

# Green Development in China Reshapes the World

## Dialogue

By LONG Yun & DAI Xiaopei

Erik Solheim, co-chair of Europe-Asia Center and former under secretary-general of the UN and executive director of the UNEP, is vocal about China's global role.

Recently, following his participation in the "Understanding China" conference in Guangzhou in southern China, he posted on X that "the rise of China is the most peaceful rise of a major power in history. China has brought everyone out of (extreme) poverty and helped other nations grow."

In an interview with *Science and Technology Daily* in Beijing on December 5, the same day the *Global Environmental Think Tank Development Report 2025* was released, Solheim went beyond these broad statements to offer detailed, firsthand observations on what he sees as China's real contributions to sustainability, the persistent misconceptions in the West, and how the world should respond.

"China is now the total dominant force in all green technologies," he said. "China is the indispensable nation for the green transition, producing 60 percent or more of renewable energy, electric vehicles and batteries. In terms of the solar energy field, that share reaches 90 percent."



Erik Solheim. (COURTESY PHOTO)

He cited specific companies as proof of this leadership. "Chinese companies in electric cars and batteries are the world's leading players. So driving the technology and making the production at scale of all these technologies is the number one contribution," he noted.

In addition, China's environmental progress is not limited to industry. "China is also the biggest tree planter in the world. It has announced the largest national park system in the world, which is, up to now, the most significant."

He described a dramatic transfor-

mation in everyday environmental conditions. "Ten years ago, I would never have gone running in Beijing. It was polluted. Now the sky is blue, the sun is shining, and the air is fresh."

For Solheim, technology and the protection of nature are the two most important pillars to sustain China's ecological development.

He expressed frustration that many in the West remain unaware of this shift. "Many people are not following the news, so they remain in the past. They have seen pictures of Beijing with heavy pollution, and they believe that is

still the case. They haven't really refreshed their minds."

He also pushed back against the notion that China's green manufacturing dominance stems from low labor costs. "It is not because salaries are low in China. It is because China is super-efficient and has the most robots, the most efficient production anywhere in the world."

His recommendation to Western governments is pragmatic: embrace Chinese investment. "My main suggestion is to invite more Chinese companies to invest in Europe, in the U.S., but of course also in Africa and everywhere else, because then these companies will bring the technology and this business practice, and we can learn from it."

On the global stage, Solheim emphasized China's deepening ties with the rest of the developing world. He argued that this economic centrality positions China to help reshape global governance. "China is absolutely critical for trade, for technology, for economic prosperity, and for green development. But China can also help establish a new, fairer global system."

The current global system has been fundamentally dominated by the U.S. up to now. "To build a fairer order, China needs to work with India, Indonesia, Brazil, and all the other nations of the Global South to establish a fairer global system that is representative of the 21st century."

## Tech+Culture

# Ancient Tibetan Papermaking Lives on

By Staff Reporters

Located at nearly 4,000 meters above sea level, Awang Quyang, 46, is testing a new plant-based dye for Tibetan paper. As a fifth-generation inheritor of the Zhigong Gaxiu Tibetan papermaking technique, listed as a municipal-level intangible cultural heritage in Lhasa, he has helped adapt the ancient craft for modern use.

The workshop, in Tangjia township, Mozhugongka county, Xizang autonomous region, has walls displaying sheets of colored paper, from deep red to indigo, some printed with classical Tibetan scriptures, others with contemporary designs. Nearby are notebooks, pen holders, lanterns, and other products made from this paper, showing how a 1,300-year-old tradition is finding new relevance.

Tibetan papermaking dates back to the 7th century. The unique method has been passed down within one family since the 11th century. Many historical texts preserved in the Potala Palace and Jokhang Temple were written on this paper.

"The paper can last hundreds of years without rotting or being damaged by insects," said Quyang, holding a well-preserved sheet made with traditional methods. The key lies in its raw material: the root of the Langdu plant (wolfbane), which is naturally toxic and insect-resistant. The process involves more than 10 steps, peeling, boiling, pulping, forming and drying, resulting in paper that is durable, resistant to decay and hard to tear.

