect China's steady advances in basic research. "Neglecting basic research is equivalent to stifling innovation's future," said Wang Chi, academician of the Chinese Academy of Sciences (CAS).

Looking ahead to the next five years, Wang Yifang, a CAS academician, believes that strengthening fundamental research and fostering original innovation should start with ensuring stable support and encouraging free exploration.

Securing core technologies

During the 14th Five-Year Plan period (2021-2025), China built 33 national manufacturing innovation centers and made nearly 700 breakthroughs in critical technologies.

See page 2



Robots play a replica of the ancient bronze percussion instrument known as Goudiao during the opening ceremony of China's 15th National Games in Guangzhou, south China's Guangdong province, November 9. (PHOTO: XINHUA)

STI Frontier

Thorium-uranium Conversion Makes Breakthrough

By QI Liming

In early November, the experimental operation of a 2-megawatt liquid-fuel thorium-based molten salt reactor (TMSR), led by the Shanghai Institute of Applied Physics, Chinese Academy of Sciences (CAS), achieved the world's first thorium-uranium nuclear fuel conversion in Wuwei, Gansu province.

This landmark breakthrough has provided core technical support and feasible solutions for the future large-scale exploration and utilization of thorium resources in China, as well as for the development of fourth-generation advanced nuclear energy systems.

Abundant thorium resources

Energy security is a fundamental and strategic issue that affects the overall development of a country's economy

and society. The shortage of energy supply caused by the rapid growth in electricity demand means that nuclear energy has become an important new energy option for resolving the energy crisis.

At present, the main fissile isotopes used as nuclear fuel in reactors include uranium-235, plutonium-239, and uranium-233. Although these resources are limited, thorium — a fertile rather than fissile element — is more abundant in nature and can be converted into uranium-233 for use in nuclear power generation. China possesses significant thorium reserves, largely associated with its rare-earth mining industry. The TMSR is a fourth-generation nuclear energy system that uses thorium fuel and high-temperature molten salt as the coolant. It operates at near-atmospheric pressure

without the need for water cooling and offers high thermal efficiency and enhanced safety features.

This technology is designed to integrate with industries such as solar and wind power, high-temperature molten salt energy storage, hydrogen production, and coal-to-chemical processes. By doing so, it aims to form a multi-energy complementary, low-carbon composite energy system that enhances efficiency and reduces emissions.

TMSR convenient and safe

Most conventional nuclear power plants are located along the coast, because a large amount of water is needed for cooling the reactor core. "Unlike the currently widely used pressurized water reactors, the TMSR uses high-temperature liquid molten salt as the coolant.

See page 3

China Charts Green Course Toward Carbon Neutrality

By Staff Reporters

China has built one of the world's most comprehensive carbon reduction policy frameworks and developed the largest, fastest-growing renewable energy system. It contributes about one-fourth of the world's newly added green areas and ranks among the countries with the fastest decline in energy consumption intensity, making major contributions to global climate action and sustainable development, according to a white paper released by the State Council Information Office on November 8.

Titled "*Carbon Peaking and Carbon Neutrality: China's Plans and Solutions*," the white paper reviews the nation's major achievements over the past five years and outlines its approaches, actions, and experience in pursuing its carbon goals.

Five years after announcing its carbon peaking and carbon neutrality commitments, China has made historic progress in advancing a green and low-carbon transition, guided by the principle that lucid waters and lush mountains are invaluable assets.

Peaking carbon and carbon neutrality is a national strategy, with extensive and in-depth initiatives launched, accelerating full-scale green transition of the economy and society.

As energy consumption is the main source of carbon emissions, China has prioritized green energy transition by taking vigorous measures to substitute renewables for fossil fuels and promoting a new energy and power system. These efforts provide strong support for achieving the dual carbon goal.

Industry, transport, construction, and daily life remain key sources of

emissions. China has incorporated carbon targets into overall social and economic development, accelerating the establishment of green industries, low-carbon lifestyles, and high-quality development models.

It is promoting innovation in both traditional and emerging industries, upgrading its industrial structure, and fostering green and low-carbon sectors.

The development of low-carbon transport vehicles and equipment has accelerated, gradually optimizing the overall transport structure. Transport infrastructure has been upgraded for green development with the construction of green highways, airways and waterways, green and smart development of newly built stations, airports and ports, and improving new energy transport infrastructure.

See page 4

Brand-new Technology Better Serves Events and Lives

By QI Liming, HE Liang & LONG Yuemei

The 15th National Games, hosted for the first time across three areas-Guangdong, Hong Kong and Macao in south China, one of China's most dynamic economic regions collectively known as the Greater Bay Area, highlight China's technological prowess.

Spectacular opening

The opening ceremony in the Guangdong Olympic Sports Center Stadium in Guangzhou city on November 9 showcased the beauty of technology in motion, integrating seamlessly the unique characteristics of the Greater Bay Area.

The "Dialogue Between Past and Present" blended traditional southern China culture with modern technology, exemplified by a spectacular lion dance performance interwoven with AI-generated content. A performance of the Yingge Dance, a dynamic folk dance blending martial arts, opera, and dance with gongs and drums, was accompanied by holographic projections, and a dragon boat race was enacted "rowing" into the audience seats through augmented reality technology.

"In the past, large-scale events like this required many performers," said Meng Ke, executive director of the opening ceremony. "With technological advances, we can now create powerful effects with far fewer people and greater efficiency."

Robots play ancient bronze musical instrument

Three fully autonomous humanoid robots with embodied intelligence, the Walker S2 models, struck bronze musical instrument modeled on their historical prototypes unearthed from the nearby 2,000-year-old tomb of the king of an ancient kingdom, creating a harmonious resonance that spanned over two millennia.

