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ACTIVE ROLE NEEDED BY U.S. IN SDGS

PAGE 3 | INSIGHTS

VIDEO: TECH FOR BETTER LIFE IN CHINA *EP7*

PAGE 4

International Cooperation

Green Energy Key to Addressing Climate Change

By HONG Hengfei & JIANG Yun

Summer 2022 has seen many countries wilting under unprecedented heat waves, as extreme weather conditions happen with increasing frequency. In the face of the growing impact of climate change and environmental degradation, the global community is seeking consensus on green, low-carbon, and sustainable development.

Liu Qibao, vice chairman of the National Committee of the Chinese People's Political Consultative Conference, emphasized that international cooperation is urgently required given the increasing impacts of climate change.

"As a developing country, China has actively pushed for the signing of the Paris Agreement on climate change and has continuously honored its pledges," said Liu, speaking during the China-Europe-Africa Green Energy Development Forum, held in Hangzhou, Zhejiang province, on September 7 and 8.

He said that China, Europe and Africa share a lot of views on climate change and green development. He called for joint efforts made by the three parties to pursue green, low-carbon and sustainable development.

When pursuing a green energy transition, different countries are confronted with multiple challenges. Andreas Loschel, a famous German economist and an elected member of the German National Academy of Science and Technology, said Germany has adopted a series of measures to develop green energy to reduce the dependence on fossil fuel imports.

Bertie Ahern, the former Irish Prime Minister and current Chair of the World Carbon Neutrality Forum (WCNF), has mentioned that, "Cooperation and globalization are the only way forward" and that China, the European Union, and Africa should boost their cooperation in innovation and technology, market exchanges, and green investment. *See page 4*

Partnership Deepens Between China and LAC

By Staff Reporters

Held online on September 2, the 14th Forum of Science, Technology and Innovation of China-Community of Latin American and the Caribbean States welcomed multiple ministers from Latin America and the Caribbean countries (LAC) and China, to discuss collaboration on science and technology.

All participants from LAC expressed their wishes to renew their collaboration with China, highlighting several on-trend technological realms, including clean energy, agricultural technology, and communications and satellite, testifying to the long history of collaboration between the two regions.

"This forum has become one of the most important platforms for China and LAC to understand the development gaps on both sides, helping reach a consensus, while tightening our ties," said Wang Zhigang, China's minister of science and technology, adding that China is willing to deepen the science and technology collaboration with LAC through exploiting mutual advantages, and expand collaborative areas by adopting a more inclusive attitude in the face of increasingly serious global challenges. *See page 4*

The 8th Bangladesh-China Friendship Bridge opens to traffic in Pirojpur, Bangladesh on September 4. (PHOTO: China Railway Major Bridge Reconnaissance & Design Institute Co., Ltd.)

A high-speed train made for the Jakarta-Bandung HSR is in trial in Qingdao, Shandong province. (PHOTO: XINHUA)

Editor's Pick

China's High-speed Rail Makes Monumental Advances

10 Years Review

By WANG Xiaoxia

China's high-speed rail (HSR) has undergone a process from acquisition, adoption and re-innovation to independent innovation and now China has risen to be the world leader in HSR technology.

From over 9,000 km in 2012 to more than 40,000 km at present, China's HSR tops the world in terms of the operating length of HSR, projects scale under construction, the number of electric multiple unit (EMU) trains in operation and the speed of commercial operation in the world.

Independent innovation in HSR technology

In the past decade, China developed an advanced HSR technology system with independent intellectual property rights, covering the three major fields including equipment manufacturing, project construction and operation management.

The Fuxing bullet train was rolled out in September 2017. The train, which contains more than 2,500 sensors to simultaneously collect some 1,500 real-time indicators from all carriages, was the result of five year's effort from more than 30 institutes and companies, said Zhang Bo, researcher at the China Academy of Railway Sciences.

The sheer size of China and its diversity of terrain, geology and climate have presented the country's engineers with incredible challenges, pushing them to break bottlenecks and achieve technological breakthroughs.

Fuxing bullet trains are being continuously upgraded to be faster, safer, greener and more intelligent. On April 21, the train reached a world record-breaking relative speed at 870 km/h on the Puyang-Zhengzhou section of Jinan-Zhengzhou HSR.

New technology such as autonomous train operation has also been introduced. The driverless bullet trains connecting Beijing and Zhangjiakou in Hebei province can reach a speed up to 350 km/h, making them the world's fastest autonomous trains.

After a decade's demonstration, China's HSR technology was well received around the world and was adopted in overseas projects, such as the Jakarta-Bandung HSR and the China-Laos Railway.

Wider railway network boosts regional development

The HSR construction in China has made rapid progress since 2008, when the first Beijing-Tianjin intercity railway with a designed speed of 350 km/h was put into operation. Since 2012, a large number of HSRs have been put into operation, with an annual rail line increase of 3,500 kilometers. To date, the HSR lines has connected 93 percent of cities with a population of 500,000 or more, boosting regional development.

Gaoyou, a city located in Jiangsu province, had no railway until the end of 2020, when Lianyungang-Zhenjiang HSR was opened to traffic, integrating the town into the fast-track development of Yangtze River Delta region. *See page 4*

New Kinetic Energy Boosts China's Economic Development

By Staff Reporters

The new kinetic energy index of China's economic development reached 598.8 in 2021 (was 100 in 2014), increasing by 35.4 percent compared with that of the previous year, according to data published by the National Bureau of Statistics recently.