For Quyang, the craft carries cultural meaning. "Every step reflects respect for nature and tradition," he said. "We turn a poisonous plant into something useful, a practice built on generations of knowledge."

While keeping core techniques unchanged, Quyang and his team now use eco-friendly dyes, expanding the paper's color range from the original earthy yellow to 12 different shades. They have also developed a version with a leather-like texture.

Quyang began learning papermaking from his father as a teenager. In 2001, while working at a paper mill run by the Caiquan Welfare Special Education School in Lhasa, he traveled to Nepal to study Tibetan paper dyeing. After returning, he introduced what he learned and, in 2013, began his career in Tibetan papermaking in his hometown to continue the tradition.

Recently, his nephew Dainzin Norbu, a 23-year-old computer science graduate, joined his team. "We're developing AR postcards," he said. "When scanned, they show animations of the papermaking process and its history." He believes intangible heritage must connect with young people through new technologies.

Two local youth at the cooperative can now complete the full papermaking process on their own. "This skill has been passed down for generations—not just as a craft, but as part of our identity," said Quyang. He plans to build a hands-on workshop to let more people experience the technique directly.



An inheritor makes Tibetan paper in Lhasa, southwest China's Xizang autonomous region. (COURTESY PHOTO)

# No Shortage of Food for Taikonauts

## Science Outreach

By Staff Reporters

In 2025, an unexpected delay to the Shenzhou-20 mission gave the public their first close-up of China's space station's logistical support capabilities. As the taikonauts' scheduled return time was extended, concerns arose. Was there enough food? Was there enough water? Could their basic needs be met?

However, Wu Dawei, deputy chief designer of the astronaut system at the China Astronaut Research and Training Center, quickly dispelled these doubts with the following response: "The space station's food and living supplies are more plentiful than

you can imagine."

This wasn't just some ad hoc response, but rather the result of careful planning and preparation. Even the laboratory mice in orbit was included in the allocation of supplies, they got the taikonauts' soy milk. The mice eventually returned to Earth healthy, proving the success of the experiment and reflecting the space station's flexible and efficient resource management.

Contrary to popular belief, space food on the Chinese space station is no longer limited to processed food in toothpaste-like tubes or compressed biscuits. Today, the taikonauts' menu exceeds 190 items. Every food item is scientifically categorized and stored. Most are processed using high-temperature sterilisation in soft cans or freeze-drying technology, which allows them to be stored at room temperature for over a year.

These foods are stored in cargo bags in the space station. Fresh fruit and vegetables, such as apples, tomatoes and lettuce, are regularly supplied by the Tianzhou cargo spacecraft and stored in specially designed refrigerators at a temperature of 2-4 °C. Developed by a Chinese company, this refrigerator is lightweight, energy-efficient and impact-resistant, and can be remotely monitored to ensure the freshness of the ingredients.

But why go to such great lengths to ensure good quality food? It's because the effects of the space environment on the body far exceed what people imagine.

In weightlessness, for example, the rise of bodily fluids can lead to a decrease in taste and smell of over 30 percent, which can make astronauts prone to a loss of appetite. Therefore, the menu includes strongly flavoured foods such as Sichuan cuisine, chilli

sauce and rich soups to stimulate appetite. The nutritional design is also extremely precise: high protein to prevent muscle atrophy, high calcium and vitamin D to combat approximately one percent monthly bone calcium loss, low sodium and high potassium to protect the cardiovascular system and dietary fibre to alleviate slowed intestinal motility. Every meal is the result of scientific calculations.

The reason the Chinese space station's material reserves are "more plentiful than you can imagine" lies in its highly systematic support system. Every link has undergone repeated verification, from the regular resupply of the Tianzhou spacecraft and the intelligent management of on-orbit supplies to long-term food preservation technology and emergency allocation mechanisms. Even the soy milk consumed by the mice is part of this coordinated operation.

