

Science and Technology Daily

VOL.6-NO.226

JANUARY 24-25, 2026

Innovation Pathway

2025: A Bumper Year for Sci-tech Innovation

By Staff Reporters

In 2025, China once again enjoyed a bumper year of scientific and technological innovation, with major sci-tech achievements emerging one after another. China has become one of the economies with the fastest-growing innovation capacity in the world.

Collaborative breakthroughs

On January 20, 2025, the Experimental Advanced Superconducting Tokamak, known as China's "artificial sun," maintained a steady-state high-confinement plasma operation for a remarkable 1,066 seconds, setting a new world record.

This marks a major leap forward in China's fusion power research from basic science to engineering practice, Wang Teng, an associate researcher at the Institute of Plasma Physics, Chinese Academy of Sciences, told *Science and Technology Daily*.

On October 15, 2025, the Chuanke 1 well of China National Petroleum Corporation was drilled to a depth of over 10,000 meters. This breakthrough was due to the joint effort of enterprises, universities and research institutions.

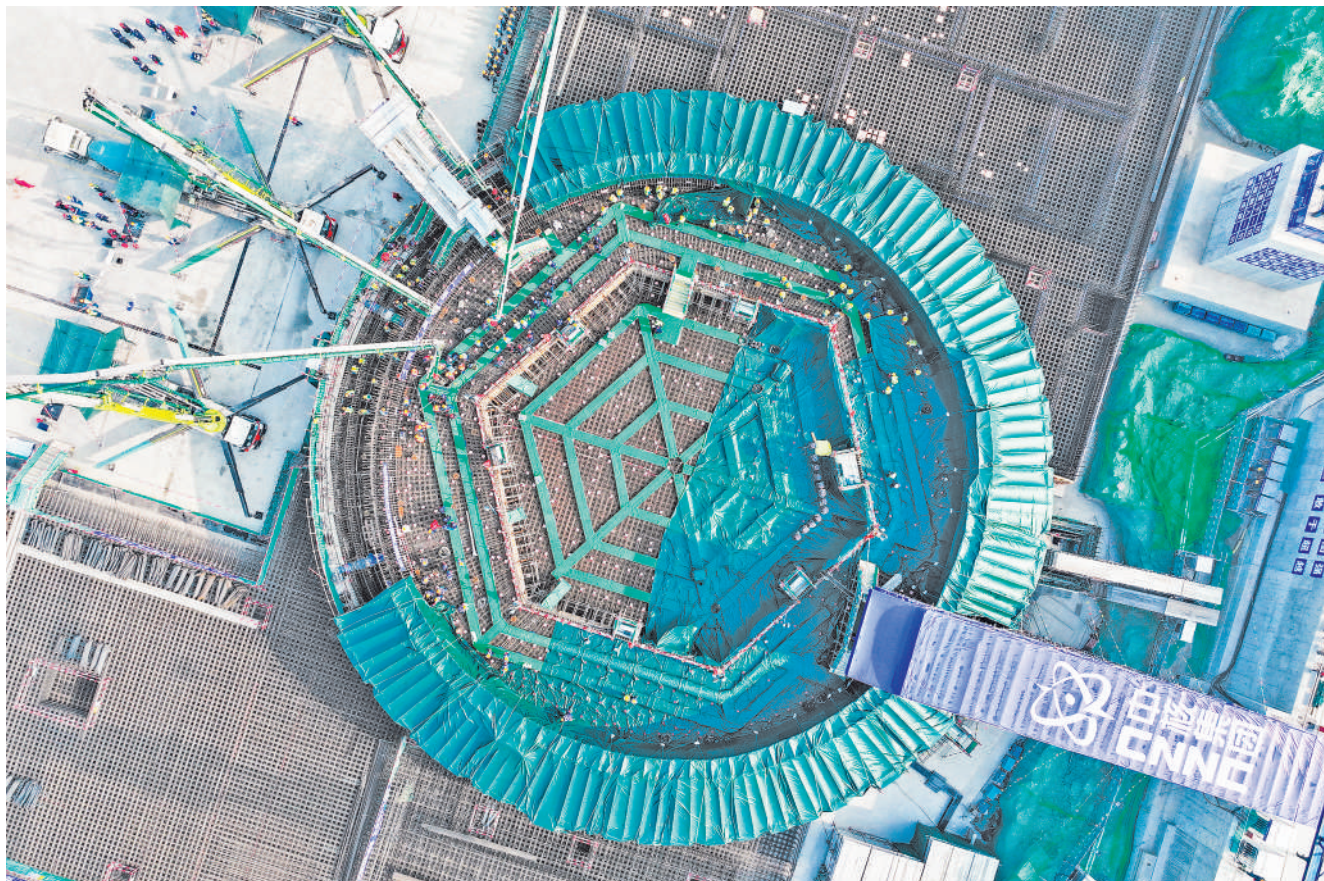
Collaborative R&D has improved the innovation mechanisms nationwide. Major national sci-tech programs, including the BeiDou Navigation Satellite System, China's lunar exploration program and the CR450 EMU, next-generation, world-record-setting high-speed train, have all benefited from collaborative innovation.

The Recommendations of the Central Committee of the Communist Party of China for Formulating the 15th Five-Year Plan for National Economic and Social Development also stress improving the new system for mobilizing resources nationwide and adopting 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 biomanufacturing.

Innovation-driven economy

In terms of emerging and future industries such as AI, industrial robots, quantum computing, clean energy and low-altitude economy, China has maintained a rapid and stable development momentum in recent years.

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Construction of the Xuwei Nuclear Heating and Power Plant in Jiangsu province, eastern China, begins with the pouring of concrete for the nuclear island of its first unit, January 16. As the world's first project to supply low-carbon steam from nuclear energy to the petrochemical industry, it offers an innovative pathway for green transformation in high-carbon sectors. (PHOTO: XINHUA)

STI Frontier

Shield Machines Rendezvous under Yangtze River

By WANG Xiaoxia & DU Peng

Under the lower tributaries of the Yangtze River in China's eastern Jiangsu province, the "riverbed docking section," or completion of the Jiangyin-Jingjiang Yangtze River Tunnel, was officially celebrated recently.

Constructed by China First Highway Engineering Co., Ltd. (CFHEC), the successful completion of this major infrastructure project, conquering the world-class challenge of a shield-tunnelling machines rendezvous beneath the mighty Yangtze's riverbed, despite being confronted with high water pressure and highly permeable strata, is a defining breakthrough in modern engineering.