This index refers to the statistical indicator system with new industries, new business formats and new business models as the main contents. Five sub indexes are included, namely network economy, economic vitality, innovation driven, knowledge capability, and transformation and upgrading.

Soaring by 48.4 percent than that of the previous year, the network economy index saw the largest growth among all the sub indexes, contributing the most to the overall index surge.

In particular, data traffic via mobile Internet hit 221.6 billion GB in 2021, climbing by 33.9 percent year-on-year.

Life service e-commerce, such as online shopping, online food delivery and remote health service, has been developing continuously and rapidly, and Internet enterprises have further expanded to offline business, accelerating the digital transformation and upgrade of traditional business formats, according to He Qiang, statistician at a research institute of the National Bureau of Statistics.

New business forms in the network economy blossomed as well last year. By the end of 2021, the number of Cellular Internet of Things users via China Mobile, China Unicom, and China Telecom reached about 1.4 billion, with a net increase of 264 million users. The innovation driven index also enjoyed growth with a rate of 20.5 percent year-on-year.

The other three sub indexes all witnessed upsurge at different degrees. The new kinetic energy has realized steady growth, continuously injecting new force to drive the high quality development of the economy, He said.

AI Empowers International Communication

By ZHAO Boyuan & ZHONG Jianli

Literate robots, intelligent translation machines, media brains, virtual anchors — today, AI has been applied to many aspects of international communication, making the production of relevant content more accurate and smart.

On September 7, the Forum on Artificial Intelligence and International Communication, sponsored by the China International Communication Group (CICG) and Pengcheng Laboratory was held in Beijing. With the theme of enabling international communication to use new technologies, the forum discussed new technologies such as AI to promote international communication. Nearly 100 experts and scholars from scientific research institutes, media institutions, high-tech enterprises and other organizations attended the forum.

According to statistics, in 2021, the scale of the global AI industry had reached 361.9 billion USD, of which China accounts for 58 billion USD. With the continuous development of relevant science and technology, the application scenarios of AI have expanded.

"A new round of sci-tech revolution and industrial transformation led by AI is going on," said Du Zhanyuan, president of CICG, noting that seizing new opportunities brought by new tech such as AI and strengthening the international communication capacity are major tasks related to national development.

At the forum, the Intelligent Translation Laboratory of the Academy of Translation and Interpretation of CICG was founded. This laboratory aims to provide a platform for cooperation and exchange for experts and scholars in the fields of international communication, technology application and translation practice.

"AI will become the new engine of economic development," said Li Huian, vice president of Science and Technology Daily, adding that it also provides a broad stage for the media to improve their global reporting capacity.

Pengcheng's multilingual translation platform — "Silk Road 2.0" was also released at the forum. It aims to break language barriers between different countries and nations, providing translation services for different application scenarios through accurate and reliable data construction, and also serve the development of the Belt and Road Initiative.

WEEKLY REVIEW

New Technology to Produce Hydrogen from Air

Hydrogen can be directly made from the air with electrolysis technology by absorbing moisture in the air, instead of using liquid water, according to a study published in the journal *Nature Communications*.

New Lunar Mineral Discovered by Chang'e-5 Mission

Chinese scientists have discovered a new lunar mineral through research on the samples retrieved from the Moon by China's Chang'e-5 mission and named it Changesite-(Y), the China National Space Administration and the China Atomic Energy Authority announced on Sept. 9.

Maglev Car Tested on Highway

A car, modified from a traditional vehicle, ran above a highway in east China's Jiangsu province. The road was installed with permanent magnet array and good conductor rail that allowed the car to levitate, according to the technology developed by the Chengdu-based Southwest Jiaotong University.

Long March-2C Rocket Celebrates 40th Anniversary

Since its maiden flight on Sept. 9, 1982, the Long March-2C rocket has undertaken all of China's retrievable satellite launches in the following decades. It becomes China's longest-serving carrier rocket.

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Popularizing Science Helps Address Social, Global Issues

By CHEN Chunyou & LIU Yin


Shanghai Astronomy Museum, which covers an area of approximately 58,600 square meters, is located at the Lin'gang Special Area of China (Shanghai) Pilot Free Trade Zone. (PHOTO: XINHUA)

Since the 18th National Congress of the Communist Party of China, great strides have been made in popularizing science in the country. Currently, China has shifted to a stage of high-quality development, and boasts many advantages and conditions for continued development.

These include institutional advantages, improved governance efficiency, long- term economic momentum, and overall social stability. However, the tasks for reform in some fields remain arduous, and the current innovation capacity doesn't match the requirement for high-quality development.

In order to facilitate innovation through science popularization across society, the *Guideline on Further Strengthening the Popularization of Science and Technology in the New Era* was released by the General Office of the Communist Party of China Central Committee and the State Council on September 4, setting specific targets and measures.

According to the guideline, the function of science popularization to boost sci-tech innovation will see a notable improvement, and more than 15 percent of citizens will be science literate by 2025.

The guideline stresses strengthening the responsibility of the whole society in the quest to increase public science knowledge. Enterprises, research institutions, public organizations, sci-tech workers and individuals are all included in this process.

International cooperation on science popularization is highlighted. China plans to build platforms for cross- regional cooperation and promote joint construction and sharing of high- quality resources, said the guideline. Meanwhile, the country would join or take the lead in establishing international science popularization organizations and hold activities to strengthen exchanges in key fields.

