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WEEKLY EDITION

China GEO Takes Over the Lead Co-chair for 2024

By FU Lili & LIANG Yilian

At the Group on Earth Observations (GEO) Week 2023 held in Cape Town, South Africa, from November 6 to 10, on the theme "The Earth Talks," China took over the Lead Co-chair for 2024 to preside over next year's work.

China will continue to promote GEO's key work in 2024, including drafting the implementation plan of GEO's Post 2025 Strategy, implementing the 2023-2025 Work Programme, strengthening the participation of developing countries, and bridging the widening digital divide between developed and developing countries.

In his keynote speech at the GEO Week 2023 Ministerial Summit, Zhang Guangjun, vice minister of China's Ministry of Science and Technology and GEO co-chair, spoke on narrowing the digital divide between the Global North and South by sharing China's endeavors and achievements in Earth observation.

He called on the GEO community and its partners to work together to create an open, inclusive, equitable and non-discriminatory Earth observation landscape and sound digital economy environment.

Zhang said GEO should promote the connectivity of Earth observation infrastructure, ensure the smooth flow of geo-spatial information and promote synergy of development philosophies among all parties holding fast to inclusiveness and mutual learning.

He also encouraged GEO to enhance people-to-people exchanges among countries and all stakeholders, and jointly promote stronger, greener and healthier global development.

Chinese experts gave details about China's latest research achievements in Earth observation, and shared remote sensing datasets for global ecological environment monitoring. The data is expected to provide decision-making references for sustainable development of the Asia-Oceania region and the international community.

Eleven ministerial representatives attended GEO Week and nearly 1,000 representatives from the United States, the European Commission, South Africa, the GEO Secretariat as well as other GEO members, participating organizations and associates took part in the activities during the week.



The Phase I project of Bozhong 19-6 Gasfield, the first 100 billion cubic meter gasfield in Bohai Sea, has been successfully put into operation, marking a new stage in the development of deep complex hydrocarbon reservoirs in China. (PHOTO: XINHUA)

Editor's Pick

Green Electricity Shines at CIIE

By ZONG Shihan

Bright lights blazing, large screens flashing and electric vehicles on the move — the National Exhibition and Convention Center (Shanghai) shone brightly as it played host to the 6th China International Import Expo (CIIE) from November 5 to 10.

The power source behind every light, screen and electric vehicle in the venue was green energy, providing irrefutable proof that China is witnessing the development of an energy revolution.

Green electricity marketing

Green power refers to electricity produced with zero or near-zero carbon dioxide emissions in the production process, mainly derived from renewable energy sources such as solar and wind power.

The 6th CIIE bought eight million kilowatt-hours of green electricity from East China's Anhui province through green electricity trading, covering all of the electricity consumption requirements at the expo. This marks the first

time that the CIIE has been fully powered by green energy, reducing carbon dioxide emissions by about 3,360 metric tons.

In September 2021, China officially launched a pilot project for green electricity trading. Guiding green electricity consumption in a market-oriented manner distinguishes a group of electricity users who are willing to take on more social responsibilities. They can directly trade with wind and photovoltaic power generation projects, increasing economic and environmental benefits.

In addition, according to China's policies, compared with traditional power generation, green power has priority in power grid dispatching, execution and settlement.

The emergence of green electricity trading created a bridge between the 6th CIIE in Shanghai, which had a demand for green electricity, and Anhui, which is rich in green electricity resources.

Since November 1, green electricity from several clean energy power generation companies in Anhui has been direct-

ly sent to the National Exhibition and Convention Center in Shanghai to power the 6th CIIE.

Electricity saving

How to maximize the use of green electricity from outlying areas and ensure the smooth and safe use of electricity during the CIIE was a major challenge. To address this issue, the expo synchronized green energy sources with the intelligent power supply safeguard system, known as the "energy brain," to achieve safe, stable, and efficient green energy consumption.

A total of 3,943 data collection sensors across the venue served as neural tentacles of the "energy brain." Based on the intelligent Internet of Things architecture, these sensors analyzed real-time energy usage in the venue to support the development of energy-saving measures for lighting systems, air conditioning systems and advertising equipment, improving the low-carbon and energy-saving management level of the venue.

See page 2

China Established as a Major IPRs Country

By Staff Reporters

China's ranking in the Global Innovation Index 2023 (GII 2023), released by the World Intellectual Property Organization, has risen to 12th place, and its number of the world's top 100 scientific and technological innovation clusters jumped to first in the world for the first time.

These indicators mean China's status of intellectual property rights (IPRs) is firmly established, according to Shen Changyu, commissioner of the China National Intellectual Property Administration, speaking on November 8.

The GI 2023, published on September 27, shows the pulse of global innovation trends in the current economic environment. It reveals the ranking of this year's most innovative economies in the world amongst 132 economies and localizes the top 100 science and technology innovation clusters.

Shen said that as of September 2023, China's effective invention patents and trademark ownership had reached 4.805 million and 45.122 million respectively, and its annual registration of copyright reached 6.353 million in 2022. The country's Patent Cooperation Treaty interna-

tional patent applications ranked first in the world for four consecutive years.

At the same time, the transformation and utilization of intellectual property rights in China has continued to be strengthened. According to Shen, "The formulation and implementation of a special action program on transforming and utilizing patents is accelerating."

Shen also said that the added value of patent-intensive industries and copyright industries accounted for 12.44 percent and 7.41 percent of GDP, which strongly promoted the high-quality development of the economy.