Bold decision

In February 2023, during the excavation of the 6.4km tunnel, the shield machine unexpectedly encountered an

accident and was unable to continue moving forward. After much deliberation, the project team of CFHEC made a bold decision to use a new shield machine from the other side of the river, to recover its stranded twin and make a rendezvous beneath the riverbed.

CFHEC principal engineer Yao Zhanhu said the biggest challenge in the rendezvous was to ensure that the new shield machine could accurately find its direction in the geological environment of high-pressure, water-rich and sandy strata with surging undercurrents.

"We have developed a visualization system, installing cameras and various sensors on the shield machine to collect real-time data and information about the surrounding environment, achieving all-round monitoring of the tunneling process," said Zhang Lei, deputy manager of the project.

In the summer of 2024, the two

shield machines closed in on the critical moment of docking. On the surveillance screen, the "cross" bullseye symbolizing the target gradually coincided. The rendezvous between the two was achieved with just 2mm of vertical error and no horizontal deviation.

Control of the water

A successful rendezvous was only the first step. Surrounding the two shield machines was the soft and unstable soil layer rich in groundwater. To carry out subsequent construction in the section, it was necessary to control the strata where the undercurrents surged.

"One of the best ways to control water is to freeze it." After conducting systematic argumentation, Academician Chen Xiangsheng of the Chinese Academy of Engineering accepted the asymmetric freezing method proposed by the project team.

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Enterprises' Principal Role Reinforced in Innovation

By Staff Reporters

The principal role of enterprises in technological innovation should be reinforced, according to the Recommendations of the Central Committee of the Communist Party of China (CPC) for Formulating the 15th Five-Year Plan (FYP) for National Economic and Social Development (hereinafter referred to as Recommendations).

This ongoing strengthened strategic orientation has also boosted the confidence of entrepreneurs, according to *Science and Technology Daily (SET Daily)* interviews with many business leaders. It is envisaged that during the 15th FYP period (2026-2030), enterprises will feature more prominently in the national

innovation system, leading to breakthroughs in key technologies and exploration of emerging fields.

Key tech breakthroughs

During the 14th FYP period (2021-2025), the innovation strength of Chinese enterprises has been consistently improved. In 2024, China's total R&D expenditure, ranking second in the world, reached 3.6 trillion RMB, of which 77 percent was investment from enterprises.

The Recommendations encourage enterprises to make more investments in basic research, and underscore developing new drivers of economic growth such as quantum technology, biomanufacturing, hydrogen and nuclear fusion power, brain-computer interfaces, embodied artificial intelligence, and 6G

mobile communications.

To date, enterprises have made breakthroughs in multiple key technologies. For example, Chinese enterprise CIQTEK, a high-end scientific instruments developer and manufacturer, has realized localization of basic scientific research instruments such as electron paramagnetic resonance spectrometers, and developed the world's first low-temperature scanning nitrogen-vacancy probe microscope.

Quantum precision measurement, as one of the quantum information technologies closest to industrial breakthroughs, is now at a critical stage of moving from the laboratory to application, said Xu Kebiao, vice president of CIQTEK. See page 3

International Cooperation

China-Spain Industrial Chain Cooperation Deepened

Edited by WANG Xiaoxia

China and Spain have expanded their cooperation areas in recent years and established a dynamic and resilient industrial and supply chain cooperation relationship, benefiting both with tangible achievements.

More and more Chinese new energy vehicles can be seen in the streets of Spanish cities, the result of the increasing deep integration of the automobile industrial chains of the two countries.

At the end of 2024, Chinese automobile producer Chery and Spanish company Ebro-EV Motors launched their first model at their joint venture factory in Barcelona. In July 2025, BYD's hybrid vehicles topped the sales in Spain with a market share of 10 percent.

The bilateral cooperation is complementary. Spain has rich experience in vehicle manufacturing and parts supply and has established a sales network in Europe. Chinese enterprises have advantages in new energy technology, intelligent configuration and cost control.

Chinese automakers produce in Spain and cooperate with local suppliers, creating numerous job opportunities for the local people, said Marta Blazquez, president of Spain's Federation of Automotive Dealers Associations, in an interview with *People's Daily*.

Also, China encourages Chinese enterprises to invest in Spain, expanding cooperation in the fields of green energy and power battery industrial chains and emerging industries such as AI and advanced manufacturing, creating new opportunities for bilateral cooperation.

During the China International Industry Fair held in September 2025, the two countries announced plans to co-establish an industrial mother machine supply chain promotion center. See page 2

WEEKLY REVIEW

Shenzhou-20 Brings Retired Extravehicular Spacesuit Back to Earth

The return capsule of the Shenzhou-20 spacecraft landed at the Dongfeng landing site in north China's Inner Mongolia autonomous region on January 19 without any crew onboard. Among the items brought back to Earth was a retired extravehicular spacesuit. Known as extravehicular spacesuit B, it is the first spacesuit used in China's space station to meet the extended service target of supporting 20 spacewalks over a four-year period.

Chinese Satellite Data Signals Iceberg Near Complete Breakup

Data from China's Fengyun-3D satellite show that A23a, once the largest iceberg in the world, is approaching the final phase of its breakup, the China Meteorological Administration said. True-color images with a resolution of 250 meters reveal that the iceberg's main mass has diminished to about 506 square kilometers — less than one-eighth of its original area of 4,170 square kilometers when it separated from an Antarctic ice shelf in 1986.

UN High Seas Treaty Enters into Force

The Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction officially entered into force on January 17. The treaty establishes the world's first comprehensive legal framework for protecting and sustainably using marine biodiversity in areas beyond national jurisdiction, commonly known as the high seas.

Robot Learns Human-like Lip Movements

Researchers from Columbia University have developed a robot that can learn lip motions for tasks like speech and singing. Not relying on preset rules, the robot learned this by observing its own reflection and analyzing videos of human speech available online. Researchers believe this breakthrough could help robots finally cross the uncanny valley.

New Graphic



WECHAT ACCOUNT



E-PAPER



Monetary Policies Back High-quality Economic Growth

Policy Express

By LIN Yuchen

China's monetary and financial policies have delivered clear results in supporting the real economy, according to officials at a press conference held by the State Council Information Office on January 15.