It was the first time a national sports event used humanoid robots as opening ceremony performers, and also the first time in the world that humanoid robots played millennia-old bronze ritual music. See page 2

WEEKLY REVIEW

Perovskite Solar Cell with Over 27% Conversion Efficiency Developed

Researchers from the Institute of Semiconductors, Chinese Academy of Sciences, have developed a prototype perovskite solar cell with a photovoltaic conversion efficiency of 27.2 percent and significantly enhanced its operational stability. Regarding stability, the cell maintained 86.3 percent of its initial efficiency after continuous operation for 1,529 hours. The research findings were published online in *Science*.

Breakthrough Made in Saline-Alkali Soil Technology

A plant-based nano-silica technology for saline-alkali soil improvement has successfully undergone field trials in Jinpu New Area in Dalian, Liaoning province in northeast China. It was used on medium-to-heavily saline coastal soils with pH 10.54 and a salt content exceeding 5 percent to achieve a major breakthrough from zero corn yield per mu to 603.1 kg per mu in the same year.

Quantum Computer Interconnection Reaches 2,000 Km

A research team from the Pritzker School of Molecular Engineering at the University of Chicago has theoretically extended the connection distance between quantum computers to 2,000 kilometers. Based on this advancement, the university's quantum computer can now establish connections with equipment located as far away as the outskirts of Salt Lake City, Utah. The team stated that the technology for building a global-scale quantum Internet is now truly "within reach" for the first time.

Lab System Grows Materials on Its Own

A U.S. research team has developed a self-driving lab system which can autonomously "grow" materials. It is capable of independently completing the entire material synthesis and optimization process without continuous human intervention. Integrating robotic automation with machine learning algorithms, the system autonomously determines subsequent experimental steps, achieving fully closed-loop operation from experiment execution and performance measurement to result analysis.

New Graphic

CHINA'S INTELLIGENT COMPUTING POWER RANKS AMONG THE TOP IN THE WORLD

As of June 2025

10.85 million

China had 10.85 million standard racks in operation nationwide.

788 EFLOPS

The scale of intelligent computing power reached 788 EFLOPS.

Source: Ministry of Industry and Information Technology
Designed by Science and Technology Daily

WECHAT ACCOUNT



E-PAPER



Context Innovation to Turn Sci-tech Breakthroughs into Application

Policy Express

By Staff Reporters

China has issued a guideline to accelerate the development of application contexts for new technologies and products, marking a strategic step toward fostering new quality productive forces and high-quality development.

The guideline, released by the General Office of the State Council, defines "contexts" as real-world settings that validate the industrial use of new technologies, products, business models and supporting policies, serving as a bridge between R&D and the market.

"This is the first time China has made a systematic deployment of context cultivation and opening at the national level," said Li Chunlin, deputy head of the National Development and Reform Commission, at a State Council policy briefing on November 10.

He said the goal is to leverage China's super-large market and rich application contexts to create an "experimental field" for innovation, an "accelerator" for emerging industries, and a "touchstone" for institutional reform.

Contexts, he added, have become a key innovation resource, integrating technological advancement, industrial transformation, and systemic reform. The guideline outlines clear pathways



A robot is displayed at the exhibition area of the 2025 Global Industrial Internet Conference in Shenyang, northeast China's Liaoning province. (PHOTO: XINHUA)

and innovative policy measures to enable broad participation and drive deep integration of science and industry.

Zhu Zhihua, an expert from the Beijing Great Wall Enterprise Strategic Research Institute, told *Science and Technology Daily*, "This is the first time China has holistically mapped out socio-economic application contexts at the national level. It provides a practical roadmap for governments, enterprises, and

institutions across all sectors."

The plan identifies 22 priority areas under five directions — AI, digital economy, smart manufacturing, social governance, and daily-life services — and calls for three types of contexts: comprehensive mega-contexts, sector-integrated contexts and high-value niche contexts targeting specific challenges.

Chen Hongsheng, an official from the Ministry of Science and Technology,

described contexts as a "training ground" for turning scientific breakthroughs into real-world impact.

"Large-scale context application not only validates technology but also guides R&D priorities," he said, describing a rapid innovation cycle: demand-driven R&D, technological breakthrough and industrial application.

Yao Jun, director-general of the Ministry of Industry and Information Technology's Planning Department, announced an upcoming "AI + Manufacturing" action plan to embed AI across the entire manufacturing lifecycle — from design to operations to amplify its "multiplier effect."

According to Gui Gang, an official from the State-owned Assets Supervision and Administration Commission, central enterprises have already built over 800 AI-related contexts and opened 190 pilot platforms offering more than 400 services to external partners.

"We welcome private firms, SMEs, and research institutes to co-develop contexts with central enterprises," he said.

With coordinated implementation across ministries and regions, China aims to transform its contextual advantage into a powerful engine for innovation-led, high-quality economic growth.



Guidelines to Boost 'AI+' in Healthcare and Medical Services

By LIN Yuchen

A new strategic initiative designs the integration of AI into the healthcare sector to enhance the quality and efficiency of healthcare services while ensuring safety and accessibility for the public.

The recently released document on promoting and regulating the application of AI+ in healthcare and medical services aligns with the broader goals set forth by the Chinese government in the national AI development plans.

The policy sets an ambitious roadmap with key objectives for the years 2027 and 2030.

By 2027, China plans to establish comprehensive healthcare data sets and trusted data spaces, alongside the creation of specialized AI models for clinical diagnostics and treatment decisions. Widespread implementation of AI will be targeted across primary care, specialized clinical decision-making, and patient services, marking a significant leap toward fully integrated, AI-driven healthcare services.

By 2030, AI technologies are expected to be fully embedded in medical

imaging, diagnostic tools, decision support systems, and patient care, ensuring that secondary and tertiary hospitals across China adopt these innovations.

A primary focus of the policy is the enhancement of AI applications in primary healthcare. These include improving diagnostic accuracy in medical imaging and laboratory diagnostics, alongside the development of AI systems for chronic disease management and personal health monitoring.

AI tools will also be used to improve the quality and efficiency of public health services, such as routine screenings and health management for vulnerable populations. Through these initiatives, the policy aims to bridge gaps in healthcare access, particularly in rural and underserved areas, where AI can support more efficient delivery of care.