Wang Zhigang, minister of science and technology, elaborated on the importance of the necessity of science popularization exchanges. He said the international environment is increasingly complicated, while the world pattern in economy, science and technology, culture, security and politics is seeing a profound adjustment, most notably from the impact of the COVID- 19 pandemic.

To address global issues such as climate change, energy resources and public health, Wang said it is urgent to reach an international consensus on sci-tech governance. This requires science popularization to better play the role of a bridge to deepen the technological and cultural exchanges, and promote mutual learning of advanced experience among countries. He added that China would share research achievements with the world, and make more contributions to tackling common challenges.

The new round of sci- tech revolution and industrial revolution is advancing rapidly, and the social function of science and the relation between science and liberal arts has changed greatly.

Under these circumstances, Wang said that science popularization is needed to promote mutual integration between science and individuals, economy, society and culture, and build an atmosphere that advocates science, reason, civilization, and harmony, which will serve the modernization of national governance, and promote all- round human development and social progress.

For the balanced development between sci- tech innovation and science popularization, the key direction of national sci-tech development and sci-tech policies should be communicated to the public through science popularization, so as to guide society to understand and support innovation, and create a favorable atmosphere for scientific research and technological application, said Wang.

China's R&D Expenditure Hits New High in 2021

Policy

By ZHONG Jianli & LIU Yin

China's R&D expenditure continued to grow rapidly in 2021, and its R&D in basic research reached a new record, according to government figures.

On August 31, the National Bureau of Statistics, Ministry of Science and Technology, and Ministry of Finance released the *Communiqué on National Expenditures on Science and Technology in 2021*, showing that a total of 2.8 trillion RMB was invested in R&D across the country, an increase of 14.6 percent over the previous year, and an actual increase of 9.8 percent, after deducting price factors.

"In 2021, in the face of more complex and severe domestic and international situations, the R&D investment of the whole society maintained a rapid growth, which supported the country's high- quality economic and social development," said Liu Huifeng, a researcher at the Chinese Academy of Science and Technology for Development.

As the world's second largest spender in R&D, China has maintained double- digit growth for six consecutive years, making an important contribution to the growth of global R&D spending.

According to the Communiqué, the ratio of R&D expenditure to GDP reached 2.44 percent in 2021, an increase of 0.03 percentage point over the previous year.

Liu explained that the ratio of R&D spending to GDP, or the R&D input intensity, is not only an important indicator of a country's financial support for R&D activities, but also reflects its process of economic transformation and upgrading.

China's 2021 R&D input intensity is the highest level among developing countries, higher than the EU average (2.20 percent) and slightly lower than the average (2.68 percent) of countries of the Organisation for Economic Cooperation and Development (OECD).

The most obvious change in the structure of R&D expenditures in 2021 was that the investment in basic research increased significantly, according to Liu.

Accounting for 6.5 percent of the total R&D spending, the basic research fund was 181.7 billion RMB in 2021, up 23.9 percent from the previous year, the highest growth rate in nearly a decade.

It is worth noting that in 2021, enterprises invested more than 2 trillion RMB in R&D, accounting for 76.9 percent of the country's total R&D spending, 0.3 percentage points higher than the previous year. Chinese enterprises ranked second in the world in terms of R&D spending.

Although China's R&D expenditure has been the second largest in the world for many years, there is still a certain gap of input intensity between China and developed countries, such as the U.S., Germany, Japan and South Korea.

If China wants to be among the leading innovative countries, it should continue to increase investment in R&D, and especially invest more into basic research, said Liu.

This article is in cooperation with the Chinese Academy of Science and Technology for Development.

Beijing Making Metaverse Experience into Reality

Case Study

By CHEN Chunyou

Metaverse has become a focus of attention since 2021. Currently, it is integrating with multiple industries, and has become an important force to reshape the global industrial structure and promote industrial development.

In order to achieve a systematic development in the metaverse industry and advance the integrated development between digital technology and real economy, a three- year action plan on metaverse was jointly issued by Beijing's Tongzhou district, which is also known as Beijing Municipal Administrative Center, and Beijing's three other government departments this August.


Visitors at the metverse exhibition area of the 2022 China International Fair for Trade in Services in Beijing. (PHOTO: VCG)

According to this plan, within three years, Tongzhou will be developed into a metaverse application demonstration area featuring culture and tourism. More than 100 metaverse industry chain enterprises and about 30 typical "metaverse+" application scenario projects are to be introduced and cultivated.

Research institutes and related enterprises at home and abroad are encouraged to set up joint branches in Tongzhou, which are engaged in research of the basic theory, technology development and the popularization of research achievements concerning metaverse, said the plan, adding that these branches are expected to introduce innovation resources of virtual reality, artificial intelligence, blockchain, Internet of Things, cloud computing, 5G technology and information security.

Tongzhou district will build a metaverse application innovation center and plan a batch of thematic parks featuring metaverse demonstration applications, exhibitions and experiences.

Enterprises located at the metaverse application innovation center will get rental subsidies. The financial organizations in Tongzhou district are also encouraged to offer financing services for qualified enterprises. For talented individuals, who work in the area, public rental housing and children's schooling endorsement will be available.

Research teams owning internationally leading technologies or independent intellectual property rights are also welcome. They will get support in the commercialization of their research achievements.

The plan promotes implementation of brand upgrades to create characteristic scenes such as cultural tourism, urban construction, and virtual life.