Based on full-year financial data, the effectiveness of monetary and financial policies in supporting the real economy is evident.

The People's Bank of China (PBOC) announced that in response to evolving economic and financial conditions, it has expanded the quota for its relending program supporting technological innovation and industrial upgrading from 800 billion RMB to 1.2 trillion RMB.

The scope of eligible recipients has also been widened to include private small and medium-sized enterprises (SMEs) with high levels of research and development investment, further strengthening financial backing for innovation.

China's economic structure has continued to improve in recent years, with new growth drivers gaining momentum. In the first 11 months of 2025, the value added of high-tech industries above designated size rose by 9.2 percent year on year, making them a key



The State Council Information Office holds a press conference about effects of monetary and financial policies on high-quality development of the real economy in Beijing, January 15. (PHOTO: XINHUA)

engine of economic growth.

At the same time, financial support for technology continues to increase, while financing costs have significantly decreased. In November 2025, interest rates on newly issued loans in the technology sector and the digital economy were 0.32 and 0.51 percentage point lower, respectively, than a year earlier.

Loans in priority areas such as technology, green development, inclusive finance, elderly care and the digital economy all recorded double-digit growth, reflecting progress in advancing what poli-

cymakers describe as the "five key areas" of financial services.

To support green transition, the central bank has included projects with direct carbon-reduction effects — such as energy efficiency upgrades and low-carbon energy transformation — under its carbon emission reduction support tool. This tool is operated quarterly, providing one-year relending funds, with annual operations capped at 800 billion RMB.

Financial opening up and cross-border financing have also been enhanced.

In 2025, China introduced more facilitative cross-border financing policies for high-tech, specialized and innovative firms and technology-focused SMEs, while launching pilot programs for green foreign debt. These measures have helped companies secure nearly 10 billion USD in financing to date, supporting green and low-carbon projects.

Support for the private sector has been reinforced. The PBOC has decided to establish a one trillion RMB relending facility dedicated to private enterprises, particularly SMEs and micro enterprises.

In addition, tools supporting technology innovation bonds and private enterprise bond financing have been merged into a unified risk-sharing mechanism, offering a combined relending quota of 200 billion RMB.

On the consumption side, policies continue to focus on expanding domestic demand. A 500 billion RMB relending program for service consumption and elderly care has already seen 118.4 billion RMB disbursed by the end of 2025.

Meanwhile, outstanding consumer loans — excluding mortgages — reached 21.2 trillion RMB by November 2025.

The authorities say further efforts will center on lowering financing costs, supporting employment and entrepreneurship, and meeting increasingly diverse consumer financing needs.

Case Study

Energy and Manufacturing in Shaanxi Embrace Transformation

By Staff Reporters

Once known for its heavy industries and raw resource extraction, Shaanxi province in northwest China is rapidly reinventing itself as a hub of green innovation.

From turning coal into biodegradable plastics to exporting smart electric trucks and tech-enhanced agricultural products worldwide, the province is leveraging science and sustainability to drive high-quality economic growth. This transformation encompasses energy, agriculture and advanced manufacturing, driven by R&D investment, university-industry collaboration, and a clear shift toward low-carbon, high-value production.

Moving toward the 'new'

In Yulin, Shaanxi's energy heartland, the traditional coal chemical industry is shedding its "crude and polluting" image. The second phase of the 15-million-ton-per-year clean coal conversion demonstration project of SHCCIG Yulin Chemical Co., Ltd. recently reached a milestone: The control room for its vinyl acetate monomer unit was topped out. As the world's largest coal-to-chemicals project under construction, it symbolizes Yulin's push to upgrade the entire coal value chain.

At China Energy Yulin Chemical, the world's first commercial plant producing polyglycolic acid (PGA), a fully biodegradable plastic derived from coal, has entered stable operation. "We're turning coal into high-end, eco-friendly materials," said Tao Long, manager of the PGA production unit. "Our focus is on high-end and low-carbon development."

Supported by national demonstration initiatives and its status as an Energy Revolution Innovation Zone, Yulin has attracted approximately 200 billion RMB in investment to build a modern coal chemical cluster.

Across Shaanxi, this shift is accelerating: The province now operates a full industrial chain covering coal-to-oil, coal-to-ethylene glycol, and coal-based advanced materials. All coal-fired power units meet ultra-low emission standards. Renewable energy capacity has grown nearly nine-fold over the

past decade, surpassing 40 gigawatts. Carbon capture projects have already stored 450,000 tons of CO₂.

Turning tech into value

In the village of Jinmi in Zhashui county, technology is revitalizing rural livelihoods. Fungi farming, once at the mercy of the weather, now thrives in smart greenhouses with real-time sensors and mobile monitoring. Seven locally developed fungus strains, bred at an academician-led research station, account for the county's entire mushroom yield.

The village has moved beyond raw produce, creating value-added goods like fungus beer, biscuits and health supplements. Recently, it shipped 1,000 kilograms of dried fungi to Dubai, expanding its global footprint. Annual production exceeds 100 million fungus bags, with a brand value of 5.323 billion RMB, the highest in China.

"The fungi show how technology can unlock ecological value," said Wang Xiaoning, director of Shangluo city's Development and Reform Commission.

Linking intelligence to global market

In the Shaanxi Automobile Group's intelligent factory, one new-energy heavy-duty truck rolls off the line every 4.8 minutes. "We used to build diesel trucks; now, battery-electric and hydrogen models dominate," said senior technician Wu Xiaoming.

The company has shifted decisively toward electrification and autonomous driving, integrating electric drive-trains, lightweight materials, and 5G-enabled vehicle-to-infrastructure systems. From January to November 2025, it sold 20,882 new energy trucks, a 266 percent year-on-year increase, capturing 11.24 percent of China's market share.

This momentum extends across the province. In the first three quarters of 2025, Shaanxi's exports of new-energy vehicles rose by 73.3 percent compared to the same period in 2024.

"Shaanxi will deepen openness in aviation, auto parts and advanced coal chemicals," said Zhao Yide, secretary of the Communist Party of China Shaanxi Provincial Committee. "By combining our strengths in science and sustainability, we are building a high-quality, globally competitive economy."