In clinical settings, the policy encourages the use of AI in medical imaging and decision support systems, particularly in specialized areas such as oncology, pediatrics, and mental health. AI applications will aid healthcare professionals in diagnosing complex conditions and managing rare

diseases, significantly improving the quality of clinical decision-making and patient outcomes.

The policy also outlines the expansion of AI-driven rehabilitation and personalized treatment options, reflecting a comprehensive approach to patient care across various stages of illness and recovery.

Another key aspect of the policy is the integration of AI with traditional Chinese medicine (TCM). The initiative proposes the development of AI tools that will assist in TCM diagnostics and treatment planning, leveraging vast repositories of historical data and clinical research to enhance the personalization of care based on TCM principles.

To support these efforts, the policy emphasizes the need for robust infrastructure and data-sharing mechanisms. It calls for the construction of a national health information platform that will allow seamless data exchange across public and private healthcare institutions. This platform will serve as the backbone for AI-driven applications, ensuring that medical professionals have access to the most up-to-date and comprehensive patient

information.

Additionally, the policy advocates for the development of more powerful AI algorithms and computing capabilities, which are critical for the widespread deployment of AI applications in the healthcare sector.

Data security and privacy are paramount in the policy's design. To protect patient information and maintain public trust, comprehensive guidelines have been drafted for the secure use of healthcare data. Oversight mechanisms have also been introduced to monitor the ethical and legal use of AI technologies, ensuring that they comply with the national and international standards for data protection and privacy.

Through this initiative, China aims not only to advance the domestic healthcare system but also to position itself as a global leader in AI-driven healthcare innovation. The integration of AI technologies will facilitate more efficient, accurate, and equitable healthcare delivery, while also fostering growth in the broader health technology sector.



Case Study

Xinjiang: Innovation Bridges Heritage, Progress

By Staff Reporters

Across the Xinjiang Uygur autonomous region in northwest China, a compelling narrative of development has been unfolding, seamlessly weaving technological advancements with deep-rooted traditions.

Spanning smart manufacturing plants and ancient-style dwellings, and bustling cities and revitalized villages, the region is experiencing dynamic growth. At the heart of this transformation lies innovation.

Agricultural progress against environmental odds

Despite its predominantly arid and semi-arid landscape and water scarcity, Xinjiang has achieved remarkable agricultural breakthroughs, defying environmental odds.

This year, Xinjiang's summer grain crops yielded 411.5 kg per mu, exceeding the national average of 375.6 kg per mu, earning it the title of the country's top region for yield growth.

Central to this success is advanced seed science. At the forefront of this effort is Join Hope Seed Co., Ltd. in Changji city in north Xinjiang, where researchers are producing improved seed breeds. "Historically, developing a high-performing seed variety typically took eight to 10 years," Join Hope's Chair She Gang said.

Today, investment in research and development has refined and accelerated the breeding process. Join Hope has developed over 300 high-yield varieties, many of which are sown in Xinjiang's key grain-producing areas. The authorities have contributed to this progress by establishing innovation platforms and technological support services to strengthen the sector.

Innovation goes beyond agriculture

Xinjiang's innovation drive extends beyond agriculture, taking advanced technology to other sectors. Urumqi-

based Yinduolan Uighur Medicine Co. exemplifies this transformation. The enterprise has fully automated its packaging line, which has dramatically increased its production efficiency. The automated control system for processing herbal extracts, a pioneering measure, has slashed the production cycle time by 30 percent, energy consumption by 35 percent, and improved extraction yields by 10-20 percent.

TBEA Co., also in Changji, is another company that has undergone technological transformation. From a small factory that nearly went bankrupt in 1998, the company has grown into a major industry player with reported total assets of 207.6 billion RMB in 2024.

Huang Hanjie, CEO of TBEA, attributes the transformation to a significant industry player today primarily to innovation.

A prime example of this is TBEA's digital dry transformer production workshop. It became operational in January 2024 and since then, production capacity has risen by 40 percent.

Surge in tourism
Xinjiang's rich cultural heritage and natural beauty are attracting a growing number of domestic as well as international visitors, bolstered by focused development initiatives.

The popular TV drama *My Altay* put the Altay region, which has a rich ice and snow culture, on the tourism map.

The local master craftsmen are also contributing to it with their unique art. Sulanbek Shahesh, in his 70s, is an inheritor of the intangible cultural heritage of fur ski making. His workshop promotes the region's winter culture, making traditional fur skis.

The Jiangujishan Mountain Int'l Ski Resort attracted nearly 550,000 visitors during the 2024-2025 season, with revenues exceeding 65 million RMB, reflecting over 20 percent year-on-year growth.



An aerial drone photo shows tourists visiting the Sayram Lake scenic area in northwest China's Xinjiang Uygur autonomous region. (PHOTO: XINHUA)

Brand-new Technology Better Serves Events and Lives

From page 1

Walker S2 is 176 centimeters tall and weighs 70 kilograms. Its body has 52 degrees of flexibility and uses the world's first hot-swappable autonomous battery replacement system for humanoid robots. This enables autonomous battery replacement in just three minutes, and is also equipped with the self-developed co-agent technology, the world's first intelligent agent specifically designed for the body of industrial humanoid robots.

In addition to the groundbreaking opening ceremony, Walker S2 is participating in multiple core functions of the Games. It is on duty in various locations such as the competition sites, the main operations center, the event operation command center, and the main media center to provide intelligent services, promoting the principle of "technology serving events."

Renovations for Games & daily life

The stadium has an area of 654,600 square meters, capable of accommodating approximately 75,000 people. Its eye-catching ribbon-like roof conveys a sense of "floating and flying gracefully."

To convey this impression, the designing team from the Chinese Academy of Engineering showed bold innovation. While maintaining the basic shape of the roof, they creatively added a PTFE suspended membrane design, covering a large area of exposed steel structures to optimize the visual effect. Modern floodlight projection technology was harnessed to create diverse and dynamic light and shadow effects on the roof, forming a brand-new "ribbon".