Universities, institutions, enterprises and think tanks will be united as an alliance to advance the formulation and implementation of related standards on the Next Generation Internet, technologies and products. Meanwhile, metaverse forums, summits, and exhibitions will help the regional brand popularization.

In addition, the connection will be strengthened between Tongzhou district and three other county- level regions of Hebei province, including Sanhe, Dachang and Xianghe, in metaverse industry and urban digital scenarios, according to the plan.

First Batch of Innovative Counties Passes Muster

By LI Linxu

The first batch of innovative counties (cities) has passed acceptance check, marking an important milestone in the construction of innovative counties.

The list of these counties has been released recently by the Ministry of Science and Technology (MOST), with a total of 47 counties.

They are from 20 provinces, three autonomous regions, Chongqing Municipality, and Xinjiang Production and Construction Corps.

Of particular note is that about a third of these innovative counties are from the Yangtze River Delta, such as Kunshan city, Changxing county, and Jieshou city.

In 2018, MOST initiated construction of the first batch of innovative counties, with 52 counties on the list.

The construction of innovative counties mainly focuses on leveraging sci- tech to support industrial development, ecological civilization, and life improvement.

After three years, their performance was reviewed and evaluated by experts, according to a notification released by MOST.

The pass of acceptance check is an important phased achievement for the construction of innovative counties, as well as a new starting point for the innovation- driven high- quality development of counties in the new era, said the notification.

It urges these innovative counties to further improve their development quality, develop replicable and applicable experience, and play a guiding role in the innovation-driven high-quality development of counties.

Next, these innovative counties are required to compile their work plan for 2022-2024 to be evaluated in three years time.

The evaluation will be based on five primary indicators such as innovation investment, enterprise innovation, innovation environment, and 24 secondary indicators such as sci-tech budget, R&D- to- sales of industrial enterprises and the number of hi-tech enterprises.


Kunshan Economic and Technological Development Zone. (PHOTO: VCG)

Establishing Standards System for Digital Village Construction

By LI Linxu

A guideline on building a standards system for digital village construction was recently released by four government bodies, including the Cyberspace Administration of China (CAC).

The guideline puts forward a relevant framework, as well as goals and tasks, during the 14th Five-Year Plan period.

By 2025, a standards system that can basically meet the requirements of digital village construction will be initially established, according to the guideline.

A batch of pilot projects are expected to be carried out for the application of these standards, said the guideline.

Digital village is a strategic direction for rural revitalization, said an official from CAC, noting that standardization plays a guiding role in advancing digital village construction.

It is of great significance to address the issue of interconnection in infrastructure, agricultural equipment and data resources, and to support the digital transformation of production, living and governance in rural areas.

In recent years, China's digital village construction has sped into the fast lane. By now, all of the country's administrative villages have been connected to broadband Internet services.

The standards system framework consists of seven parts, including basic and general standards, digital infrastructure standards, agricultural and rural data standards, agricultural informatization standards, and village digitalization standards.

The guideline also lays out standardization pathways for digital village construction from the aspect of standards application, compilation, revision and transformation.

Standards concerning agricultural Internet of Things, agricultural and rural big data, agricultural informatization, and rural e- commerce are in urgent need, as per the guideline.

Statistics show that in the first half of 2022, online retail sales in rural areas and of agricultural products grew 2.5 percent and 11.2 percent respectively, indicating a strong growth momentum.

Pioneer in Speech Science: Kiyoshi Honda

By BI Weizi

After receiving his PhD from the University of Tokyo, Kiyoshi Honda worked at the ATR Research Institute in Japan as a supervisor of speech science research, then at the University of Wisconsin in the U.S., and Université Sorbonne Nouvelle- Paris 3 in France.

After joining Tianjin University in 2012, Honda led a multidisciplinary speech physiology research team, which is a cutting-edge research project in the field of life information science today. In June 2012, he was awarded the Quintana Award, the highest award in the field of speech science. Recently, Honda spoke to *Science & Technology Daily* to introduce his research achievements and share his insights on cooperation between China and Japan.

Science & Technology Daily: What is your story with Tianjin University ?

Kiyoshi Honda: I came to Tianjin, China, in 2012. The previous year, when I was in Paris, I received a call from Professor Jianwu Dang at Tianjin University. He asked me to apply for the National Program of Foreign Experts.

Professor Dang was my former colleague in Japan, and I immediately agreed to do so. Therefore, it was natural for me to join Tianjin University for his project. I already knew that a new international program is starting between Tianjin University and Japan Advanced Institute of Science and Technology.

Having lived in Tianjin for many years, how do you like the city?

Tianjin was familiar to me, as it is also to many Japanese people. I liked Tianjin for the modern, international, and accommodating atmosphere. Some areas downtown resemble streets in Paris, which also attracted me. I enjoyed working with our colleagues, sporting staff, and students, since they are particularly kind to me and respectful of my age. I presumed that university students generally want to keep a distance from professors, but I was wrong. I am particularly grateful that I am able to spend a pleasant life in China with intimacy of my students.

Speech science involves integration of many basic disciplines. What are your suggestions on basic science research and student training?

Professor Kiyoshi Honda. (COURTESY PHOTO)

Speech science is not a single field of research, but it is multidisciplinary, combined with linguistics, physics, biology, and engineering. It is difficult to learn because basic knowledge of such wide fields is required. No single teacher could teach everything, and no student can learn the whole in a short time. Ideally, it is recommended to be instructed by a group of researchers from many fields. Many important studies have been done at specialized institutes, such as MIT, with resources of many outstanding researchers.