The "Zhenbeitai" watchtower in Yulin, northwest China's Shaanxi province. Yulin has positioned itself to play an important role in China's energy transition. (PHOTO: XINHUA)

New Vision for Govt Investment Fund Management

By SUN Jin & LIU Yuanyuan

Working measures to guide the planning and allocation of government investment funds, as well as improve the evaluation and management of government investment fund allocations, were released on January 12 by the National Development and Reform Commission (NDRC) and three other government departments. The NDRC also released administrative measures for evaluating the allocation of government investment funds.

Liu Guoyan, a researcher at the Chinese Academy of Macroeconomic Research, said that the combination of the two measures are expected to enhance the efficiency of fiscal fund utilization and optimize the country's capital supply structure.

The working measures stipulate that government investment funds should better leverage their guiding role, emphasize their policy-oriented positioning,

and provide robust and effective support for major strategic initiatives, key sectors and areas where the market fails to function adequately.

Government investment funds should also be navigated to promote the deep integration of scientific and technological innovation with industrial innovation, optimize the layout of productive forces, accelerate the cultivation and development of new quality productive forces, and facilitate the transformation and upgrading of traditional industries, the measures noted.

According to the measures, national-level government funds should adopt a big-picture approach. They must prioritize key areas such as building a modern industrial system and overcoming technological bottlenecks, and support eligible cross-regional major projects and private-sector investments with strong demonstration effects. The objective is to address industrial chain weaknesses, overcome critical constraints,

and concentrate resources on strategic areas where government funds can lead by example.

When local government funds or their sub-funds are invested, they must align those investments with both their policy mandates and local conditions. They are required to follow national guidelines on building a unified domestic market and regulating local investment incentives. Priority must be given to upgrading industries, boosting innovation, supporting small and medium-sized private enterprises, and nurturing tech startups, which will encourage broader participation from private capital.

The working measures also include a negative list that explicitly bans government funds being used in specific investments.

The working measures provide clear planning before investments are made and ongoing guidance during implementation, Liu said. "The measures clearly define the fund's investment

targets, establish positive and negative lists, and provide detailed provisions to standardize fund investment activities and further emphasize policy-oriented guidance."

She noted that the administrative measures focus on oversight after investments are made. They introduce a comprehensive evaluation system that assesses how well funds align with national policy goals throughout their entire operational cycle, using both quantitative data and qualitative judgment.

According to Liu, the two measures mark a new stage in the development of China's government investment funds, focusing on standardization, quality and effectiveness. With clearer strategic direction and stronger performance evaluation, these funds are better equipped to support national strategies and drive high-quality economic growth.



Rules for Used NEV Batteries Updated

By LI Linxu

A new comprehensive regulation for the recycling and comprehensive utilization of used power batteries of new energy vehicles (NEVs) has been recently unveiled, with implementation slated from April 1, 2026.

The regulation was jointly released by six government bodies, including the Ministry of Industry and Information

Technology (MIIT) and the National Development and Reform Commission.

The move comes as China's NEV industry is expanding rapidly. Latest statistics show that in 2025, NEV production and sales reached 16.63 million and 16.49 million units respectively, each posting year-on-year growth of nearly 30 percent.

In recent years, with the rapid growth of the NEV industry, NEV power

batteries are entering a phase of large-scale retirement, necessitating further regulation of the recycling and comprehensive utilization of used batteries, according to an official from MIIT.

Industry experts estimate that the country's used power battery generation would exceed one million tonnes by 2030.

The new document is built upon a series of core principles designed to enhance traceability, assign clear responsibility, and ensure environmental and safety compliance throughout the battery lifecycle. It aims to establish a coherent and enforceable system from production to recycling and comprehensive utilization.

It outlines a full-channel, full-chain and full-lifecycle management of used batteries. A national NEV power battery traceability information platform is being established to track batteries from production to end-of-life, requiring manufacturers to code and label batteries and report data.

It clarifies the recycling responsibilities of both battery and NEV manufacturers, and stipulates that the establishment of recycling service stations must comply with the laws and regulations.

Entities such as battery enterprises, NEV manufacturers, and scrap motor vehicle recycling and dismantling enterprises must standardize the transfer of used batteries.

Activities involving the comprehensive utilization of used batteries must comply with laws and regulations on resource utilization, environmental protection and safety production, and obtain necessary approvals like project approval and pollutant discharge permits.

The new policy, which replaces four previous guidance documents on battery recycling, includes a six-month transition window for existing NEV models to comply with the new information reporting requirements.



Staff members assemble a new energy vehicle at a workshop in Qingdao, Shandong province. (PHOTO: XINHUA)

China-Spain Industrial Chain Cooperation Deepened

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It will focus on high-end computer numerical control machine tools, precision components and related fields, and carry out technological R&D and formulate industry standards.

In November 2025, a joint venture between Chinese battery giant CATL and multinational automaker Stellantis broke ground for a major lithium iron phosphate battery plant in Spain's northeastern region of Aragon. The factory fully uses renewable energy and will go into production by the end of 2026.

Areas such as clean energy, smart grids, and energy storage technologies have seen closer cooperation between China and Spain. Thanks to technological innovation, investment collaboration

and policy support, Chinese and Spanish enterprises have achieved a win-win result, and provided feasible experience for the global transition to clean energy.

China National Chemical Engineering 13th Construction Co., Ltd. signed a contract to establish a renewable fuel facility in southern Spain. It will use waste oils as raw materials to produce low-carbon fuels for aviation, shipping and traffic.

The cooperation between the enterprises of the two nations in areas such as photovoltaic power, wind power, and digital energy management has been fruitful, injecting new impetus into the green and low-carbon development of both countries, according to the Chinese Ambassador to Spain, Yao Jing.

Multilateral Cooperation Stays Strong Despite U.S. Exits



By LIANG Yilian & ZHANG Jiaxin

Recently, U.S. President Donald Trump issued an executive order declaring that the United States will withdraw from 66 international organizations, conventions and treaties — including the United Nations Framework Convention on Climate Change (UNFCCC).

Of these, 31 are UN entities, covering core areas such as climate, energy, nuclear security and trade rules.

From Trump's first-term withdrawal from the Intermediate-Range Nuclear Forces Treaty and UNESCO to now further abandoning global climate consensus, the United States' "exit" actions have continued to escalate.

U.S. Secretary of State Marco Rubio said in a statement that these organizations and conventions have either been "captured by the interests of actors advancing their own agendas contrary to our own" or are "a threat to our nation's sovereignty, freedoms and general prosperity."