This "flowing ribbon" effect has not only enhanced the aesthetic appeal but also added more functionality to the roof. During events, by integrating projection technology, the venue transforms into a performance space that is both visually appealing and interactive, enhancing the atmosphere.

There are many more renovations inside the venue. The entrance passage is a slightly inclined ramp, adhering to the design concept of being friendly to people of all ages. When the Games concludes, people can come here to exercise, making the venue blend into the daily life of people.

New Quality Productive Forces Rely on Innovation

From page 1

The number of high-value invention patents per 10,000 people reached a new record of 15.3, surpassing all expectations.

"The past five years have seen China move from isolated breakthroughs to comprehensive advances," said Chu Junhao, CAS academician. "The next step is to progress from 'good' to 'excellent.'"

The Recommendations also call for improving the new system for mobilizing resources nationwide, and adopt unconventional measures to drive decisive breakthroughs in core technologies across entire chains in key fields, such as integrated circuits, industrial machine tools, high-end equipment, basic software, advanced materials, and bio-

manufacturing.

Peng Shou, academician of the Chinese Academy of Engineering (CAE), emphasized strengthening enterprises' principal role in innovation and building a market-oriented system integrating industry, academia, research and application. Wu Hequan, also a CAE academician, highlighted the need to improve data infrastructure and governance to support breakthroughs in software and artificial intelligence.

"Innovation is ultimately about people," added Chu Junhao. "We must remove constraints that limit creativity and stimulate scientists' full potential."

Deepening integration

At the third China Postdoctoral Innovation & Entrepreneurship Competition in late October, a team from Dalian

University of Technology reported that its femtosecond laser processing technology had matched enterprise demand through the event's platform, and secured a one-million-RMB investment within five months — a prime example of innovation-industry linkage.

In addition, the Recommendations proposes "promoting full integration between technological and industrial innovation." Ye Qizhen, CAE academician, said combining innovation with application is vital for economic growth and better livelihoods. Nuclear technology, for example, has entered everyday life — from power generation to medical use and heating, according to Ye.

Zhao Yuliang, CAS academician, noted that such integration is the bridge linking a "strong science sector"

with a "strong economy." Since the 14th Five-Year Plan, China's technology transfer and commercialization have surged, with national technology transaction value reaching 6.8 trillion RMB in 2024.

Looking ahead, Zhao suggested creating joint R&D consortia between enterprises, universities and research institutes. "Enterprises provide funding and real-world problems, while universities contribute equipment and talent. The two parties can jointly conduct pilot and mid-scale R&D to advance the commercialization of scientific and technological achievements," he said. "This approach helps solve bottleneck technologies and cultivates talent for deep integration of scientific and industrial innovation."

U.S. in No Position to Blame China on Climate



By LIANG Yilian & HU Dingkun

At a recent UN Security Council meeting on climate and security, U.S. representative Dan Negrea criticized China over its carbon emissions, disregarding China's large population and development needs.

Geng Shuang, China's deputy permanent representative to the UN, responded to the allegations, saying that China, with a population of 1.4 billion and the second-largest GDP in the world, "is contributing annually more than 30 percent to the world economic growth, and its per capita emission is not among the highest in the world."

Geng critiqued the U.S. for undermining global efforts by withdrawing from the Paris Agreement twice and urged collaboration instead of blaming others.

In recent years, the U.S., the country with the biggest historical responsibility for the current climate warming, has dithered on its climate policy and reversed many significant decisions.

This year, Washington withdrew from the Paris Agreement — for the second time — and issued multiple executive orders to lift restrictions on domestic coal development while expanding oil and gas production.

An analysis led by researchers from Princeton University suggests that this reversal of climate policies will cause the U.S. to emit an additional 470 million tonnes of greenhouse gases annually



The drone photo taken on April 8 shows the Hami-Chongqing UHV direct current transmission line project. (PHOTO: XINHUA)

over the next decade.

On the issue of climate, the U.S. has not only let the world down by refusing to shoulder its share of the responsibilities but also deliberately obstructed the efforts of others.

According to Politico, the U.S. government is leveraging its trade influence to coerce the EU, Japan and others into purchasing American oil and natural gas. It is also deliberately deploying diplomatic tools to prevent other countries from reducing the use of fossil fuels.

During the International Maritime Organization meeting in October, the U.S. delayed the implementation of a proposed global carbon tax on shipping by threatening and pressuring the negotiators from other countries.

According to a commentary in *npj Climate Action*, an open-access journal

published by Nature, U.S. climate actions not only undermine decades of progress in transitioning to clean energy, but also pose a direct threat to the global community's ability to limit global warming to 1.5 – 2 °C.

The commentary, published in July, was authored by Carlos Garcia-Soto, a senior researcher at the Spanish National Research Council.

Unlike the U.S., China is firmly advancing the transition to renewable energy and improving climate governance. It is also exporting clean energy technologies and products and leading the global decarbonization process.

According to the global energy think tank Ember, China is the world's largest investor in clean energy, with an investment of 625 billion USD in 2024, accounting for 31 percent of the world's total.

In 2024, clean energy accounted for 84 percent of China's electricity growth, and clean energy generation in the first half of this year increased by 27 percent year on year.

From 2022 to 2024, China's installed capacity of wind and solar power surged from 635 GW to 1,408 GW.

In 2025, the total installed capacity of China's wind and solar power will surpass coal power.

According to a study by the Brussels-based economic think tank Bruegel, China is vital especially for renewable energy products, manufacturing 92 percent of the world's solar modules and 82 percent of wind turbines as of 2024. China's production of green energy technologies not only meets its own rapid renewable energy installation needs but is also expected to meet the production capacity required for global decarbonization.

In sub-Saharan Africa, China's clean-energy exports in 2024 alone are set to cut annual emissions by around three percent per year, and by around 4.5 percent in the Middle East and North Africa region.