There is a lot to be done to translate experimental science results into industrial applications. What is the biggest challenge in this process?

The role of basic science is to contribute to promoting human happiness through applications of basic knowledge. However, the gap between basic and applied studies is always large. Results from basic studies are inevitably slow to come out, while application work tends to demand immediate solutions. Learning historical work would suggest a hint: many new technologies are based on fundamental scientific discoveries, and this consensus should be shared by both parties of researchers.

Currently, speech technologies are most acutely developing in China as part of AI technology, but it is recommended that speech technology is to simulate uniquely- human functions in communication via the sounds generated by our body.

Could you please introduce one of your major achievements that has been widely applied?

My major contribution to the industry was the idea of a high-speed digital imaging technique. The story goes back to the 1980s, when I experienced high-speed cinematography for observing the voice production mechanism. This technique required a large-scale and clumsy system, and had been used for forty years since 1940. I hit upon an idea of using a digital image sensor and high-speed digital memory. I constructed a prototype of a high-speed recording system using a linear (1D) image sensor. Then, I proposed a new system with a 2D image sensor, and this idea became a main project of the institute.

The first system was invented in 1987, and the whole technology was transferred to a company to realize the first high- speed digital imaging system to be used in industrial investigation to record high- speed mechanical motions. At that time, digital cameras were about to enter the market. Nowadays, high-speed movie cameras are widely available from many companies worldwide as convenient instruments. Retrospectively, "inconvenience in research" was the seed of a new technology.

You were bestowed with the Chinese Government Friendship Award in 2020. What does this award mean to you?

I received the Chinese Government Friendship Award in 2020, and it is a great honor for me to be chosen among many others. This gift is for all my co-workers because I believe that it is awarded to all those who supported me to continue to work in China for ten years. I intended to contribute to development in China through my work with them by seeking something exciting to happen around us.

Expats Activities

Hubei Offers Better Service for International Talent

By ZHAO Xiaojing

Recently, a legal training workshop on international talent work was held in Wuhan. In the opening ceremony, Wu Jun, deputy director of the Science and Technology Department of Hubei province, pointed out that a better law-based business environment should be created to provide better service for international talent working in Hubei, which will speed up building an important national talent center and innovation hub.

This workshop was sponsored by Hubei Provincial Association for International Exchange of Personnel and Zhongnan University of Economics and Law.

Source: Science and Technology Department of Hubei province

Providing Foreign Experts with New Medical Service

By Jiang Xiangchao

In order to further improve the service for foreign experts and provide better support for their work and life in Jilin province, Jilin Science and Technology Department (Jilin Administration of Foreign Expert Affairs) organized a physical examination for foreign experts on August 31. Twenty foreign experts from eleven countries, including the U.S., Russia, Canada, France, Ukraine, Italy and South Korea, participated.

Jilin Science and Technology Department actively coordinated with the medical examination center to develop flexible and optional body examination services, which include basic health examination items and also optional items, according to individual physical condition, to meet their health needs. During the check-up period, the hospital provided green channels for foreign experts, with professional interpreters helping them during the whole process.

In recent years, the department has been committed to serving foreign experts, including creating the "Foreign Experts in Jilin" Wechat public account, establishing two foreign experts' book rooms and seven foreign experts' reading corners, and organizing the "Foreign Experts Campus Tour" and a series of cultural immersion activities, in order to inspire them to further understand and integrate into Jilin, and continue to contribute intellectual support to the revitalization and development of Jilin.

Source: Science and Technology Department of Jilin province

Dongfeng Weir, A Marvel of Ancient Irrigation

Traditional Eastern Wisdom

By ZHAO Boyuan

Dongfeng Weir was built during the early Qing Dynasty and first named Pilu Weir. It was located on the left bank of Qingyijiang River, a tier three tributary of Yangtze River, in the Jiajiang county, Sichuan province. Dongfeng Weir is regarded as an outstanding example of sustainable contribution to ecological conservation and development in its mission for a period of more than 350 years.

The design and construction of the weir exemplifies the ancient Chinese philosophy of harmony with nature. Dongfeng Weir consists of the 12 km main diversion canal, two secondary canals diverting into four by- canals, one tunnel, eight aqueducts, 19 water - gates and other supporting facilities.

Before the construction of Dongfeng Weir, Jiajiang county was drought prone. However, since the completion of works in 1662, sufficient irrigation water supply has ensured agriculture stabilization and social development. Its irrigated area has expanded more than 10-fold from 467 hectares to 4667 hectares, covering five towns and 51 villages.

Nowadays, Dongfeng Weir is managed jointly by the local government as well as beneficiaries. The local administration is in charge of the maintenance of the general canals and branch canals, while the water user association is responsible for the sublateral canals. In 2014, Dongfeng Weir was recognized as a World Heritage Irrigation Structure by the International Commission on Irrigation and Drainage.

Expats Gather to Celebrate Mid-Autumn Festival

By LIN Huifang

Shandong Provincial Department of Science and Technology held Mid-Autumn Tea Party for foreign experts. Expats gathered to experience the traditional culture of the Mid-Autumn Festival. In a festive and auspicious atmosphere at the event site, they shared experiences living and working in Shandong and offered advice and suggestions for the high- quality development of Shandong's economy and society.

Source: Science and Technology Department of Shandong province

Multi-Media

For more detailed information about Professor Pronkina Olga's views, please scan the QR code above.