International Cooperation

BRI Drives Economic Diversification in Caribbean

By Staff Reporters

About 30 kilometers south of the Port of Spain, the capital of the Caribbean country of Trinidad and Tobago, lies Phoenix Park Industrial Estate, a state-of-the-art light industrial estate set up to stimulate economic development. Recently completed by China's Beijing Construction Engineering Group, Phoenix park becomes the first project of Belt and Road Initiative (BRI) cooperation in the Caribbean region.

Phoenix park is positioned as a high value-added, environmentally-friendly light industrial estate. In response to the long-term dependence on oil and gas resources, the government of Trinidad and Tobago has been actively promoting economic diversification and transformation, placing emphasis on the development of non-energy industries.

Equipped with modern technology, Phoenix park uses AI tools and high-speed Internet connectivity for better installation management, energy efficiency and environmental protection. In addition, it has full access to water, electricity, and gas services, as well as an efficient wastewater treatment system and green belts.

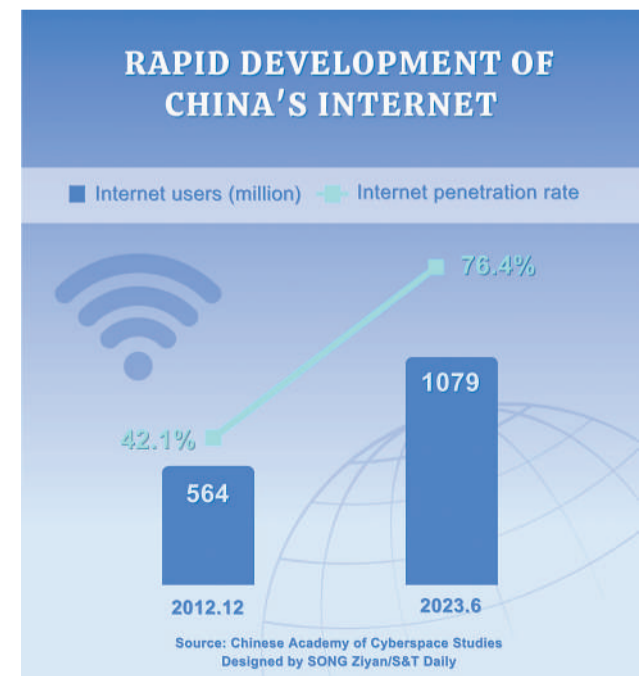
Operations began with Evolving Technologies and Enterprise Development Co., Ltd (e TecK), a state company under Trinidad and Tobago's Ministry of Trade and Industry.

Daniel Duncan, vice president of e TecK, noted that it is vital for Trinidad and Tobago to extend investment opportunities beyond the energy and gas sectors. "As the country is striving towards diversification and not [be] dependent on oil and gas only, these types of development are critical to Trinidad and Tobago, hence the reason for Phoenix Park Industrial Estate," he said.

"The initiative is a significant project from the point of view of both countries. For China, it represents investments into another country, and for us, that assistance facilitates our development," said Paula Gopee-Scoon, the trade and industry minister of Trinidad and Tobago.

Trinidad and Tobago was the first Caribbean country to sign the Belt and Road cooperation agreement with China. In recent years, the two sides have witnessed increasing economic, trade, and personnel exchanges. Amidst global uncertainty and turmoil, Gopee-Scoon emphasized the importance of unity and solidarity for collective progress and the creation of a community with a shared future.

New Graphic



WECHAT ACCOUNT



E-PAPER



CIIE: A Platform of High-standard Opening up

By LI Linxu

The 6th China International Import Expo (CIIE) witnessed a record-breaking 78.41 billion USD worth of tentative deals reached for one-year purchases of goods and services, injecting new dynamism into the global economy.

As the world's first national-level import expo, CIIE is serving as a platform of high-standard opening up that allows China's enormous market to be shared by the world.

"It's an honor for Serbia to be presented as one of the guest countries of honor at this year's expo," Danijel Nikolic, assistant secretary general of the Government of Serbia, told *Science and Technology Daily (S&T Daily)*. He said that CIIE is an important platform of China's high-standard opening up, through which Serbian companies have reached many cooperation agreements with their Chinese partners.

Honduras is also one of the guest countries of honor at this year's expo. Yadira Gómez, tourism minister of Honduras, told *S&T Daily* that CIIE is also an important platform to promote culture and people-to-people exchanges. Through CIIE, participants from around the world have opportunities to know more about Honduras.

"For Japanese companies, CIIE is a great platform to showcase their products and explore cooperation opportunities in China," Ueno Asako, minister from Embassy of Japan in China, told *S&T Daily*. About 350 Japanese companies took part in this year's expo, and she hoped that there will be more Japanese companies coming to CIIE next year.



The China Pavilion at the 6th CIIE in Shanghai. (PHOTO: LI Linxu/S&T Daily)

nese companies coming to CIIE next year.

"Next year, we plan to reserve the area of Iran's pavilion at least four times bigger," Hossein Ghaheri, CEO of Iran-China Cooperation Development Group, told *S&T Daily*, adding that CIIE is very important for Iran. Through it, visitors from around the world can see Iran's leading technologies and specialty products.

Innovation is also a defining feature of this year's expo, showcasing a diverse array of 442 new products, technologies, and services.

"CIIE is truly exceptional for its scale and diversity," Liao Honggang, professor from Xiamen University, told *S&T Daily*, adding that CIIE is a great platform for exchanges and conducive to transforming sci-tech achievements.

