

INSIGHTS

Investing in Sci-tech Manpower Brings Big Returns

Voice of the World

By Staff Reporters

China ranks first worldwide in the number of full-time equivalent research and development (R&D) personnel. This was confirmed by a report from the Ministry of Science and Technology released on December 15. Published every two years, the report summarizes the latest developments of the country's sci-tech personnel.

As a common international index used to compare scientific and technological manpower input, the number of full-time equivalent R&D personnel in China has increased from 3.25 million in 2012 to 6.35 million in 2022, the report said.

It added that the international academic influence of China's top sci-tech experts has continued to grow, and the number of Chinese scientists added to the global list of highly cited researchers had increased from 111 in 2014, to 1,169 in 2022, ranking second globally.

Contribution to world-class science
According to *Nature Index* following an upward trajectory of scientific productivity that has been gathering



Scientists pollinate wheat at the wheat breeding test field in Xiangyang city, Hubei province. (PHOTO: VCG)

steam for decades, China has reached a new milestone. In 2022, for the first time, the country had the highest share score in *Nature Index* for the natural sciences, surpassing the U.S.

This is not the first time that China has been assessed as the leader on measures of scientific productivity. In 2017, it overtook the U.S. in the total number of scientific publications, according to the US National Science Foundation (NSF). And in 2022, Japan's National Institute of Science and Technology Policy reported that China had surpassed

the U.S. in a key metric that aims to estimate performance in high-quality science: the contribution to papers that rank in the top one percent most-cited publications.

Hamish Coates, a higher-education researcher at Tsinghua University in Beijing, said the past seven years of China's journey towards becoming a scientific superpower have highlighted the "strength of its innovation ecosystem." Chinese research remains undervalued, said Coates, adding that in Western universities, there are many people who

have had passing or superficial engagements with higher education in China or Asia more generally, and have yet to grasp the transformations in play.

Effort and resources drive sci-tech industry

As *Nature Index* reported, the effort and resources behind Chinese science are immense. China's shift towards addressing urgent environmental challenges, such as air and water pollution, green-energy transition and biodiversity loss, has been a major win for researchers. In 2022, China surpassed the U.S. as the leading nation in the earth and environmental sciences (E&E), according to *Nature Index*, owing, in no small part, to the funding and resources the country has poured into fields including the atmospheric sciences, geology and materials science.

When it comes to China's dominance in E&E research, increased funding is only part of the story. Greater numbers of Chinese scientists returning from training abroad have helped uplift the sci-tech sector. *Nature Index* says China's percentage increase in E&E between 2015 and 2022 was the highest among its rise in the four natural-science subject areas covered by the database. The country's share in E&E in 2022 was more than six times that of the UK.

Comment

U.S. Should Remove Blocks on Space Collaboration

By GONG Qian

U.S. Ambassador to China Nicholas Burns recently said that he does not believe that China has shown much interest in working with the U.S. regarding space collaboration. However, the fact is that the U.S. has been impeding cooperation between the two countries.

There is an apparent contradiction that some U.S. politicians emphasize cooperation, while others praise the Wolf Amendment that restricts space cooperation with China and advocate restricting cooperation permanently, said Xu Hongliang, a spokesperson for the China National Space Administration (CNSA), in response to such irresponsible remarks.

"I don't understand whether the U.S. is playing with words or passing the buck," said Xu.

While China and the U.S. established mechanisms such as the working group on Earth science and space science cooperation and the China-U.S. Civil Space Dialogue, it was hindered after the Wolf Amendment passed by the U.S. congress in 2011. It forbids NASA-funded projects with China — unless there is an approval from the U.S. Federal Bureau of Investigation and the U.S. Congress.

The long-standing U.S. law leads to "the absence of any meaningful bilateral and multilateral cooperation between the U.S. and China in space," according to *Harvard International Review*. Furthermore, other legislations such as the U.S. Innovation and Competition Act of 2021 and the America COMPETES Act of 2022 were adopted to limit and thwart space exchanges and cooperation with China.