The U.S. environmental news site Inside Climate News commented that this behavior is like a new homeowners' association president trying to dissolve the group by posting a note on the front door.

Paolo von Schirach, chair of the London-based Global Policy Institute, further pointed out that this reflects the U.S. bilateral approach of "You want to talk to us, you come here and talk to me," rather than operating within a multilateral framework.

Treating international rules as tools — using them when convenient



The logo of the World Health Organization (WHO) is seen at its headquarters in Geneva, Switzerland. The United States officially left the WHO on January 22. (PHOTO: XINHUA)

and discarding them when not — exposes the consistent illogic in how the U.S. approaches the international order. After World War II, the U.S. consolidated its leadership by creating multilateral institutions. However today, when multilateral frameworks no longer serve its unilateral decisions unquestioningly, the U.S. has devolved from a "rule-maker" to a "order-breaker."

This reckless behavior is severely disrupting the environment of open cooperation. The leaders of France and Germany recently warned in a statement that the U.S. move is accelerating the collapse of the post-World War II rule-based global governance system.

The American think tank Center for American Progress noted that destroying multilateral avenues of cooperation does not make the U.S. stronger or

give it a freer hand internationally; it takes away a powerful tool that can, and ought to be, used to make Americans safer, more secure and more prosperous.

UNFCCC chief Simon Stiell called this decision "a colossal own goal which will leave the U.S. less secure and less prosperous."

This selfish act will have a negative demonstration effect, weakening collective efforts to respond to global crises and exacerbating the fragmentation of global rules. In an age of frequent extreme weather and global crises, institutions such as the Intergovernmental Panel on Climate Change are scientific cornerstones for all to face survival challenges.

Gina McCarthy, former administrator of the U.S. Environmental Protection Agency, said the U.S. withdrawing from

the UNFCCC is a "shortsighted, embarrassing and foolish decision."

Stanford climate scientist Rob Jackson emphasized that the U.S. withdrawal could hinder global efforts to curb greenhouse gases because it "gives other nations the excuse to delay their own actions and commitments."

Such destruction of consensus poses great risks of rule failure and delayed action when the international community faces global challenges.

However large the withdrawal, it cannot halt the collective will for global cooperation. In response to the U.S. regression, the international community has shown an unprecedented consensus.

Chinese Foreign Ministry spokesperson Mao Ning said China will always uphold multilateralism, support the UN in playing a central role in international affairs, and work together with the international community to promote a more just and equitable global governance system.

Indian External Affairs Ministry spokesperson Randhir Jaiswal said India stands for multilateralism and believes that global issues need consultative and collaborative action by all countries.

The trend of globalization is unstoppable because it is built on the objective reality of mutual interdependence among countries, not on the unilateral will of any single state. The United States' recent series of actions that deviate from agreements and destroy consensus not only harm the common interests of the international community but will also erode its own long-term development and international credibility.

Adhering to multilateralism and maintaining sincere and reliable global partnerships is the fundamental path toward a truly sustainable shared future.

Voice of the World

China's Foreign Trade Growth Fuels Global Investor Confidence

Edited by QI Liming

In 2025, China's foreign trade value reached 45.47 trillion RMB (6.48 trillion USD), up by 3.8 percent, according to data released by the General Administration of Customs of China on January 14. Since 2017, China's foreign trade has recorded nine consecutive years of growth.

Exports rose by 6.1 percent year on year to 26.99 trillion RMB. Imports hit a record 18.48 trillion RMB, with year-on-year growth of 0.5 percent, maintaining China's status as the world's second largest import market for 17 years in succession.

Foreign firms ready to go on investing

Most multinational companies (MNCs) remain confident of China's long-term prospects, according to the 2025 KPMG MNC China Outlook Report. The survey shows that 94 percent of MNCs continue to invest in China.

In 2025, the import and export volume of foreign-funded enterprises amounted to 13.27 trillion RMB, increasing by 3.7 percent, maintaining growth for seven consecutive quarters.

In 2024, China completely lifted restrictions on foreign investment in the manufacturing sector, providing a vast space for enterprises to expand their production capacity and diversify their business operations.

Birgit Böhm-Wannenwetsch, president and CEO of BMW Brilliance Automotive Ltd., said, China's efforts to promote the high-end, intelligent and green development of its manufacturing industry perfectly align with BMW's vision of establishing a digital and sustainable production.

She said the Chinese automotive industry is continuously innovating, becoming a crucial driving force in promoting the transformation of the global automotive industry toward intelligence, electrification and sustainable mobility.

China is one of the most dynamic markets in the world, attracting a large number of consumers who are tech-savvy, bold in experimentation, and open-minded, she said, adding that the company has always been optimistic about the

prospects of the Chinese market and is confident that her company will achieve significant growth in China.

Ahn Tae Min, chairman of CJ (Shenyang) Biotech Co., Ltd., said, "The continuously improved business environment and infrastructure, as well as stable policy expectations, have provided a stable, transparent and predictable development environment for foreign enterprises, which has strengthened our confidence in deepening the development here."

Li Yanbing, general manager of Michelin Shenyang Tire Co., Ltd., said China has become the world's largest automotive consumer market. "The 30-year development journey of Michelin in Shenyang is not only the growth story of an enterprise, but also a microcosm of the synchronized resonance and mutual achievement between the enterprise and China's automotive industry," Li added.

China's bullish outlook in 2026

According to Forbes magazine, consumer spending in China this year is a hot topic among groups ranging from global shoe brands to think tank researchers, owing to hopes that government policies will make it a stronger source of growth in the world's No. 2 economy this year.

Shaun Rein, founder of China Market Research Group, has been tracking trends in consumer spending in China for more than two decades and anticipates gains. "Despite the economic headwinds in China, I'm getting very bullish on consumer consumption in 2026," Rein recently told Forbes China in an interview in Shanghai.

According to Rein, Chinese brands have already been strong in domestic market, but now they're starting to go abroad. Companies like BYD and Xiaomi are going to become not just China players, but export their products and dominate markets throughout the entire world.

In 2026, the world had better get ready for the rise of high quality Chinese domestic brands with great branding. They're going to be hitting the shores throughout the entire world. For 2026, China is the next China, Rein said.