"We firmly believe that the Chinese market will continue to play a pivotal role in the global pharmaceutical innovation, poised to unlock substantial potential," said Paul Hudson, CEO of Sanofi, adding that Sanofi will persistently deepen engagement in China.

"Thanks to CIIE, EY has reached co-

operation with many enterprises," Titus von dem Bongart, EY Partner, told *S&T Daily*, adding that EY is committed to growing with the Chinese market.

"CIIE has provided a great opportunity not only for showcasing cutting-edge technologies and products, but also for exchanges and cooperation for enterprises," said Zhao Yao, general manager of Omron Healthcare (China).

Tapping into China's vast market opportunities, 3,486 companies from 128 countries and regions have participated in the event.

High-quality Growth

Rural Guizhou Embraces Smart Villages

By Staff Reporters

With the deep integration of modern technologies such as 5G, big data, and the Internet of Things, rural areas in Guizhou province are becoming increasingly smart and fashionable.

Over the past decade, Guizhou has continuously delved into the digital economy, laying a solid foundation for the rise of "digital villages." From industrial development to rural governance, "digital villages" illuminate the colorful future of Guizhou and showcase the new model of rural revitalization in China.

Rural going digital

Surrounded by green water and leafy mountains, groups of black chickens peck at their food at a breeding base in the Shuangyan community, Zhuchang town, Bijie city.

Different from ordinary chicken farms, this smart ecological breeding base adopts such technologies as the Internet of Things, blockchain, and big data.

"We can quickly understand the temperature and humidity data of the breeding base to ensure that every black chicken has favorable growth conditions," said Peng Fen, head of the breeding base.

By simply opening the smart breeding system on their phones, villagers can easily grasp the real-time situation of the entire breeding base. "During busy times, we can feed the chickens remotely using our phones and scan the QR codes on their leg rings to see the quality data of each chicken," said Peng.

Established in 2020, the intelligent chicken breeding base now has a production value of 5.5 million RMB, becoming one of the pillar industries in the area.

A beautiful rural scene with 5G

"Tourists, please take care and

mind the protective barrier." In Huawu village, Xinren Miao township, Qianxi city, village officials sit in their office and use a monitoring screen to remotely communicate with visitors.

Huawu, located deep in the mountains, has water on three sides. The unique Miao ethnic customs and the picturesque landscapes combine to create a uniquely beautiful environment.

The influx of tourists to enjoy the surroundings has posed a challenge to providing efficient and convenient services and management. Thanks to the support of emerging technologies such as 5G and big data, the village has embarked on a path of intelligent management.

"We have built a 5G + Smart Rural Management Platform, which utilizes modern information technology to integrate rural resources, thereby improving the local government's service levels and management efficiency," said Tian Jiaqiu, chief of the Xinren Miao township. Through the "digital village map," the platform visually presents data related to production, government affairs, and services in Huawu.

For the villagers, life has become more convenient since the introduction of the platform. Now, they can complete various government procedures, such as applying for necessary documentation, via this platform.

As for tourists, they can receive real-time information on visitor flow analysis, early warnings and other updates. Through 5G + VR live streaming, they can immerse themselves in the beautiful scenery of Huawu.

In addition, livestreaming e-commerce has boosted the sales of local products like yellow rice cakes, yellow ginger and Miao embroidery, increasing the income of local villagers.

China's Vibrant Internet Development Benefits World

By ZHONG Jianli

The number of Internet users in China surged from 564 million in December 2012 to 1.079 billion in June 2023, with the Internet penetration rate rising from 42.1 percent to 76.4 percent. This sizzling growth has propelled the country to become the world's largest and most vibrant digital society. That's according to a press conference on the release of the *China Internet Development Report 2023* and the *World Internet Development Report 2023* at the 2023 World Internet Conference Wuzhen Summit on November 8.

These two reports, mainly written by Chinese Academy of Cyberspace Studies (CACS), were a collaborative effort involving relevant Chinese departments, as well as foreign think tanks and research institutions.

Xia Xueping, director of the CACS, said during the press briefing that the growth of China's digital economy, which surged from 11 trillion RMB in 2012 to 50.2 trillion RMB in 2022, enabled China to become a global leader in such aspects as Internet applications, the number of netizens, and the development of artificial intelligence.

The *China Internet Development Re-*

port 2023 showed that digital technology has been deeply integrated into the daily lives of Chinese people. As of June 2023, the number of Internet healthcare users in the country was 364 million, and the rural Internet penetration rate had reached 60.5 percent.

The *World Internet Development Report 2023* highlighted China's efforts to enhance digital public services around the world. The country has utilized network information technology to carry out international education cooperation. It has also actively engaged in promoting and sharing digital poverty reduction experiences and solutions through

platforms such as the Asia-Pacific Economic Cooperation.

Of particular note is that this year's report focused more on the Internet development status of developing countries. Among the 21 developing countries analyzed by the report, 15 countries including Laos, Myanmar and Angola, demonstrated Internet application growth rates higher than the average growth rate of the selected developed countries.

These developing countries are all Belt and Road Initiative (BRI) partner countries. This, to some extent, illustrates the catalytic effect of the BRI on the Internet development in these countries.

Tacheng: Transforming Wind into Economic Advantage

Case Study

By CHEN Chunyou

The Laofengkou-Mayitasi wind zone in northwest China's Xinjiang Uygur autonomous region, commonly known as the devil wind area, is one of the world's largest wind disaster areas. Every year, the zone is buffeted by eight-gale-force weather conditions almost half the year.