Responding to the climate crisis is a global consensus, and developing clean energy represents the trend of the times. The international community can clearly see who is taking responsible action and who is shifting responsibility, who is seeking cooperation and who is making trouble on the issue of climate change.

China's clean energy technology has provided certainty for global climate governance. The U.S., perceived as a trouble-maker and responsibility-shirker in global climate actions, has no support and is in no position to blame China.

Voice of the World

Innovative China Draws the World

By LI Linxu

Innovation is a buzzword in China's 15th Five-Year Plan recommendations for the period from 2026 to 2030.

China's rapid rise as a global innovation hub is reshaping industries worldwide, attracting multinational corporations like ZEISS, Vale, and Caterpillar to collaborate and invest in its dynamic ecosystem.

These partnerships demonstrate how China's innovative prowess is not only transforming its domestic market but also influencing global sci-tech and sustainable development trends.

ZEISS, a technological pioneer in the optics and photonics field, has embraced China's innovation potential and deepened its roots in the country through localized innovation and partnerships.

"China offers a vast market, an open business environment, favorable policies, abundant talents and resources, and sophisticated supply chains. This unique combination makes China an ideal destination for business," Martin Fischer, president and CEO of ZEISS Greater China, said. He emphasized that ZEISS is continuously advancing local innovation in China, and strives to become an integral part of the country's innovation ecosystem.

Currently, ZEISS has three R&D centers located in Shanghai, Suzhou, and Guangzhou, and holds 89 impactful patents in China. It is also engaging and collaborating with academic and research institutions to drive the transformation from scientific breakthroughs into industrial applications.

"ZEISS has been a trusted partner in China since 1957, coinciding with the country's first Five-Year Plan period. As the 15th Five-Year Plan period is approaching, both ZEISS and China are poised for new beginnings," Fischer said, vowing to expand the company's investment and presence in China.

The Chinese market has become the largest market for ZEISS since 2021. Over the past decade, the company's revenue increased six-fold in China.

Transparent Jellyfish Robot for Underwater Probe

Hi-Tech

By LIANG Yilian

A research team led by Professor Tao Kai from the School of Mechanical Engineering at Northwestern Polytechnical University in Shaanxi, northwestern China, has developed a fully transparent, jellyfish-shaped bionic robot capable of intelligent underwater exploration and real-time environmental monitoring.

Dubbed the "Underwater Phantom," the robot becomes nearly invisible to the naked eye when submerged, blending seamlessly into its surroundings. Measuring just 120 millimeters in diameter and weighing 56 grams, it is powered by an electrohydraulic artificial muscle actuator and innovative hydrogel electrode materials independently developed by the team.

These technologies precisely replicate the vortex-ring propulsion mechanism of the real jellyfish, enabling the robot to achieve efficient, almost silent, movement underwater.

With an ultra-low power consumption of only 28.5 milliwatts, the robot demonstrates strong potential for long-term, covert underwater operations.

The researchers have also integrated

Brazilian mining giant Vale recognizes significant strengths in China's innovation ecology, and has deepened its innovation cooperation with China.

Tracy Xie, CEO of Vale China, said: "Chinese-style innovation prioritizes resource integration and shared development, leveraging the nation's extensive industrial infrastructure and collaborative culture." She cited Vale's expanded innovation network as a prime example, including its joint laboratory with the Central South University in Changsha in central China.

Established last year, the 3,000-square-meter facility, equipped with 100+ cutting-edge instruments, focuses on low-carbon and hydrogen metallurgy research. Open to researchers industry-wide, it aims to advance theoretical breakthroughs and pioneering technologies in sustainable metallurgy.

Caterpillar, a U.S. manufacturer of heavy equipment, also views China as a strategic location. In its 50-year presence in China, the company has built a complete value chain including local R&D, manufacturing, and supply networks.

It is focused on long-term opportunities in economic growth in China, where innovation is aligned with infrastructure development and sustainability goals.

"In the coming years, we will be continuously committed to China," Alan Yang, Caterpillar's senior vice president, said. Caterpillar remains dedicated to future innovation through investments in AACE technologies — autonomy, alternative fuels, connectivity and digital, and electrification — to meet evolving customer needs.

These cases underscore China's ability to attract and co-create with global leaders. From ZEISS's optics to Vale's sustainable metallurgy and Caterpillar's smart solutions, China's innovative ecosystem offers technology innovation, transfer, scale, and policy synergy, making it an indispensable partner for multinationals.

As the world watches, "Innovative China" continues to draw the world — not just as a market, but as a collaborator in shaping the future.

Wuzhen Summit Highlights Open Source, Global Collaboration

Opinion

By Staff Reporters

"In the past two years, Chinese open-source contributions have earned deep respect globally," said Wang Jian, founder of Alibaba Cloud and moderator of the "Six Little Dragons" Wuzhen Dialogue, at the 2025 World Internet Conference that recently concluded in Wuzhen in east China. "The international developer community now recognizes that China is making substantial, high-quality contributions to the foundation of AI."

A new consensus emerged among China's leading tech innovators: The country's growing influence in global technology stems not from closed systems, but from active participation in and contributions to open-source ecosystems and international co-creation.

During the same dialogue, the founders of six cutting-edge Chinese companies underscored that open collaboration has become central to their development strategies. Their message was clear: China is no longer just a user of

global open-source tools. It is now a key builder of them.

Nowhere is this shift more evident than in AI. Wang pointed to two landmark achievements from Hangzhou, the city in east China where the Alibaba Group is headquartered: Alibaba's Qwen large language model and DeepSeek's open-weight AI models. Both have gained adoption by developers worldwide and were honored at the Wuzhen conference.

Chen Deli, senior researcher at DeepSeek, confirmed this trend. The company, founded in 2023 with the goal of advancing toward artificial general intelligence (AGI), has released its models openly from day one.