China, EU Forge Cooperative Path on EV Trade

Opinion

By SUN Jin

After multiple rounds of consultation, China and the EU have agreed on providing general guidance on price undertakings for Chinese companies exporting battery electric vehicle (EV) passenger cars to the EU, according to China's Ministry of Commerce (MOFCOM).

The European Commission stated that each price undertaking offer will

be assessed under the same legal criteria and has committed to conducting each review in an objective and fair manner, in line with the principle of non-discrimination and in accordance with WTO rules.

MOFCOM said, the progress shows both China and the EU have the ability and willingness to properly resolve differences through dialogue and consultation under the framework of WTO rules, and maintain the stability of automotive industrial and supply chains in China, the EU and the whole world.

Upstream and downstream indus-

tries in both China and the EU share the expectation that the EU's anti-subsidy case against Chinese EVs will be properly resolved, according to a recent statement by the China Chamber of Commerce for Import and Export of Machinery and Electronic Products.

This resolution will help promote the security and stability of relevant industrial and supply chains between China and Europe, safeguard the broader framework of China-EU economic and trade cooperation, and uphold the rules-based international trade order, the statement added.

China and the EU are deeply integrated in terms of automobile industrial and supply chains. China is a crucial supplier of automotive components, such as aluminum wheels and electronic parts, to EU automakers.

Capitalizing on China's technological and industrial chain advantages, European auto enterprises, including Mercedes-Benz, BMW and Volkswagen, have already integrated deeply into China's auto production and supply chains.

Chinese automakers have also deeply

integrated in Europe through building factories and establishing research and development centers. BYD has built its manufacturing facility in Hungary. Companies such as NIO and XPeng have design and R&D centers in Germany.

The price undertaking guidance will help better balance different interests. Both Chinese and EU companies can enjoy a more stable and predictable auto industry.

Tu Xinquan, dean of China Institute for WTO Studies, University of International Business and Economics, remarked that proper handling of the EV trade difference between China and the EU underscores the fundamental value of dialogue and cooperation in resolving economic and trade differences.

While this move may not resolve all differences, it does show that in a highly interdependent global industrial system, solving differences needs cooperation and communication. With protectionism generating new uncertainties, the China-EU choice demonstrates that cooperation is a practical and necessary option for sustaining the stability of the global economy.

that the Shaanxi Qinchuangyuan sci-tech innovation platform has helped the enterprise deal with complex financing and market issues, which has supported its technology transfer.

Looking ahead, the establishment of China's technological innovation system will prioritize enterprises as its strategic foundation, channel resources towards original innovation, and strive to build a new mechanism featuring a virtuous cycle of "technology - industry - finance" and deep integration of technological innovation, industry, human resource and finance, said Yang Zhen, associate researcher of Chinese Academy of Social Sciences.

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Continuous investment is the cornerstone of technological breakthroughs, said Zhuo Yibin, chairman assistant of Xiamen Yangsen NC Equipment Co., Ltd., adding that during the 14th FYP period, the enterprise invested over 50 million RMB in R&D annually, to successfully develop high-end machine tools.

Collaborative effort

The achievements made are inseparable from the empowerment by long-

term policy guidance and practical measures. The government coordinates resources and provides institutional guarantees, thereby promoting the transformation of future industries from technological breakthroughs to commercial application, and forming new quality productive forces.

In the Intelligent Equipment Town of Xinchang county, Shaoxing city, Zhejiang province, Xu Weiqiang, chairman of Hydroc Technology (Zhejiang) Co., Ltd., said that his team came to this small city

in 2020 because of the favorable policies and diverse application scenarios Xinchang has created for the low-altitude economy. This enables the enterprise's products to be widely applied in fields such as anti-drowning aerial patrol, aviation publicity and rescue missions.

Meanwhile, in Xi'an, Shaanxi province, Huasheng Composites made a breakthrough in the domestic production of automatic filament laying equipment during the 14th FYP period. Its founder Duan Yugang told S&T Daily



People visit the exhibition zone of Chinese electric vehicle maker AITO at the 2025 IAA Mobility in Munich, Germany. (PHOTO: XINHUA)

Glasses-free 3D Display Now a Reality

Hi-Tech

By Staff Reporters

Researchers from Shanghai Artificial Intelligence Laboratory and Fudan University have together invented a new generation of glasses-free 3D display technology, the EyeReal.

For the first time, it achieves ultra-wide range full parallax glasses-free 3D display at desktop-level size, making "viewing freely without dizziness" a reality. The human eye can perceive a three-dimensional world because objects reflect light in all directions. When these light rays enter the eye, the brain automatically "synthesizes" a sense of stereo perception. The core of glasses-free 3D is to enable the screen to simulate the "all-direction light emission" effect and reconstruct a complete light field.

However, the problem is that the amount of light information required to simulate "all-directional light" is extremely large, while the information transmission capacity of modern optical display systems is limited. This makes it impossible to achieve large size, wide angle and visual continuity simultaneously.

The research team adopted a hybrid technical approach of "light field generation modeling plus neural net-

work decoding," which is equivalent to equipping glasses-free 3D with an "intelligent brain" through AI technology.

The high-precision sensors on the screen act like "trackers," constantly monitoring the user's eyes in real time. Whether the user is sitting, standing or moving, the positions of both eyes can be instantly locked. The AI algorithm functions as a "supercomputer," capable of calculating the most suitable light distribution for the user's current position in real time and precisely sending it in the direction of both eyes, without wasting a large amount of light information on other directions.

This technology is expected to drive the integration of intelligent large models into the real physical world on a comprehensive scale. In the medical, educational, automotive and the entertainment fields, it is expected to provide a comprehensive upgraded experience.



Glasses-free 3D advertising image. (PHOTO: VCG)

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LIFE IN CHINA

'Half of Me Belongs to Romania, Half to China'

Dialogue

By Staff Reporters

At the age of seven, standing in a classroom in 1970s Romania, little Luminita Balan saw Chinese characters written on the blackboard for the first time. "They were extraordinary, almost magical," she recalled. Instantly captivated, she felt certain these "mysterious symbols" would lead her into a world of profound beauty and meaning. That moment marked the beginning of a lifelong journey — one that would transform her from a curious schoolgirl into a leading sinologist, translator and cultural bridge between Romania and China.

Today, Luminita Balan, known as "the Chinese girl" among friends and family, is the Romanian co-director of the Confucius Institute at the University of Bucharest, a distinguished academic and an award-winning translator. In 2019, she was presented with the Chinese Government Friendship Award to honor her decades of dedication to promoting Chinese language and culture in Romania.