Tacheng region, located in this

zone, abounds with wind resources. However, in the past, these resources were not utilized and there were no wind turbine manufacturers in the region.

The winds of change came in December 2020, when the State Council approved a key pilot zone for development and opening up in Tacheng to promote urbanization of the border region and serve as an important window for cooperation with countries in Central Asia. Tacheng consequently embarked on a fast track of development.

Though Tacheng's economy mainly

relies on agriculture and animal husbandry, the local governments and residents have long tried to diversify the industries. In recent years, the area's wind advantages have begun to be turned into economic advantages.

New factories are coming up in the pilot zone, making the once desolate surroundings hum with activities. More than 60 enterprises have signed agreements to operate from the pilot zone, and several wind turbine and tower barrel manufacturing projects are already in operation. They include Sany (Tacheng) Wind Power Equipment Co., Ltd. and the Sinohydro Engineering Bureau No. 4 (Tacheng) Energy Equipment Co., Ltd.

Sany is among the first batch of enterprises to settle down in the zone, aiming for the vast consumption market in Xinjiang and Central Asia. It has filled the absence of local wind turbine manufacturers and created a low-carbon, high-end manufacturing industry in Tacheng.

Sany's 450-million-RMB project has an annual output of one million kilowatts of wind turbines and 600 blades. The value of the annual production is about two billion RMB.

Wu Hao, an administrative staff of

Sanyi, said the company chose Tacheng because its location is transport-friendly and the costs for transporting the products to other areas of Xinjiang and neighboring countries are low.

Wu said this year, 10 wind turbines were exported to Kazakhstan and other Central Asian countries via Xinjiang's Baketu Port.

"It takes about 24 hours to make a turbine from raw materials," said Dawuleni Wuken, a staff at the workshop of Sany. He came to Tacheng from Urumqi in February, drawn by its potential to develop new energy industries. "Many people from nearby provinces and regions have chosen to work in Tacheng like me," he added.

A number of upstream and downstream new energy companies have also been attracted to Tacheng, forming a clean energy industry cluster, which has become a new development driver of the region.

According to Chen Weilong, deputy director of the pilot zone's management committee, the total industrial output of the landed projects in the zone from January to October this year is expected to be worth over 300 million RMB.



Huawu village is equipped with 5G for rural management. (PHOTO: HE Xinghui/S&T Daily)

Green Electricity Shines at CIIE

From page 1

When the system showed that the power load of the venue exceeded 40 percent, venue staff would check all load types to ensure that the entire venue operated under energy-saving conditions.

Meanwhile, with a total installed capacity of 2.2 megawatts of photovoltaic power generation on the roof of the venue, emissions were reduced by 4.6 percent for the duration of the expo. The venue also used the waste heat generated from power generation for summer cooling, winter heating, and domestic hot water supply, achieving reasonable energy utilization.

Long-term electricity generation

China is the world's largest producer and consumer of electricity, having the world's top power generation, power grid scale and new energy scale.

Under the aim of having CO₂ emissions peak by 2030 and achieving carbon neutrality before 2060, the power industry has vigorously promoted the green and low-carbon transformation, with remarkable results.

According to data from China's National Energy Administration, as of the

first nine months of 2023, China's installed capacity of renewable energy had been about 1.384 billion kilowatts, accounting for about 49.6 percent of the country's total installed capacity, which has exceeded the installed capacity of thermal power. China has now ranked first in hydropower, wind power and solar power generation installed capacity for 18 years, 13 years and 8 years in a row, respectively.

As a leading country in renewable energy development, China has also been working with other countries to seek green energy and low-carbon innovation solutions.

Whether it is the "power expressway" built by the State Grid Corporation of China, which transports hydropower from the Amazon River basin to southeastern Brazil more than 2,500 kilometers away, meeting the electricity demand of 22 million people, or the Saudi Arabian Al Schubach 2.6 GW photovoltaic power station project undertaken by other Chinese companies that have opened up a flower of hope in the desert, China's green power technology not only illuminates the CIIE, but also shines around the world.



A group of wind turbines in Laofengkou wind farm in Tacheng region, Xinjiang Uygur autonomous region. (PHOTO: VCG)

INSIGHTS

Sci-tech Cooperation Leads to Development

Voice of the World

By TANG Zhexiao

Focusing on technology cooperation, an innovation resource matchmaking event held on November 8, gathered science and technology diplomats in Beijing to enable more exchanges and cooperation and discuss how to create an open novel cooperative mechanism.

Beijing is in a stage of high-quality development, and the event will enhance sci-tech cooperation in wider areas and at a higher level, Zang Yan, deputy director of international cooperation division, Beijing Municipal Science and Technology Commission, said in her address.

Seventeen science and technology diplomats, and experts, scholars and executives exchanged ideas and views.

"New Zealand and China has had almost 50 years of science and innovation cooperation, and we have seen growing signs of it," said Dr. Ron Xavier, science and innovation counsellor of the New Zealand Embassy in China.

He illustrated the main areas where the two countries promoted science innovation cooperation, such as resuming the New Zealand-China Scientists Exchange Programme, signing memorandum (MoU) of cooperation arrangements with the Chinese Academy of Sciences, fund-



The locals show seedlings at the China-aided Nigeria Agricultural Demonstration Center in Abuja, Nigeria. (PHOTO: XINHUA)

ing joint research centers and establishing a strategic research alliance.