"We practice the concept of a community with a shared future in cyberspace, advocating openness, cooperation and mutual benefit," Chen said. "By open-sourcing our models, we enable global developers to use, test, and improve them. In return, we receive invaluable feedback that accelerates our own progress. This two-way exchange has become a core competitive advantage."

This philosophy extends beyond software to hardware and robotics. Wang Xingxing, founder, CEO and CTO

of Unitree Robotics, explained that the recent leap in humanoid and quadruped robots from lab prototypes to agile, real-world machines was made possible by global open-source collaboration.

"It's not the achievement of any single nation," he said. "Developers around the world share algorithms, simulation environments, and control frameworks on open platforms. That collective effort is why robots today can walk, dance, and operate in complex environments."

He added that Chinese companies are not only benefiting from this ecosystem but enriching it. Unitree, for instance, has open-sourced the key components of its robot control stack, enabling researchers and startups globally to build upon its work.

Huang Xiaohuang, founder of Qunhui Technologies, emphasized that China's role in the global digital economy has always been interconnected.

"China's Internet era generated massive public data and user scenarios," he said. "This accumulation didn't just support domestic AI — it also provided foundational training material for global models, including those developed by companies like OpenAI. Now, we're giving back

through open models, transparent research, and collaborative development."

Even in creative industries, openness fuels innovation. Feng Ji, CEO of Game Science, commented that Chinese game developers have long relied on global platforms like Steam to reach audiences, gather feedback, and iterate.

"Last year, four of the world's top 10 highest-grossing games were created by Chinese teams," he said. "That success was built over more than a decade of engaging with a global player base and talent pool not in isolation."

The emphasis on open source reflects a broader strategic shift. As Wang observed, the past decade, the period since China proposed building a community with a shared future in cyberspace, has seen China evolve from a technology adopter to a co-architect of global digital infrastructure.

The participants agreed that in an era of rising technological fragmentation, open collaboration offers a more sustainable path forward. Their work demonstrates that innovation thrives not behind walls, but in shared spaces where code, ideas, and ambition flow freely across borders.

tor exceeded 90 percent, and all key core equipment was domestically produced, establishing an independent and controllable supply chain system.

From the implementation of the project to its stable operation, the construction of the experimental reactor has been advancing steadily. In June 2024, it achieved full-power operation for the first time, and in October 2024, it completed the world's first molten salt reactor with thorium. It was the first in the world to build a unique MSR and thorium-uranium fuel cycle research platform.

Now, the research team is conducting systematic studies on the key scientific issues related to adding thorium, and aims to complete the construction of a 100-megawatt TMSR demonstration project, and begin operation by 2035.

Thorium-uranium Conversion Makes Breakthrough

From page 1

There is no need for huge pressure vessels or a large amount of water for cooling. It's like generating electricity by flowing 'nuclear fuel' through 'high-temperature salt,' which is both safe and efficient," according to researchers of the Shanghai Institute of Applied Physics, CAS.

Because there is no need of water as a coolant, the TMSR is expected to enable the construction of safe and highly efficient nuclear power plants in inland areas.

According to researchers, when a reactor needs to add nuclear fuel, conventional pressurized water reactors need to be shut down regularly and the top cover

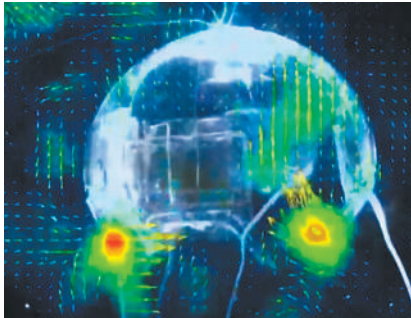
of the pressure vessel needs to be opened to replace the nuclear fuel. However, the TMSR uses liquid fuel. The nuclear fuel is uniformly dissolved in the molten salt coolant and circulates along with it, allowing for fuel replenishment without shutting down the reactor.

The TMSR also has many safety features. When the temperature of the TMSR inside the reactor exceeds the predetermined threshold, the bottom freezing plug will automatically melt, and the molten salt carrying the nuclear fuel will all flow into the molten salt storage tank, thereby terminating the nuclear reaction. Meanwhile, the reactor operates under a normal pressure environment,

with simple and safe operation. The fluoride salt coolant turns into a solid state after cooling, effectively preventing the leakage and spread of nuclear fuel, and also preventing it from interacting with groundwater and causing ecological disasters.

Tackling key tech barriers

In 2011, CAS initiated the TMSR nuclear energy system technology project, systematically overcoming a series of technical challenges such as the design of the experimental reactor, the development of key materials and equipment, installation and commissioning, as well as reactor safety. Ultimately, the overall self-made rate of the experimental reac-



A fully transparent, jellyfish-shaped bionic robot. (PHOTO: Northwestern Polytechnical University)

4

LIFE IN CHINA

Science Empowers Global South Cooperation

Dialogue

By LONG Yun & BI Weizi

"Global cooperation is not a luxury. It is a necessity. It is through dialogue, trust and shared scientific work that we can build bridges and create solutions that leave no one behind." This powerful message was part of the speech given by Brazilian scientist Professor Helena B. Nader at the 2025 General Conference of the Alliance of National and International Science Organizations for the Belt and Road Regions (ANSO) on Science and Innovation 2025, which opened in Beijing on October 28.

Nader is the president of the Brazilian Academy of Sciences (ABC) and the first woman to hold that role in its history. She is also vice president of ANSO. As a biochemist by training, she has spent her career in research and teaching at the Federal University of São Paulo (UNIFESP), while actively pushing for greater inclusion in science, especially for women and Afro-Brazilian researchers. Her words in Beijing were not new. They reflect a belief she has long held: Science works best when it is open, collaborative and grounded in real human needs.

Fighting for equity within sci-tech community

Nader's journey to the pinnacle of scientific leadership began with a deep commitment to justice and inclusion. When she assumed office as president of the ABC in May 2022, she brought with her a clear mission: to make science more representative of the society it serves. Her inaugural speech set the tone, emphasizing gender, racial and ethnic equity within the scientific community.