Daily Life Myth Buster

By Staff Reporters

Rumor A: Fatty liver only belongs to overweight people and a vegetarian diet can help against fatty liver disease.

Fact: People who are vegetarians, malnourished and overweight can all suffer from fatty liver. The metabolism of fats and the transportation between the liver and the blood require apolipoproteins as the "transportation." When there is not enough apolipoproteins in the body due to poor nutrition, especially when protein intake is inadequate, the liver is unable to transport the excess fat outward, thus leading to a fatty liver.

Rumor B: Ready made food is junk food, and only inferior ingredients are used in its preparation.

Fact: Ready made food is not necessarily a bad option. It is food that is ready for consumption often with a long shelf life, having been prepared by someone else and sold to a consumer. Convenience is a major selling point for ready made food. For many busy people, cutting out cooking time, as well as the reduced need to shop for groceries or plan meals, can support a healthy and consistent diet. Moreover, the catering industry can save labor, space and cost by using pre- made dishes, and food safety is more assured. However, pre-cooked dishes have unbalanced nutrition with limited ingredients, excess fat and sodium, and frequent consumption of them is not beneficial to health.

Green Energy Key to Addressing Climate Change

From page 1

Enhancing green energy - focused technical and vocational education is also on the agenda. South African Ambassador to China, Siyabonga C. Cwele, said, "China has quality training institutions that can cooperate with African institutions to reduce the necessary skills gap," adding that affordable technology, innovation, and financial sharing are vital in shifting to a low-carbon economy and sustainable development.

China's High-speed Rail Makes Monumental Advances

From page 1

Wufushan HSR station in Jiangxi has brought new life to mountainous towns. The traveling time in the area has shortened considerably, and the local national forest park and other tourist spots become more accessible.

In the past decade, more than 20,000 kilometers of HSR lines have been built in rural areas and poverty-stricken areas, accounting for 80 percent of the country's total during the same period, allowing all Chinese people to benefit from the growth.

Upgraded operation for better services

Efficiency, convenience and intelligence are the goals of modern transportation. Along with rapid expansion, China's HSR has upgraded its operation to provide better services for passengers and cargo.

12306.cn, China's official website for purchasing railway tickets, is the world's largest of its kind. By April 2020, electronic tickets were available for all HSR and intercity railways on China's mainland, requiring only an ID card to get onboard.

Fengtai Railway Station, built in 1895, reopened as the largest rail transport hub in Asia on June 20, 2022 after four year's renovation work. The station occupies 400,000 square meters and is able to host 14,000 passengers per hour at its peak, operating bullet and regular trains as well as subway lines.

"It's hard not to be impressed by the sheer size of some of the new stations, and by the efficiency with which the system moves vast numbers of people, all with a reserved seat and without the need for paper tickets," said Mark Smith, founder of the Man in Seat Sixty-One.

In 2021, China State Railway Group has upgraded the e - commerce platform to realize 24/7 online processing of railway freight business. More than 6,900 enterprises have registered on the platform, and 97 percent of waybills have been digitalized, which effectively improves the efficiency of freight business and its smooth operation during the pandemic.

Partnership Deepens Between China and LAC

From page 1

Flavio Salazar, Chile's minister of science, technology, knowledge and innovation, for example, said that having seen achievements through collaborations with China in climate change and satellites, Chile expects more in emerging technologies such as medicine and space. He called for further steps in enhancing international science and technology innovation and collaboration, to facilitate regional development and alleviate poverty.

Today, the trade volume between China and LAC has increased more than 17 - fold compared to 2001, the time when China joined the WTO. The forum continues to encourage both sides to explore the development potentials that can be mutually beneficial.

A memorandum of understanding on cooperation has been signed to facilitate the construction of a food innovation center for sustainable development between China and LAC countries on September 2.

Active Role Needed by U.S. in SDGs

Opinion

By LI Zhe & TIAN Nianping

The CHIPS and Science Act, passed in August, seems to support U.S. domestic chip industry and scientific research. But in reality, it aims to politicize and marginalize the development issues, and to artificially create divisions and confrontations by setting restrictions on China's technology, investment and personnel communication, etc.

The act not only undermines sci-tech innovation cooperation between the two countries, but also impedes global economic recovery and sustainable development.

In the past decades, China and the U.S. have deepened their international cooperation in various fields such as scientific research, industry, investment and education, and established extensive relations.

Supporting economic development and people's well-being, the cooperation has driven globalization and the sustainable development goals (SDGs), which is in line with aspirations of the people worldwide for peace, development and cooperation.

Currently, sustainable development is facing historic challenges that can only be solved by sci-tech innovation cooperation.

Amina Mohammed, deputy secretary-general of the United Nations, speaks at the UN High-level Political Forum on Sustainable Development. (PHOTO: XINHUA)

On one hand, there is a structural imbalance between global supply and demand, which includes imbalances between different countries and regions, as well as imbalances between different stages of development.

China and the U.S. play the most important roles in global technology and industrial gradient transfer. That means, if the cooperation falls, it will further reduce the efficiency of the global economy and hinder its recovery.

On the other hand, the various sustainable development problems facing the world today can be traced back to the development gap and development deficit.

Facing a huge financing gap, there is a long way to achieve and implement the *United Nation's 2030 Agenda for Sustainable Development*. Issues such as cyber security, energy security, food security, climate change, and infectious diseases can only be solved through sci-tech innovation cooperation under a multilateral framework.