A childhood passion against the odds

In her youth, China was a distant, almost mythical land to most Romanians. But fate intervened when her elementary school became one of a few selected for a pilot program introducing Chinese language instruction, an unusual choice at the time. Her young, passionate teacher brought the language to life with humor and creativity, sparking Balan's deep fascination.

When her family moved farther from the school, she faced a difficult decision: transfer to a nearby school without Chinese classes, or continue commuting over two hours daily by tram. Determined not to give up her studies, she chose the latter. "Every minute mat-



Professor Luminita Balan. (PHOTO: China University of Political Science and Law)

tered," she said. "I used the tram rides as my mobile classroom, reading Chinese stories and myths." While many classmates dropped out, Balan persisted, turning language learning into a way of life.

Without access to formal dictionaries, she created her own. She meticulously recorded new words in a notebook, organizing them in alphabetical order. To make it more vivid, she bought two copies of Chinese pictorial magazines — one to keep, one to cut up. She pasted images of landmarks, street scenes and traditional life into her handmade "dictionary," which became, in her words, a "miniature world of China."

It wasn't until her third year of university that she owned her first real Chinese dictionary. "It was so precious," she said. "No one in my family was allowed to touch it."

From dream to reality

For years, visiting China seemed like an impossible dream. "China felt like a mythical land," she recalled. "I thought I could only reach it in my

dreams." After graduating from the University of Bucharest, she remained hopeful. In 1992, her dream finally came true when she was selected as an exchange student at Beijing Language Institute (now Beijing Language and Culture University).

Her flight landed on her birthday — the same day she first left Romania. "Touching down in Beijing felt like stepping into a fairy tale," she remembers. "The streets were full of people, bicycles flowed like rivers, and the dormitory caretaker greeted me with such warm, simple kindness. It eased my homesickness and made me feel instantly at home."

That day, she said, "everything felt destined", connecting Bucharest to Beijing, and her past to her future.

A translator's mission

In 2013, the Confucius Institute at the University of Bucharest was established through a partnership with China University of Political Science and Law. Balan became its Romanian

director, finally realizing her long-held wish to make the Chinese language and culture accessible to more Romanians. Under her leadership, the institute has flourished — from just dozens of students to nearly 8,000 learners cumulatively. Students now range from five-year-old children to 78-year-old retirees, drawn by interests in Chinese martial arts, history, philosophy and cuisine.

Beyond teaching, Balan has dedicated herself to translating Chinese literature into Romanian. Her journey began with *Zhuangzi*, one of the Taoist classics by the philosopher Zhuang Zi of the Warring States Period and its later studies, inspired by a beloved university professor who introduced her to classical Chinese philosophy. Though initially hesitant about her language skills, she embarked on the project with a mentor and spent 20 years completing the translation.

During one of her darkest times, the loss of her father in 1998, a colleague gave her a copy of *Xunzi*, an ancient Chinese collection of philosophical writings attributed to Xun Kuang. "That book became my best friend," she said. Reading *Xunzi*'s teachings helped her find meaning again and inspired her to translate *Xunzi* as well. "Confucian classics offer timeless wisdom — on benevolence, integrity, justice and harmony. They're keys to navigating today's complex world."

In recent years, she has focused on contemporary Chinese literature, translating works by Mo Yan, Yu Hua and Ah Cheng. "Many Romanians know *Dream of the Red Chamber* or *Journey to the West*, but they don't know modern China," she explained. "Literature is one of the best ways to understand a nation's soul." Reflecting on her journey, Balan said simply: "Half of me belongs to Romania, and half to China."

This article was edited and translated based on the Chinese version by the Confucius Institute.

Tech+Culture

Large Model Links Relics Protection with Tourism

By BI Weizi & WANG Yuhan

A partial image of China's prized gigantic Chao Yuan Tu mural, ancient artwork that features a congregation of about 300 Taoist deities and tells the story of Taoist etiquette, was recently uploaded to a large AI model for cultural and tourism resource restoration and generation. Within five seconds, the damaged lower left corner was automatically repaired, with the repair marks virtually invisible to the naked eye. The granular detailed information captured from this repair can then be used to repair the mural wall itself.

This is a routine operation for the model, which was developed by Professor Jiao Licheng's team at the School of Artificial Intelligence at Xidian University, in Shaanxi province. Not only can it intelligently diagnose and repair ancient murals, but it can also generate personalized travel guides for tourists. This multimodal large model is injecting new momentum into cultural heritage protection and smart tourism thanks to its cross-disciplinary services.

In the school's demonstration area, team member Gao Zihan uploaded electronic images of the damaged Landscape Screen of Tang Huifei Wu's Tomb and Landscape Painting of Han Xiu's Tomb to the model, which immediately generated a detailed a "health" report. It not only provided an analysis of the type and extent of the damage, but also proposed appropriate repair methods, as well as suggesting which mineral pigments should be used for filling.

Through their deep involvement in the research, repair and restoration of murals, the team members developed a

greater appreciation for the profound richness of Shaanxi's historical and cultural heritage. This led to consideration about what they could do to offer tourists a deeper and more comfortable cultural and tourism experience.

"Please help me plan a three-day trip to Xi'an. I have hypertension, hyperlipidaemia and hyperglycaemia, and I'm traveling with two children. I would like to enjoy the food in Xi'an, so the itinerary should not be too tight, but should also maximize cultural experiences and technological elements." After entering such a complex request, the model quickly generated a customized guide covering an itinerary overview, dietary suggestions, itinerary highlights, a transportation guide and important notes.

The model can also act as an intelligent travel companion. Zhang Jie uploaded an image of the Jade Nectar from the game "Black Myth: Wukong," and the model identified an ancient rhyton cup with a similar design through image retrieval. It also pointed out that the Shaanxi History Museum houses a similar national treasure and accurately located the cup within the museum, planned a visit route and provided explanations about the history of rhyton cups.

Through the deep integration of technology and culture, the team plans to expand its cooperation with cultural and tourism departments in various regions. Relying on artificial intelligence, big data and multimodal sensing technologies, the team will continuously innovate and explore areas such as the digital protection of cultural heritage, the intelligent recommendation of cultural and tourism resources, and immersive interactive experiences.