# Zhoubi Suanjing: Fundamentals of Astronomical Calculations

## Traditional Eastern Wisdom

By BI Weizi

The Zhoubi Suanjing (The Mathematical Book on Gnomons and Circular

Paths), written around the 1st century BC, is the oldest surviving Chinese book on the fundamentals of astronomical calculations. The book is known for its early use of the Gougu theorem (a Chinese version of the Pythagorean theorem), along with its detailed astronomical and calendrical methods. It is one of the 10

classic books on mathematics from ancient China.

The original preface explains that the word zhou (周) refers to the Zhou dynasty (11th century-221 BCE). However, zhou also means "circuit, circle, round", thus referring to astronomical movements. The word bi (髀) means "thigh" (gu). Together with its shadow, referred to as a "hook" (gou), the two sides of a right-angled triangle (or a carpenter's square) are formed (the adjacent and the opposite). Using these two pieces of information, the length of the hypotenuse can be calculated. This formula corresponds to the Pythagorean theorem (modern term: gougu dingli).

Mathematically, the book covers fractional multiplication and division, arithmetic sequences, methods for calculating the circumference of a circle, linear interpolation, extracting square roots from arbitrary positive numbers, representing decimal fractions using remainders and the earliest recorded use

of the Pythagorean theorem.

Despite containing errors and rough approximations, such as assuming the Earth to be flat and using this model to infer celestial phenomena, the Zhoubi Suanjing occupies an irreplaceable position in the history of Chinese astronomy.

The book's pioneering use of the "gougu" theorem and observational measurement techniques greatly influenced later mathematicians, who further developed and applied these methods. From the Tang (618-907 CE) and Song (960-1279 CE) periods onwards, the Zhoubi Suanjing was formally included in the imperial curriculum as an official mathematics textbook, contributing significantly to the evolution of Chinese mathematical thought. The book also spread beyond China. During the Tang dynasty, it was introduced to Japan and became one of the official mathematics textbooks, thereby extending its influence further into East Asia.

# Long High-pressure Steel Pipes Now Homegrown

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## Forging long steel billets

The forging of steel billets was the next challenge. The first time, due to the slower lifting speed, the billet hardened before being fully forged to the set length, because of the rapid drop in temperature. After much deliberation, Xu Ruibing, the senior engineer at NHIG, decided to take a two-pronged approach, optimizing the processing technique and controlling the cooling time.

The core difficulty lay in temperature control. Xu believes that only by achieving precise temperature control during the processing, can engineers ensure that the billet does not cool down before being drawn to a sufficient length.

Relying on the vast amount of data in manufacturing steel pipes, the team developed an intelligent temperature control system. It models through complex algorithms, monitors the temperature of each part of the steel billet in real time, and precisely regulates the processing method based on the temperature.

The team further optimized the processing technology, and soon after that the first ultra-long billet that met the requirements was delivered.

## Drilling and grinding

The steel billet is solid. It needs to

be drilled from both ends to form a uniform, smooth and straight circular channel. Then, its surface is ground to finally form a steel pipe.

The allowable deviation of concentricity at both ends of a 17-meter-long steel pipe is thinner than a person's fingernail, Xu explained, to demonstrate the difficulty of the task.

Through countless attempts and improvements, the NHIG developed an extremely rigid deep hole drilling machine system, and drill pipes specifically for super-long steel pipes.

The machine system features excellent shock absorption performance and stability, effectively resisting the deflection of drill pipes caused by gravity, said Xu, adding that the drill bit is made of super-hard materials with special geometric design. Its ability and efficiency to drill deep holes in hard steel have been significantly enhanced.

The team also developed a deep hole honing machine specifically for extra-long steel pipes. Using the mentioned deep-hole drill pipe, grinding stones of different specifications were sent into the deep hole for precise honing. Eventually, the inner side of the 17-meter-long pipe ultra-high pressure pipe was polished as smooth and flawless as a mirror, signaling that it was ready for service.



The Zhoubi Suanjing is on display at the National Museum of Chinese Classics in Beijing. (PHOTO: VCG)