Reflecting on her historic role as the first female president of the ABC, Nader told *Science and Technology Daily*, "[Throughout] my whole life I fought



Professor Helena B. Nader. (COURTESY PHOTO)

for equity and for the equilibrium of gender. So when I became [president], it wasn't planned. It was a consequence of my performance and presence in the academy."

Under her leadership, the ABC has made significant strides in increasing female representation among its members. Today, nearly 25 percent of full members are women, a marked improvement from previous decades.

However, she is quick to point out that progress remains uneven. "We have a problem in terms of equity," she admitted. "Brazil's population is half made up of people of African descent, mixed race, or indigenous backgrounds. But in our academy, we see very little representation from these groups."

Nader does not just care about numbers, and sees diversity not as a checkbox but as a scientific imperative. "When people with different backgrounds, cultures and life experiences join research, we ask better questions and come up with more meaningful solutions," she said.

South-South cooperation needed

As vice president of ANSO, Nader plays a pivotal role in shaping a new era

of international scientific collaboration. Since its inception, ANSO has grown into a dynamic network connecting about 80 science organizations across Asia, Africa, the Middle East and Latin America. For Nader, this platform represents a powerful opportunity to shift the center of gravity in global science.

"I am deeply aware of how important ANSO has become in just a few years," she observed. "It connects scientists, institutions and policymakers across continents and cultures. Our strength lies in our diversity. We are united by a shared commitment to advancing science for the benefit of all humankind."

She highlighted the urgency of the recent conference's theme "Science and Innovation for a Sustainable Future" as a call to action. But she also pointed to a critical gap. While ANSO has strengthened collaboration between Asian and African nations, engagement with Latin America and the Caribbean remains limited.

Nader is determined to bridge this divide. "I'm going to work harder on increasing collaboration between ANSO and Latin American countries,"

she affirmed. By pooling resources, knowledge and expertise, nations in the Global South can tackle shared challenges from biodiversity loss to sustainable agriculture on their own terms, without relying solely on traditional Northern partners.

This shift, she argued, requires a change in mindset, especially among young researchers. "In my time, collaboration meant going North, like the U.S. or Europe, but today we must encourage young scientists to look South, to build partnerships across the Global South. I think we should not take this geopolitical crisis as a barrier, but an advantage to increase South-South collaboration."

The joy of being a scientist

Beyond her leadership roles, Nader remains deeply connected to her role in the laboratory. As a professor at UNIFESP, where she earned her PhD and conducted groundbreaking research in biochemistry, she continues to mentor students and lead research projects. "I love being a scientist. I really do," she said with genuine happiness.

Even as an administrative leader, she makes time for the lab. "I still have graduate and undergraduate students working with me. Being around young minds, seeing their curiosity and passion is the best part of my life, besides my children." This hands-on engagement keeps her grounded and reminds her why science matters.

"Science is amazing. Choose it because you're going to have fun and you're going to be very happy." She described research as a uniquely empowering profession: "You are your own boss. You design your experiments, choose your methods and follow your curiosity. It's fantastic."

She emphasized the importance of mentorship and opportunity. "We need more youth in science. I think it's most relevant to support students with real research experience. That's how talent grows."

waterways or excavates new canals for flood discharge. This comprehensive project incorporates various hydraulic structures and uses all accessible natural resources, showcasing the unique characteristics and scientific advancements of ancient Chinese hydraulic engineering.

The Lingqu Canal was also developed as an irrigation system that transformed Xing'an into a highly productive agricultural region. Following the establishment of the People's Republic of China in 1949, the canal was completely restored and has since been preserved as a historical project.

Today, the Lingqu Canal is recognized as a significant cultural heritage site and serves various functions, including irrigation, flood control, water supply and a tourism attraction.

reef recovery capabilities and should be seen as a warning to the world.

However, he believes it is premature to assert that the entire coral reef system has crossed a critical point. In the long term, coral reefs will be irreplaceable as they are highly biodiverse shallow-water systems that serve as nurseries for many fish species, and maintain the food web from the shallows to the deep sea. If coral reef systems collapse, they will be replaced by algae-dominated, low-biomass systems. The impact of these systems on carbon cycles and marine ecosystem functions is not fully understood and remains highly uncertain, but the risks are significant.

In light of this urgent situation, the report emphasizes that the key to avoiding the most severe consequences lies in taking unprecedented and immediate emergency action.

China Impression

International Voices on China's Development

By Staff Reporters

A think tank report released on November 7 elaborates on the strategic layout of China's economic and social development during the 15th Five-Year Plan period (2026-2030).

The report was made public in Beijing at a symposium co-hosted by the national high-level think tanks of the Central Institute of Party History and Literature and the Xinhua News Agency.

Addressing the symposium, Qu Qingshan, head of the Central Institute of Party History and Literature, noted that the Party leadership's recommendations for formulating the 15th Five-Year Plan, adopted at the fourth plenary session of the 20th CPC Central Committee, serve as another mobilization and overall deployment to advance Chinese modernization.

In his speech, Fu Hua, president of Xinhua News Agency, said the think tank report represents the latest research achievement, based on a deep understanding of the guiding principles from the plenum. "It seeks to interpret the wisdom that continues to guide China's modernization journey," he added.

The international participants at the symposium also gave their perspectives on China's development model, underscoring its global relevance and distinctive characteristics.

Alberto Blanco Silva, Cuban ambassador to China, emphasized that China's development is not just about growth. It is also about stability, vision and the people. China's commitment to socialist modernization serves as a stabilizing force amid global uncertainty.

The ambassador also praised China's vision of a community with a shared future for humanity, especially its contributions to South-South cooperation and more equitable global governance.