The New Zealand government is pleased to provide support in fostering the research collaboration, which is still continuing, according to Xavier. He stressed the importance of collaboration to drive innovation, noting that "By aligning priorities, we can achieve shared goals."

Pakistan and China officially signed a sci-tech cooperation agreement in 1976. For decades, the number of MoUs and agreements of cooperation in sci-

ence and technology between the two countries has reached more than 50, according to Khan Muhammad Wazir, science counsellor from Pakistan Embassy in China.

Currently, the two countries have included science technology innovation in the China-Pakistan Economic Corridor (CPEC) for high quality and sustainable development. With direct Chinese investment of 25.4 billion USD, 192,000 jobs have been created in Pakistan, said Wazir.

As the first European country to sign the Belt and Road Initiative (BRI), Hungary is forging a strong sci-tech partnership with China.

According to Balogh Andras Zoltan, first secretary for science and technology in Embassy of Hungary in China, the bilateral cooperation covers various field such as car industry, battery production, neuroscience, physics, space technology and new materials.

Large sci-tech facilities and tools will be jointly used in the future, as well as large scientific research centers, said Zoltan, adding that Hungary is willing to provide more opportunities for Chinese researchers.

Participants also made observations about exploration of the new way of international cooperation in sci-tech innovation in the new era. Apart from a focus on specific areas, many of them said that trust is one of the most significant factors in global scientific development.

Collaboration with China was highlighted. Professor Joseph C. Kolars, senior associate dean of the Medical School and executive director of the Office of Global Public Health at the University of Michigan, spoke about the reasons why the world needs to work with China. "Our future depends on China," said Kolars. In his view, cooperation will promote interconnection, co-dependency and productivity.

Comment

No Global Solutions Without Sci-tech

By LIANG Yilian & FU Xiaobo

Good science anywhere is good for science everywhere is the core message of Saifur Rahman, president and CEO of Institute of Electrical and Electronics Engineers, in his video address at the 6th World Forum on Development and Governance for Science and Technology Societies in Xiamen, east China's Fujian province, on November 7.

As for sci-tech societies, the question arises: How can we harness the power of scientific advancements in one region for the betterment of all humanity? "We are facing significant challenges, for example, geopolitical issues. However, there are actions that can be taken by people's activities, and sci-tech societies can play a role that governments cannot fulfill. Events like today's forum provide excellent opportunities to establish connections and promote collaboration," Guo Huadong, academician of Chinese Academy of Sciences and honorary president of International Society for Digital Earth, told *Science and Technology Daily* at the forum.

Meanwhile, Robin Peter Tensen, CEO of GlobalTech IP, pointed out the resistance to the trend of globalization in various countries. "In many countries, such as the U.S. and many European nations, individuals, especially workers, feel apprehensive about the process of opening up and the blurring of national boundaries." He said this sentiment is partly related to attitudes towards immigration and a concern that, for example, in the U.S., there may be a loss of dominance. "It is my belief that the 'genie' is out of the bottle, and a reversal seems unlikely due to the efficiency and benefits it brings," said Tensen.

Sudip Parikh, CEO of the American Association for the Advancement of Sci-

ence told the forum about the significance of "data sharing and transparency" in addressing global challenges that transcend borders, such as climate change.

"We generate a large amount of data and then share it to improve monitoring and evaluation of sustainable development goals (SDGs). Chinese Foreign Minister Wang Yi on behalf of the Chinese government made a commitment to the United Nations, ensuring that the data collected by Sustainable Development Science Satellite 1 (SDGSAT-1) would be available for free use by all 193 UN member states," Guo told the forum.

And according to Bob Cryan, emeritus president of Institution of Engineering and Technology, sci-tech societies are becoming more and more recognized as being extremely important. He told *S&T Daily* that the general public are starting to understand that without science, technology and engineers, global problems can't be solved.

"What we need to do is to look at the whole of our international community, to take the best minds from around the world, and get them to tackle the problems. That's the only way that humanity can continue to develop and drive," said Cryan.

And the cooperation is built on trust, which is gained incrementally. Events like this forum help to increase communication among scientists. The collective efforts of sci-tech societies, in conjunction with collaborative data sharing and transparent practices, will play an indispensable role in addressing pressing global issues. The recognition of this critical role is steadily growing, underscoring the essential nature of scientific advancements in finding solutions to the challenges that transcend borders.

Energy Storage, Great Potential Technology

Edited by QI Liming

In the transformation of traditional fossil fuels to renewables, the issue of new energy storage is one of major concern—where do we get our energy from when the wind is not blowing and the sun is not shining?

A dive into the current situation and future development of new energy storage reveals understanding, innovation and new technology going forward.

Why does renewable energy need to be stored?

According to UK magazine *Impakter* and UK National Grid, as the world moves towards a more renewable and decentralized energy system, energy storage is becoming increasingly important.

Energy storage technologies allow us to store energy when it's available and release it when it's needed, providing a range of benefits for the grid, businesses, and households.

Efficient energy storage is crucial for the green transition. One of the pri-

mary reasons is the need to manage variable energy supply. Renewable energy sources like wind and solar are intermittent and don't provide a consistent energy supply. Energy storage can help smooth out these fluctuations by storing excess energy when it's available and releasing it when needed.

As many renewable energy sources are becoming cheaper, storing them and using them later can be very cost-efficient for society.