Take the chips act as an example, the U.S. has taken the initiative to carry on a series of actions in recent years to undermine China-U.S. technological innovation cooperation and exchanges.

These actions not only add additional costs to the global innovation system, but also disrupt the fundamental paradigms in science, and reduce other countries' voice on issues such as research integrity, ethical issues raised by new technologies, and sustainability of ecological environment.

Moreover, in the face of global problems, China and the U.S. are both major suppliers of capital, technology and infrastructure. The destruction of bilateral cooperation will inevitably have a very negative impact on various multilateral cooperation mechanisms.

As the developed country with the largest economy in the world, the U.S. has a huge impact on global sustainable development. Thus, the U.S. government should be fully aware of its responsibilities, and abandon the deglobalized cold war mentality and zero-sum thinking.

Only by actively carrying out different forms of sci-tech innovation cooperation with emerging markets and developing countries including China, can the U.S. solve its own problems and play an active role in the global development pattern of win-win cooperation and shared prosperity.

The authors are researchers at the Chinese Academy of Science and Technology for Development.

Comment

U.S. Sci-tech Hegemony Will Not Succeed

Edited by GONG Qian

U.S. chipmaker NVIDIA said it received a notice from the U.S. government on August 26, informing the company that it needs a new license to export certain graphics processing units (GPUs) used in AI to China and Russia.

The new license equates to an export ban, which directly affects the NVIDIA's A100 and forthcoming H100 integrated circuits.

According to Reuters, another chip manufacturer, Advanced Micro Devices (AMD), said the U.S. government also ordered it to stop exporting its MI250 AI chips to China.

These are new technological restrictions imposed by the U.S. on China. However, the brunt of the impact will be felt by the two companies and the U.S. itself.

China is the second largest market for both NVIDIA and AMD, making up 26.42 percent and 24.92 percent of their global revenues respectively, according to their most recent annual financial reports.

The two companies are therefore trapped by their own government. Shares of AMD and NVIDIA fell 3.7 percent and 6.6 percent respectively hours after the export bans, according to Reuters.

But it seems that NVIDIA will suffer even further. NVIDIA's stock price plummeted, with its shares finishing the week down almost 15 percent, said Fox Business.

The restrictions may impact the company's ability to complete its development of H100 in a timely manner, NVIDIA said in the Securities and Exchange Commission (SEC) filing.

So it is foreseeable that the U.S. ban will negatively impact the company. NVIDIA revealed that it may lose, "Approximately 400 million USD in potential sales to China." This represents 6.8 percent of the company's expected revenue in the third fiscal quarter, "A sizable percentage of NVIDIA's overall business," *Forbes* magazine reported.

Again, the U.S. is trying to limit China's access to technology using so-called concern over national security as an excuse.

"This is the new Cold War reality and broader export restrictions are part and parcel of this," Amir Anvarzadeh of Asymmetric Advisors told Bloomberg. "The export restrictions will broaden and it will impact semiconductors, AI, autonomous systems and biotech," he said.

"What the U.S. has done is typical sci-tech hegemony," said China's Foreign Ministry Spokesperson Wang Wenbin at a regular press conference on September 1. "The U.S. seeks to use its technological prowess as an advantage to hobble and suppress the development of emerging markets and developing countries," he said.

Opportunities and challenges often go hand in hand. Washington's move may hinder the development of China's high-end chips, but it "will accelerate the development of local datacenter GPUs such as Alibaba's" and it will boost sentiment for domestic stocks in the sector, Jeff Pu of Haitong International Securities told Bloomberg.

Bloomberg also reported that the stock shares of China's Cambricon Technologies Corp. jumped more than 30 percent over two days after U.S. export restrictions were announced. Cambricon is to a homegrown alternative to NVIDIA or AMD for AI chipmaking.

China, meanwhile, has been making every effort in tech innovation to produce more alternatives, thus realizing its self-dependence. That the U.S. perpetuates its hegemony in the sci-tech sector will not succeed, said Wang Wenbin.

Voice of the World

Global Energy Supply Needs Chinese Solar Industry

Edited by QI Liming

Renewable energy sources such as solar panels and wind turbines will dominate the energy supply in the future, putting the world technologically and economically in a position to be rid of fossil fuels entirely by 2050, according to a July 25 paper published by the Institute of Electrical and Electronics Engineers (IEEE) in New York.

Solar-powered street lights "illuminate" the beautiful countryside in Huai' an, Jiangsu province. (PHOTO: VCG)

According to the United Nations, over 160 companies with a combined 70 trillion USD in assets are committed to decarbonizing the global economy, which means phasing out fossil fuels by 2050, said Sven Teske, associate professor at the University of Technology, Sydney and one of the authors of the report. "Our research has shown that we have the technology to implement a global energy supply based entirely on renewable energy," said Teske.

Solar power is enjoying trail winds. The sector is on track to produce 33 percent of the world's electricity by mid-century, according to International Energy Agency (IEA), putting it second behind wind power's 35 percent.

According to IEA's newly released report, the global manufacturing capacity for solar panels has increasingly moved out of Europe, Japan and the U.S. over the last decade and into China, which has taken the lead in investment and innovation.

China's share in all the key manufacturing stages of solar panels exceeds 80 percent today. "China has been instrumental in bringing down costs worldwide for solar PVs, with multiple benefits for clean energy transitions," said IEA Executive Director Fatih Birol.