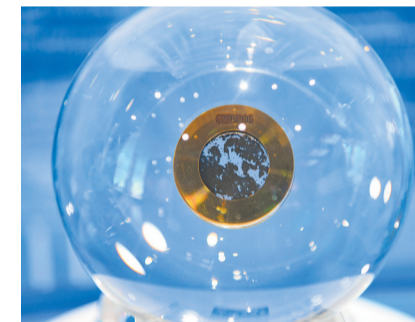
Upholding the Cold War mindset,

the U.S. is provoking a space race. On the contrary, China has always been open to having space exchanges and cooperation with the world. Recently, China issued the announcement of International Cooperation Opportunities for the Chang'e-8 Mission and orchestrated the seventh round of applications for access to Chang'e-5 lunar samples.

According to Xu, China has signed more than 170 cooperation agreements or memorandums of understanding with more than 50 countries, space agencies and international organizations.

China hasn't issued any document, regulation or law to restrict its cooperation with the U.S. If the U.S. truly wanted to advance space exchanges and cooperation with China, it should revoke and abolish relevant legislation, stop irresponsible comments and take practical steps to remove the stumbling blocks on the path towards cooperation, said Foreign Ministry spokesperson Wang Wenbin.

"Orbit isn't a high-ground that one can seize. Instead, space works like a commons, where for any one state or company to be able to operate safely, all have to act responsibly. We need peaceful cooperation to enjoy its benefits," said *Time* magazine.



Chang'e-5 lunar samples. (PHOTO: VCG)

U.S. New Rules on EVs Put its Green Ambitions at Risk

Opinion

By GONG Qian

Electric vehicle (EV) buyers in the U.S. will be ineligible to qualify for a full 7,500 USD tax credit after a new proposed guidance by the Biden administration on December 1, 2023.

The new rules apply to any EV manufactured with materials and minerals originating from a "foreign entity of concern." Washington said it is a move designed to strengthen domestic supply chains for batteries and electric vehicles and ensure the U.S. leads the clean vehicle future.

However, news outlets analyze that the move is targeted at choking China's EV development and will also put U.S. ambitions to drive its green transition at risk.

In the near term, the new rules would lead to fewer car models being eli-

gible for the tax credit. Currently, only about 20 kinds of vehicles qualify for the new rules, out of more than 103 EV models for sale in the U.S., John Bozzella, president and CEO of Alliance for Automotive Innovation, wrote in his blog. Popular models like the Tesla Model Y and Model 3 would be excluded.

Meanwhile, the move may also push up the price of buying EVs. "If you're trying to source all of the components of an EV without drawing on any Chinese content... it's going to be logistically more challenging and likely [to be] a more expensive product at this moment in time," Eli Hinckley, partner at Baker Botts, told the *Financial Times*.

Extremely strict rules would only stifle electric vehicle sales, which in turn hurt the interests of both the consumers and EV manufacturers in the U.S.

In the long term, as a pivotal measure to combating climate change, the rules may hinder the U.S.' green econo-

my transformation, thus delaying its climate change targets.

Unleashing a manufacturing and clean energy boom, and accelerating the production of affordable EVs are a significant part of the Biden administration's agenda, which includes tax credits to incentivize the purchase of new and used EVs to achieve its goal of having 50 percent of all new vehicle sales be electric by 2030.

Now the new rules may cast a shadow over this goal. According to *The New York Times* (NYT), the rules could have a profound impact on the U.S. electric vehicle market, which is rapidly growing — battery-powered vehicles made up about 8 percent of new cars sold in the third quarter. At this rate, it won't be easy for the Biden administration to reach its targets. The new regulations have also raised new questions about whether more stringent supply chain requirements could lead to an increase in

the number of customers who choose to lease vehicles instead of purchasing them, *NYT* reported.

"The EV transition requires nothing short of a complete transformation of the U.S. industrial base. It's a monumental task that won't happen overnight," said Bozzella.

As the world leader in EVs, China has dominance in the manufacturing and trade of most clean energy technologies and production at every stage of the EV battery supply chain, according to *Energy Technology Prospective 2023* by the International Energy Agency. For the U.S., attempting to build its own EV supply chain to supersede that of China is unrealistic.

At a time when the world is facing an increase in the severe consequences of climate change, the U.S. government should abandon its narrow and selfish egoism, and not use EVs as a dangerous political pawn.