Energy storage can also provide backup power during emergencies and help reduce peak demand, which occurs when many people use electricity simultaneously.

By storing excess energy during off-peak hours and releasing it during peak hours, energy storage can help prevent blackouts and reduce the need for expensive infrastructure upgrades or reliance on fossil fuels.

Improving energy storage infrastructure and overcoming the issues posed by the intermittent renewable energy supply is essential to achieve decarbonization targets and drastically help eliminate our fossil fuel dependence.

How is renewable energy stored?

When asking how to store renewable energy efficiently, one concept needs particular attention, this is long duration energy stor-

age (LDES).

According to *Financial Times*, LDES generally refers to any form of technology that can store energy for multiple hours, days, even weeks or months, and then provide that energy when and if needed. It is an essential technology if the world is to increase the proportion of renewable energy.

Various technologies are being worked on, with varying degrees of success, but the benchmark is pumped hydro storage, partly because of its high round-trip efficiency: the proportion of the energy stored in this way that can later be extracted is around 80 percent.

It is technology that has been around for more than a century, involving the movement of water between lower and higher reservoirs to store and generate energy. However, it remains the most used storage method globally, with around 160GW of power capacity installed as of 2021. A further 130GW is planned or under construction, with China accounting for around 60 percent of the new plans.

According to *South China Morning Post*, compared with pumped hydro storage, electricity storage processes that use emerging technologies such as compressed air, flywheels and electrochemical are the trends to follow.

Electricity storage process is more flexible when it comes to site selection, and has other advantages, including short construction periods, faster and flexible response and more diverse functions.

What are the most promising energy storage technologies?

Frank Wouters, co-president of the

LDES Council, said that LDES remains a nascent market without an established business model.

Both regulators and industry players are still trying to figure out what the right business model is, he added.

According to research blog StartUs Insights, energy storage is undergoing a rapid transformation wherein research is underway to develop efficient long-lasting solutions.

Currently, the energy storage sector is focusing on improving energy consumption capacities to ensure stable and economic power system operations. Broadly, trends in energy storage solutions can be categorized into three concepts:

- Moving away from the traditional lithium-ion batteries toward innovative battery chemistries that offer greater stability, density, and shelf life.

- Developing storage solutions that store intermittent renewable energy efficiently and also scale it up to power large geographical areas.

- Transitioning from centralized energy storage to a more flexible and portable distributed form of energy storage.

Meanwhile, Greentech Media evaluated the five most promising long-duration storage technologies left standing: pumped hydro, stacked blocks, liquid air, underground compressed air, and flow batteries, while *Impakter's* list is a little bit different: thermal energy storage, pumped hydroelectric storage, green hydrogen, and gravity batteries.



The 6th World Forum on Development and Governance for Science and Technology Societies is held in Xiamen. (PHOTO: China Association for Science and Technology)

New Long-Ladder Fire Truck Boosts Fire-fighting Power

By Staff Reporters

China's first 40-meter straight-bend ladder fire truck, devised by Xuzhou Construction Machinery Group (XCMG), made its debut at an exhibition recently, showcasing China's progress in fire equipment development.

XCMG made a breakthrough in two core technologies: dual ladder expansion technology and multi-track asynchronous pipeline transmission technology. This enables the fire truck with stronger obstacle-crossing capability and larger operating range, as well as

the ability to reaching higher altitudes when carrying out rescues.

In addition, the fire truck has multiple intelligent protection functions for safer operation such as ladder intelligent vibration reduction.

The fire extinction power has also been boosted with a fire system configuration that can automatically issue fire-fighting foam in the required proportion.

The new fire truck helps speed up rescue as the ladder can be quickly extended, enabling the rescue workers to enter the platform operation zone on the ladder.



The 40-meter straight-bend ladder fire truck, invented by Chinese company XCMG. (PHOTO: XCMG)

Turning Garden Waste into Eco Treasure

Hi! Tech

By QI Liming

While some countries are still using incineration and landfills to dispose of garden waste, more and more countries are using new technology to avoid emitting greenhouse gases and wasting resources.

A research team from Chinese Academy of Sciences presented the latest research results of artificial humification of garden waste recently. Artificial humification technology, with aerobic fermentation as the core, is becoming an effective resource recovery scheme.

The researchers screened both high-efficient medium and high temperature lignin degrading bacteria, and applied them to bio-enhanced directed humus of garden waste.

For example, according to the thickness of the garden waste, small pieces of dry branches and fallen leaves are ground into powder and thick tree trunks and branches are sliced into pieces.

After both the small and thick ones are humified at the same time, the former can be made into organic fertilizer, and the latter can be made into organic mulch sheets by coloring. These organic mulch sheets can not only suppress dust and retain water and heat, but also has a

landscape effect with their colorful appearance, and can be used for urban park construction.

In the future, the directed humification technology of garden waste can bring ecological and economic comprehensive benefits.

As for the economy, more and more organic fertilizer and mulch made by this technology can be sold on the market, along with the benefit of soil carbon sink income.

Dialogue

Growing with My Career in China

By XU Qingqun & BI Weizi

In early 2021, Romanian Silviu Negru received a job invitation from Great Wall Motor Mind Electric and Electronic System (Mind) and arrived in China in July of the same year. Whilst being excited to work in the country, he also had bouts of anxiety about how he would adapt to the different lifestyle. Two years later, the Mind chief engineer has settled in well in Baoding, the city where he works and lives in central Hebei province, and has no regrets about his decision.