Anna Malindog-Uy, director and vice president of external affairs at the Asian Century Philippines Strategic

Studies Institute, described China's modernization as a long-term historical process. She noted achievements in sci-tech field, rural revitalization and ecological civilization. She praised China's openness to the world through endeavors such as the Belt and Road Initiative. "China's development is not closed or exclusive," she said. "It offers opportunities for other developing countries."

Several foreign experts who have lived and worked in China for decades shared their firsthand observations of how China turns plans into reality.

Mustafa Mohamed Ahmed Yahia, Arabic expert at the Institute of Party History and Literature, has lived in China for over 30 years. He has observed six Five-Year Plans from beginning to implementation. "I have seen with my own eyes how China has transformed," he said. For him, the strength of China's planning lies in execution. "These are not just documents," he said. "They are action plans carried out year after year with consistency and discipline." From infrastructure to digital economy, from rural development to urban innovation, he has witnessed how policy translates into real improvements in people's lives.

Elena Kazanina, Russian expert at the Institute of Party History and Literature, spoke about the depth and continuity of China's governance philosophy. She has noted how the core principles remain stable across time. "What stands out is not only the pace of change but the consistency of direction," she said. "China's modernization is not copied from others. It is shaped by its own history, culture and socialist path."

The discussions at the forum reflected a growing international understanding of China's development, which is the result of long-term planning, strong institutions and a clear strategic vision. In a world facing turbulence, China's path offers stability, coherence and hope.

Lingqu Canal: Ancient Engineering Marvel

Traditional Eastern Wisdom

By BI Weizi

The Lingqu Canal, located in Xing'an county in the Guangxi Zhuang autonomous region, is a historic waterway that links the Xiang and Li rivers, connecting the Yangtze and Pearl River basins and facilitating travel between central China and the Lingnan region (present-day Guangdong and Guangxi).

Spanning a total length of about 36.4 km, it flows through the communities of Xing'an, Yanguan, Rongjiang

and Xiangli. Key components of the project include the Canal Head Complex, the North Canal and the South Canal.

Completed in 214 BC, this project is now recognized as the Lingqu Canal. Its construction had significant military implications for securing south China. For over two millennia, the canal was the main route for transporting water between Lingnan and central China, until the Yuehan and Xianggui railways were built in modern times.

The canal's fundamental design principle involves using weirs to raise the water level of the Xiang River. This directs one stream into an upper section

of the Li River (the present-day South Canal), while another stream is channelled through a newly constructed canal (the current North Canal) that flows into the Xiang River. This method effectively links the two rivers, enabling communication between the Yangtze and Pearl River systems.

At the head of the canal, overflow dams, training dikes and lateral overflow dams are used to manage water diversion and flood control. The canal was constructed through a combination of excavation and dam building. It features eased slopes with curves and controlled water flow via ancient locks (doumen) and weirs, and utilizes existing natural

Is Earth at Climate Tipping Point?

Science Outreach

By Staff Reporters

According to a recent report, the globe is facing a "new reality" as it approaches the first of several catastrophic and possibly irreversible climatic watershed moments: the widespread destruction of coral reefs.

However, there are differing opinions on this assertion within the academic community. Some experts believe that it is premature to assert that the entire coral reef system has crossed

the tipping point.

The *Global Tipping Point Report*, co-authored and released by 160 scientists from 87 institutions in 23 countries, states that as global warming surpasses the critical threshold of 1.5°C, the world is rapidly approaching a series of catastrophic tipping points, with the large-scale death of warm-water coral reefs being the first significant indicator. This means that humanity has entered a new "climate reality," where the stability of multiple critical systems on Earth is under unprecedented threat.

The report warns that global temperatures have already risen by approximately 1.4°C, while the thermal tipping point for warm-water coral reefs is estimated to be between 1°C and 1.2°C.

This means they have substantially crossed the point of no return. Even if warming can be kept below 1.5°C, there is a greater than 99 percent probability that coral reefs will disappear on a large scale. These ecosystems support the livelihoods of nearly one billion people and a quarter of all marine biodiversity. So the loss of coral reefs will exert a collapsing effect on all marine ecosystems.

Despite the grim situation, some experts and professors have offered differing opinions. Johan Rockström, director of the Potsdam Institute for Climate Impact Research, said that the ongoing fourth global coral bleaching event, occurring at an unprecedented frequency, is severely impacting coral



The symposium titled "Understanding the Fourth Plenary Session of the 20th Central Committee of the Communist Party of China" is held in Beijing on November 7. (PHOTO: XINHUA)

China Charts Green Course Toward Carbon Neutrality

From page 1

Significant progress has been made in energy conservation, emission reduction, circular economy development, and enhancement of carbon sink capacity. During the first four years of the 14th Five-Year Plan period (2021-2025), energy consumption per unit of GDP dropped by 11.6 percent, excluding non-fossil energy use and raw materials.

Tailored waste management policies have promoted the standardized and large-scale recycling of renewable resources. Integrated conservation of mountains, waters, forests, farmlands, grasslands, and deserts has been strengthened, boosting the carbon sink capacity of ecosystems. China is the first country to realize zero net land degradation, and its desertified and sandified areas are both shrinking.

At the same time, China is also advancing scientific and technological innovation, improving financial and policy support, and expanding market-based mechanisms to reinforce its carbon reduction efforts. Priority has been given to basic research on key technologies related to carbon neutrality, leading to

breakthroughs in renewable energy, energy storage, and smart power grids.

Climate change remains a global challenge that calls for collective action. Committed to multilateralism and cooperation, China is contributing to the development of a new model of global climate governance, the white paper said.

It has pushed for the signing and implementation of the Paris Agreement, and upheld the goals, principles and frameworks of the United Nations Framework Convention on Climate Change.

In addition, China has advanced high-quality international cooperation on green and low-carbon development under various mechanisms including the Belt and Road Initiative, offering financial, technological and capacity-building support to other countries of the Global South.

Looking forward, China stands ready to work with the international community to advance eco-environmental conservation, promote green development, address global climate challenges, protect the green Earth, and secure a cleaner and more beautiful world, the white paper concluded.