Visitors enjoy the Chang'an Lantern Festival at Xi'an's Tang Paradise in Shaanxi province (PHOTO: XINHUA)

Traditional Eastern Wisdom

Siyuan Shu: Pinnacle of Ancient Chinese Mathematics

By BI Weizi

In order to solve univariate higher-order equations in ancient China, Siyuan Shu (the four-variable method) was developed based on Tianyuan Shu (the one-variable method) by mathematician Li Ye and others, during the late Jin (1115-1234) and early Yuan (1271-1368) dynasties.

Mathematicians then progressed to explore multivariate equation systems. Ultimately, Zhu Shijie achieved a breakthrough by extending the theory to four variables, which brought the system to its peak. Hailed as "the greatest mathematician of the medieval world", Zhu Shijie was also an educator. He authored

two major mathematical works: *Introduction to Mathematics* (1299) and *Jade Mirror of the Four Unknowns* (1303).

The Jade Mirror of the Four Unknowns consists of an introduction and three books containing a total of 288 mathematic problems. The first four problems in the introduction illustrate his "four-unknowns" method. Zhu demonstrated how to convert a verbal problem into a system of polynomial equations using up to four unknowns: Heaven, Earth, Man and Matter. He then demonstrated how to reduce the system to a single polynomial equation in one unknown by successively eliminating the unknowns.

The elimination steps are as follows:

First, select one unknown as the main variable, treat the other variables as coefficients and form an univariate equation. Using techniques such as cancellation, transposition, mutual elimination and common denominator, the other unknown variables are gradually eliminated until a univariate higher-order equation is obtained.

This equation is then solved using Qin Jiushao's Linglong method, which was a powerful algorithm from his 1247 text *Mathematical Treatise in Nine Sections* for finding numerical solutions to high-degree polynomial equations.

The distinguishing feature of Siyuan Shu, is that it extends the elimination method to multivariate nonlinear

equation systems, by integrating Qin Jiushao's method for solving high-degree equations and Li Ye's Tianyuan Shu. It represents the culmination of traditional Chinese mathematical algorithms.

The algorithmic thinking behind Siyuan Shu is remarkably similar to that behind modern computer algebra systems, reflecting the mechanized algorithm tradition of ancient Chinese mathematics. Siyuan Shu is a jewel in the crown of ancient Chinese mathematics, showcasing the mathematical wisdom of the Chinese nation. From Li Ye's Tianyuan Shu to Zhu Shijie's Siyuan Shu, it exemplifies the spirit of continuous exploration and innovation of Chinese mathematicians.

2025: A Bumper Year for Sci-tech Innovation

From page 1

During China's 15th National Games, "Kuafu," the world's first 5G-A humanoid robot, independently completed part of the relay in Shenzhen in south China.

In 2025, the 5G-A network, faster than 5G, was rapidly expanded to over 300 cities across the country, and applied in multiple scenarios such as intelligent manufacturing and major events.

The innovation drivers have not only improved industrial competitiveness, but also accelerated economic transformation and upgrade. In 2025, China's production and sales of new energy vehicles exceeded 16 million units, topping

in the world for 11 consecutive years. China also built the world's largest clean power generation system and the largest power infrastructure system, facilitating its energy transformation.

Its low-altitude economy is expected to exceed 1.5 trillion RMB, and a strategic emerging industry cluster is rising.

Benefiting the people

In 2025, an increasing number of sci-tech achievements moved from laboratories to production lines, integrating into people's daily lives and bringing about tangible changes.

A Chinese-led team reported a breakthrough in brain-computer interface technology after completing the

first-ever clinical trial to precisely locate deep-seated brain tumors using implanted microelectrode arrays. The technology could advance treatment of gliomas and brain metastases, which are difficult to remove because of their sensitivity locations.

Domestic high-end medical devices and innovative drugs are constantly being updated. Zhou Le, deputy director of the department of drug regulation of the National Medical Products Administration, said 76 innovative drugs were approved in 2025, ranking first in the world in terms of quantity.

Technologies such as intelligent driving are facilitating people's lives,

while smart agriculture is harnessing meteorological big data to predict pests and crop diseases so that early warnings can be issued.

In museums such as the Palace Museum in Beijing and the Dunhuang Museum in Gansu province in northwest China, visitors can enjoy cultural relics in detail thanks to digital panoramic platforms and 3D modeling technology.

At the beginning of the 15th Five-Year Plan period (2026-2030), in the face of the complex global technological competition, China is steadily advancing high-quality development with independent innovation, so that innovation achievements reach every corner of life.

Shield Machines Rendezvous under Yangtze River

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The basic approach of this method is to install over 300 freezing pipes from the interior of the shield machine to cool and freeze the water-rich stratum, solidifying it into an "ice barrier" to ensure the safety of the subsequent connection.

However, when water freezes, it causes volume expansion. The expansion caused by over 300 pipes can squeeze the shield machine and the tunnel. So, it was vitally important to make sure that the freezing tubes could extend precisely to the designated position.

The team made a 1:1 model and organized the simulation training, repeatedly optimizing the selection of drilling tools, adjusting drilling parameters, and perfecting their operation skills.

Finally, after more than five months of preparation, the 363 boreholes for the freezing pipes were successfully completed. The deviation of the hole opening angles was all controlled within 0.2 degree, far exceeding the designed standard.

The interwoven frozen pipelines were deeply embedded in the soil, building a solid "barrier" 3.9 meters thick with an average stable temperature of -13°C.

Removing the shield machines

The construction process then

reached the most critical step in the latter stage — disassembling and extracting the shield machines.

As both shield machines could not be lifted out, they could only be cut and disassembled inside the tunnel. High-intensity cutting and welding generate a large amount of heat, which could have affected the newly formed frozen soil, said the project manager Liang Yuqiang.

Meanwhile, large machinery could not enter the tunnel due to the limited space, and all cutting and transportation work had to be done manually. Like "ants moving house," two shield machines, each weighing several thousand tons, were disassembled and transported out by hand, bit by bit.

On March 26, 2025, the construction teams on both sides met each other beneath the riverbed. On November 29, 2025, the main structure of the tunnel was completed, marking the full connection of the Jiangyin- Jingjiang Yangtze River Tunnel.

No safety accidents occurred throughout the entire construction process. The team's exceptional skills and courage transformed an unforeseen setback into a historic breakthrough in global tunnel engineering construction.