Joining Mind
Negru got to know about Great Wall Motors in 2016. Mind, as a wholly owned subsidiary of Great Wall Motor, was established in 1998 with the aim of providing customers with fashionable, smart, green and safe automotive component systems. "I have been looking forward to joining this company ever since," he said. In fact, one of the major reasons for him to come to China was his belief in China's great potential in terms of the automobile industry. "This is a great opportunity for me because it allows me not only to experience life in China, but also to understand the Chinese culture. I also saw [a lot of potential in] the company's prospects and its determination to develop," he said.

Before joining Mind, Negru had accumulated 15 years of professional experience,



Mr. Silviu Negru. (PHOTO: International Talent Magazine)

mainly as a wire harness design engineer, in different countries such as Romania, Germany, France and Hungary, through which he developed an open and inclusive mind to different cultures. With a continuous history of 5000 years, China was always destined to offer him a unique and life-enriching experience.

Making every day count in China
According to Negru, only about 20 skilled workers are needed in a 5,000-square-foot automotive manufacturing workshop at Mind, with robots doing most of the work. He is the person who works "behind the scenes" of

these robots, mainly designing wiring harnesses.

He explained that wiring harnesses is the process of combining electrical cables or assembly of wires that connect all the electrical and electronic (E/E) components in the vehicle, such as sensors, electronic control units, batteries and actuators.

The wire harness manages the flow of energy and information within the E/E system to perform primary vehicle functions such as steering and braking, as well as secondary vehicle functions such as ventilation and infotainment.

Wire harnesses can be used not only in automobiles, but also in home appliances, computers and communication equipment.

Talking about his work at the company, he said, "I really like it here. The company's cultural promotion activities are very engaging. During the Chinese festivals, various events were launched, which helped me to gain a deeper understanding of Chinese culture and to fall in love with the country."

Negru is also a person who loves to explore and enjoy life after work. He knows some of the best local restaurants in Baoding and often takes advantage of his vacations to travel around China, trying local delicacies and taking pictures of the sites. Talking about his impressions of China, he said researching the country beforehand helped him, but it is never the same as experiencing the real thing. "After visiting many places in China, I would say that I really like the friendliness of Chinese people, the taste of Chinese cuisine and the richness of Chinese culture," he said.

"Every day is a new experience here. I am looking forward to growing with my company. I'm also keen to travel to more places, discover more beauty in this country, and explore the vast and profound culture of China," said Negru.

This article is in cooperation with International Talent Magazine.

Better World Needs 'Global Brain': Cuban Scientist

By HE Liang & LONG Yun

Cuban scientist Pedro A. Valdes-Sosa, currently a full-time professor at the University of Electronic Science and Technology of China (UESTC) in Chengdu, southwest China's Sichuan province, hit the headlines recently when he wrote a letter to Chinese President Xi Jinping, talking about his team's brain research work and Cuba-China cooperation in science, and Xi replied to his letter.

"I sincerely hope that cooperation between China and Cuba in various fields, including science and technology, will continue to deepen in the new era for the greater benefit of the peoples of both countries," Xi said in his reply, according to Xinhua.

In a recent interview, Valdes-Sosa described his joy on receiving Xi's response as well as a feeling of intense responsibility.

He called his collaboration with UESTC a vivid example of how international partnerships can advance scientific research. He described the collaboration as going beyond publishing research papers. He said it was about developing technologies that can benefit millions of people worldwide.

UESTC is proposing to establish a Belt and Road joint laboratory that will accelerate the detection and prevention of brain diseases and serve people not only in both countries but globally.

He said unlike some Western countries that are making empty promises, China is advancing science and technology

for the benefit of all with its economic strength and commitment to science.

Valdes-Sosa was invited to the first Belt and Road Conference on Science and Technology Exchange in Chongqing where the International Science and Technology Cooperation Initiative was launched.

According to him, science should not be a self-serving endeavor driven solely by personal rewards or national interests. Instead, "we have to make science reach the whole population."

He encourages scientists to think about how their research can lead to increased prosperity, industrial development and improved public health on a global scale.

The "global brain," a collaborative initiative with one of his colleagues in Canada, promotes a more inclusive and cooperative approach to science. It seeks to break the traditional model where scientific research often benefits only a small percentage of people in wealthy countries.

"Fields like medical science should extend beyond major hospitals and focus on preventive medicine at all levels of healthcare," he said, adding that this goal is best realized in socialist countries, where governments prioritize the welfare of their people over the interests of a few.

Valdes-Sosa lauded China for counteracting the historical models of science driven by exploitation and conflict. He sees China's commitment to international collaboration and the Belt and Road Initiative as a pathway to "a better world."

My China Story

Coming to China, Looking for Unique Opportunities

By LONG Yun & GONG Qian

Three years ago, Mr. Matthias Sendzik, a German engineer, embarked on a remarkable journey when he decided to seize what he described as "a unique opportunity" in China and to live and work there.

The story began like this: when he received a job offer from Volkswagen Anhui, one of Sino-German joint ventures in Anhui province, he made his decision to say yes "just within hours" with the support of his family. "People get such an opportunity only once in their lifetime," he remarked.

Keywords to describe China
"The keywords for me to conclude the impressions of China are development, clean air and friendship," he said in a recent interview with *Science and Technology Daily (S&T Daily)*.

He highlighted the readiness of people to offer assistance in daily situations, making him and his family feel at home.