Hi-tech

Trimming Branches with Six-pulse Excalibur

By QI Liming

Recently, a video showing a laser cannon being used to trim tree branches went viral on the Internet. In the video, the machine shoots a blue laser beam and the branches on the tree are cut off, making netizens marvel that "science fiction has become a shining reality."

The laser cannon, also known as the laser obstacle remover, is a new product developed by a Chinese compa-

ny. It consists of five parts: a power supply unit, a laser generating device, a laser emitter, a PTZ (pan-tilt-zoom) head for targeting, and a laptop that can be operated remotely.

The principle of laser pruning is to shoot a laser beam of a certain power and bandwidth at the branch from a certain distance to achieve the cutting effect.

With the help of the high-precision PTZ, the machine automatically plans the path of the beam for cutting and can

hit a target tens of meters away. In addition to pruning branches, this laser cannon can also be used to destroy hornets' nests.

While improving efficiency and reducing operational risks, this equipment has strict control and operation procedures. When it is in operation, once a person or animal is identified in the path of its beam, it will immediately stop emitting light, causing no harm. To ensure safety, device operators must undergo training before operating it.



The laser obstacle remover trims the branches. (PHOTO: Red Coast Base Company)

Shoulder Bag Heats Your Meal Anywhere

By Staff Reporters

If your office doesn't have a microwave, now a Willcook "microwave" shoulder bag, which only weighs 160 grams, could help to heat your food. Different from a cordless microwave, which runs on power tool batteries, the Willcook delivers a hot meal without need-

ing access to kitchen appliances or a roaring fire.

Although described as a "microwave" bag, the bag doesn't actually use the same technology as microwave ovens. Instead, it is made from woven fabric powered by an external battery. The fabric looks and feels no different to regular fabrics and can even be cut, sewn

and washed without affecting its functionality.

The bag includes a rechargeable battery, which fits into a small external pocket attached to the bag and provides the power to heat the meal or beverage.

The interior of the bag can reach a temperature of 80 °C in just five min-

utes, and the battery life depends on the temperature to be maintained inside the bag.

There are no controls on the bag as turning it on and off and making temperature adjustments is done through a mobile app. The user can also use the app to check the remaining battery life while the bag is heating.

IUSTC International Union for Science & Technology Communication

Promoting Open Science for All

By TANG Zhexiao

As a prelude to the closing ceremony of the International Year of Basic Sciences for Sustainable Development, the United Nations Educational, Scientific and Cultural Organization (UNESCO) launched *Open Science Outlook 1* report in Geneva on December 14, 2023, marking the first endeavour to assess the status of open science at global level.

Adopted in 2021, the UNESCO Recommendation on Open Science defined "open science" as an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society.

It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities.

To reach its full potential as a global equalizer, open science will need commitment from all. According to the report, open science practices are on the rise but access to participation in and sharing of the benefit from open science are uneven across the world.

Though most researchers are positive about open science, they are actually coming across obstacles in practical practices such as sharing data, software and methods results.

According to a senior U.S. science official, science funders in the U.S., UK and Canada planned to set up a network

to share information about security risks affecting international research projects.

Leading U.S. academics thought such tougher controls would restrict the ability of American scientists to collaborate with partners abroad, said Richard L. Hudson, editorial director of the *Science Business*, in December 2023.

Moreover, for open science to reach its full potential, it must be a truly global equitable phenomenon. The report points out that gaps persist along existing socio-economic, technological and digital divides among countries.

Open science can be a powerful tool to bridge these existing science, technology and innovation gaps, according to UNESCO.

Jonathan Bagger, CEO of American Physical Society, said that open science creates and fosters an environment in which anybody in the world can participate in science.

For some scientific fields, the requisite infrastructure would be nearly impossible to create, host and maintain by one nation alone. From the High-Altitude Water Cherenkov Gamma-Ray Observatory (HAWC) that is supported by more than 30 universities and scientific institutions from eight countries, to the national-coordination level project Square Kilometre Array Observatory (SKAO), which currently involved 16 countries, these shared scientific infrastructures are vivid examples of scientific collaborations.

It is clear that collective, collaborative and coordinated action and investment can accelerate the transition to a truly global, equitable open science, as the examples show.