According to *Nikkei Asia*, solar cell manufacturing is driven by capacity. As bigger production volumes drive down the cost per unit, all players pursue economies of scale, and the global decarbonization push sets the stage for aggressive investments.

Chinese solar panel manufacturers are planning or building new production facilities that will add a combined annual output capacity equivalent to 340 nuclear reactors, with strong global demand and new mass-production technology.

According to *The Wall Street Journal*, rooftop solar, in particular, could become a financially attractive option for many homeowners given skyrocketing electricity prices. Global financial services group Nomura expects global solar installations to grow nearly 50 percent both this and next year.

Many of those installations will be in China. The country built a record amount of solar power capacity in 2021, and it will likely break that record again this year. China added 31 GW in the first half of this year, more than double the new capacity installed during the same period last year.

The Wall Street Journal also pointed out that skyrocketing demand for non-fossil-fuel energy sources worldwide means a bonanza for China's solar industry. The fair winds blowing for Chinese manufacturers looks set to continue for some time to come.

China's Manufacturing Remains Vibrant

Edited by TANG Zhexiao

Since carrying out the policy of reform and opening up, China has seized its opportunity with both hands, racing to emerge as the world's biggest manufacturer.

From "Made in China" to "Intelligent Manufacturing in China," the country has shown its resilience and vitality, during the global supply chain crisis, providing support to stabilize the industrial chain and contributing to the high-quality development of global manufacturing.

Irreplaceable world factory

Since 2015, China's five major projects including innovation centers, industrial bases, green manufacturing and intelligent manufacturing, have all been launched and achieved results.

India's online news website Mint recently published an article, saying, "Other countries want to cut their dependence on the world's biggest factory floor, [and are] wary that Beijing is wielding too much power over the global economy. Replacing China, though, isn't all that easy. "

Parts of the supply chain may shift away from China, but for now, "No country can come close to building the intricate network of factories across such a broad range of sectors," said Mint.

U.S. bimonthly magazine *The National Interest* holds the same view. Ever since the beginning of the pandemic, many in the West have discussed the need for supply chain diversification to decrease their dependence on China for manufactured goods. But unfortunately, China is unlikely to be replaced in the global manufacturing supply chain anytime soon.

In fact, China has cemented its position as the world's leading supplier over the past two years. *The Wall Street Journal* said, "The West relies on Chinese factories, despite national security, supply-chain concerns."

China's share of global electronics exports, for instance, increased to 42 percent in 2021 from 38 percent in 2019, while its share of textile exports rose to 34 percent from 32 percent, according to data from the United Nations Conference on Trade and Development.

Intelligence boosts manufacturing upgrade

The magazine *European Tool & Mould Making* said, "Smartly Made in China" is making progress and some regions have already become real hot spots.

A recent report by global management consulting firm McKinsey, also said that China's industrial and manufacturing sectors will be able to drive a new wave of growth in the country's cloud computing market.

After surveying 278 decision makers in enterprise IT, digital and cloud from a wide range of sectors, analysts at McKinsey expect China's public cloud market to triple in size in the next few years, from 32 billion USD in 2021 to 90 billion USD by 2025, as industrial and manufacturing companies shift their information technology workloads to the cloud.

Green manufacturing in China has flourished as well. According to an article reporting on the world state of hydrogen technology patents by Japanese newspaper *Nikkei Asia*, the number of hydrogen technology patent filings by Chinese companies over this decade is already more than 10 times that of filings in the previous decade.

Scoring higher than Japan in four of the five categories of manufacturing, storage, safety controls and transportation, China has a good chance eventually to overtake Japan in all hydrogen-related fields, the article said.

China's manufacturing remains formidable despite the changes brought about by the pandemic, said *Barrons*, an American weekly magazine published by Dow Jones & Company, adding that "If global manufacturing were akin to the Olympics, China would take gold or silver in every event."

Small Inspection Robot Wriggles Through Pipelines

Hi! Tech

By Staff Reporters

In complex machinery like aircraft engines and oil refinery systems, pipeline inspection is an essential task for ensuring safety.

To this end, a research team from Tsinghua University has developed a type of smart material-driven pipeline inspection robot (weight 2.2 grams, length 47 millimeters, diameter <1 centimeter) that fits into pipes with sub-centimeter diameters and different curvatures.

Inspired by the principle of an earthworm wriggling, the researchers adopted high-power density, long-life dielectric elastomer actuators as artificial muscles and smart composite microstructure-based, high-efficiency anchoring units as transmissions.

Fast assembling of components using magnets with an adjustable number of units, were used to fit varying pipeline geometries. The research team analyzed the dynamic characteristics of the robots by considering soft material's unique properties, like viscoelasticity and dynamic vibrations and tuned the activation voltage's frequency and phase accordingly.

Powered by tethered cables from outside the pipe, the peristaltic pipeline robot achieved rapid motions horizontally and vertically (horizontal: 1.19 body lengths per second, vertical: 1.08 body lengths per second) in a subcentimeter-sized pipe (diameter is 9.8 millimeters).

In addition, the robot has capacity to move in pipes with varying geometries (diameter-changing pipe, L-shaped pipe, S-shaped pipe, or spiral-shaped pipe), filled media (air or oil) and materials (glass, metal, or carbon fiber), and it successfully finished an inspection task at various speeds.

Worm-inspired robot for centimeter-scale pipeline inspection. (PHOTO: SCREENSHOT)