His two sons are studying in Nanjing, an eastern city in China renowned

for its history, culture and progress in science and technology. Sendzik said they have embraced their new lives in China enthusiastically: "They are really happy about [coming to China]. Now they enjoy their life in Nanjing at the university."

Sendzik's experience of working with Chinese colleagues has been one of seamless integration. He leads a team of over 30 Chinese staff and said he is very happy with them. He emphasized their strong work ethics and experience in the automotive development sector and admired their commitment to their work: "I've never seen such hardworking people who put their heart and soul into their jobs."

Sendzik also holds Chinese innovation capability in high regard: "People can develop something completely new with these people in China, whether it's a technique, a product, a way of thinking or a collaboration model."

Safety is a paramount concern for Sendzik and his family. In China, this demand was fully met. He shared that they

feel secure in China at all times, emphasizing the presence of helpful individuals who go out of their way to assist.

The fruits of Chinese modernization

China has proved itself to be one of the most dynamic and creative countries in the world, and its rapid rise in recent years has captured the world's attention.

"In many developments, China's ideas and innovations have prevailed," Sendzik said. He finds Chinese modernization driven by technological progress, political support and market demand.

Anhui is a prime example of how Chinese modernization is benefiting the nation. Sendzik highlighted the development of the automotive industry in Anhui and the emergence of new companies, thanks to the government's efforts to attract businesses to the province. Anhui, he said, has successfully transformed itself into a hub of automotive development and innovation.

Sendzik called Chinese modernization, which aims to improve people's quality of life, going in the right way. He

applauded the punctuality and speed of China's high-speed trains and the versatile mobile payment platforms that facilitate daily activities, from public transportation payments to shopping.

"I even saw the Alipay used in my hometown," Sendzik said, noting that Alipay's influence is expanding worldwide and is transforming the payment landscape.

He is also impressed by the availability of shared bicycles and electric motorcycles in China. According to him, in Germany, regulations limit the use of shared electric vehicles, but in China, they have become a common and efficient mode of transportation, promoting a sense of freedom and environmental consciousness.

"In the future, the Chinese path to modernization will continue to reach 'Chinese speed' in a number of areas," he said.

This article is also contributed by Anhui News English, Anhui New Media Group.



Professor Pedro A. Valdes-Sosa. (PHOTO: XINHUA)

Copper Bird: The Oldest Weather Vane

Traditional Eastern Wisdom

By ZONG Shihan

The world's earliest wind direction instrument, the copper bird, was invented by Zhang Heng (78-139), a renowned scientist in the Eastern Han Dynasty. It resembles a bird made of copper with a short head and a long tail, placed on a straight pole about 16 centimeters high. When the wind blows, the direction pointed by the bird's head is that of the wind.

The design of the copper bird follows the principles of aerodynamics. When the wind blows on the copper bird, it exerts pressure on both the head and tail of the bird. Because the head area is small, the wind pressure is small, while the opposite is true of the tail. As a result, the bird will rotate under the wind torque at the tail. While the bird's head is pointing towards the wind, the force on both sides of the tail is balanced, keeping the bird stable in one position.

An example of the copper bird can be seen on top of the tower in Yuanjue Temple in Shanxi province, which continues to operate efficiently today after 800 years. The bird has three structural features. Firstly, it has a hollow structure, which avoids water accumulation while reducing weight. Secondly, the sur-

face of the copper has been treated so that it has not oxidized for 800 years. Thirdly, the bird stands on an octagonal tower, with each side representing a direction. People can quickly judge the direction indicated by the bird's head to understand the wind direction.

The weathercock invented in Europe in the 12th century is similar in principle to the copper bird, but replaces the shape of bird with a rooster. The rooster has a pointed beak, a small head and a large tail. When the wind blows, the direction indicated by its beak is that of the wind.



The copper bird on top of the tower in Yuanjue Temple in Shanxi province. (PHOTO: VCG)

Language Creates Cultural Bridge

By LONG Yun & BI Weizi

Thirteen years ago, an American teacher and music enthusiast, Parker Trevathan, embarked on an extraordinary journey in China.

Following his heart
Trevathan became deeply immersed in Beijing's vibrant music scene while pursuing a career in education after first arriving in China. "I never planned to focus solely on music as a profession. It's more something I truly love to do," he told *S&T Daily*.

Over the years in Beijing, he grew to enjoy teaching, especially working in a university environment.

Currently, Trevathan is an English lecturer at Tianjin University (TJU). He

explained that the decision to move to Tianjin was a natural one, driven by personal connections. He recalled, "As my fiancée was living in Tianjin and I had made many trips here over the years and grown to like it, it seemed like a perfect choice to move here."

Reflecting on his years in China, Trevathan acknowledges the remarkable changes he's witnessed. "It is hard to pinpoint exactly [the most important changes], but there have, of course, been a multitude of them. A specific change is the improvement in air quality," he said.

Trevathan also noticed the profound impact of science and technology on China's development. "It has undoubtedly affected everyone's life in China, in-

cluding how we travel, work, make purchases, and engage with various institutions," he said. In addition, he highlighted China's status as the most significant contributor to top scientific journals, emphasizing the nation's focus on training young scientists for global engagement.

Using language as a bridge
As a believer in the power of language to be a cultural bridge, and having been involved in teaching English for many years, Trevathan emphasized its pivotal role in "sharing culture."

"It is a massive benefit for my students to improve their English skills to better interact with the international scientific community, thereby promoting exchanges, collaboration, and development," he said.