

Editor's Note

From accurate weather forecasts to epidemic prevention and from clean ice-making technology to AI sign language interpreter, the Olympic Winter Games Beijing 2022 demonstrate a high level of technology in all aspects.

As President Xi Jinping emphasized when inspecting the preparatory work of the Games, in today's world, the role of science and technology in competitive sports is becoming increasingly prominent. To build a strong sporting country, it is necessary to achieve a high level of self-reliance and self-strengthening in sports science and technology.

Sci-tech innovation has been a distinctive feature of Beijing 2022 during its entire preparatory process. Technological innovation has supported the realization of the green Olympics. From venue construction and event organization to logistical services, a host of low-carbon, environmentally-friendly new technologies and applications were developed, which help ensure the smooth operation of the Games.

Even after the Games, these innovative technologies will be applied to various fields of economic and social development, to further promote the country's sustainable development and bring long-lasting benefits for the people.

We believe, with these precious sci-tech legacies, Beijing 2022 will be a model of presenting sustainability to the world.



Nucleic Test System for Indoor Olympic Venues

A bioaerosol nucleic acid detection system was specially developed to serve Beijing 2022 by Chinese researchers.

The system consists of two parts, namely a portable aerosol collector and a novel Coronavirus nucleic acid detector with high sensitivity.

After the samples are collected, the test results will be directly displayed on a screen through the novel Coronavirus nucleic acid detector.

The whole process is all done automatically. The specially designed system is lightweight and can collect aerosol particles up to 12 cubic meters in half an hour.

The system has been tested and verified in five Olympic venues and the main media center, and hundreds of samples have been collected at test events.

In the near future, this system can serve the Beijing Winter Paralympics. In the days to come, the system will also be used in large conference venues, terminals, train stations and other crowded closed places.



AI Auxiliary System Provides More Accurate Weather Forecast

In order to help Olympians perform well at the games, the Artificial Intelligence (AI) "model output machine learning" (MOML) algorithm empowers the weather prediction model to make the forecast more accurate.

At present, MOML algorithm has made breakthroughs in the forecast of temperature, humidity, wind speed, wind direction and other weather factors. It is able to improve the accuracy of forecasts by more than 10 percent compared with conventional methods.

It is understood that Beijing 2022 has realized the short-term meteorological near forecast "100-meter scale, minute level update."

The technology is expected to boost the development of winter sports in post Beijing 2022. At the same time, it could play a more important role in exploration, search and rescue, disaster prevention and other fields in the future.



AI Sign Language Interpreter Facilitates Olympics Broadcasting

Lingyu, a 3D AI sign language interpreter developed by Tencent, was seen interpreting for the hearing impaired when China won its first gold medal at Beijing 2022.

Over 90 percent of Lingyu's interpretation is understandable, which places her as a leader in technical ability in the industry.

A vocabulary of more than 1.6 million, including phrases and sentences targeted for sports events are included in Lingyu.

Lingyu first produces highly accurate sign language representation, then conducts joint modeling and prediction to generate sequences of actions, facial expressions and lip movements, thus generating a natural, and highly understandable sign language presentation.

Lingyu can also quickly acquire new words and learn relevant knowledge, which improve the accuracy.

AI sign language interpreters can be used in more scenarios such as live-stream and e-commerce in the future.



Artificial Snow for Beijing 2022 Meets the Goal of a Green Olympics

Artificial snow has been widely used in Olympics since Lake Placid in 1980. To ensure the success of a competitive surface, about 80-90 percent of Beijing 2022 venues are using artificial snow.

Many athletes such as Australian snowboarder Matt Cox and New Zealand gold medal winner Zoi Sadowski Synnott, have praised the snow.

The whole process of snow-making at Beijing 2022 is using 100 percent renewable energy, presenting the world with a green Olympics. The water snow gun used is from rainfall and surface run-off, pumped from nearby reservoirs and water plants.

Most of the snow will melt into water and flow back from where it originates, and the rest will be captured and reused for snow-making, irrigation and other uses.



New Ice-making System Brings Better Scores

Since the start of Beijing 2022, many long-held records have been broken in the National Speed Skating Oval. New technology's contributions have not gone unnoticed.

The technology of developing a carbon dioxide transcritical direct cooling ice machine system was adopted for the first time in Winter Olympics history. By burying a steel tube under the two to three centimeters thick ice surface and letting liquid carbon dioxide flow through it to create heat exchange, the temperature difference of the ice surface can be controlled within 0.3-0.4°C. The smaller the temperature difference, the more stable the hardness of the ice surface is, which is more conducive to skating.

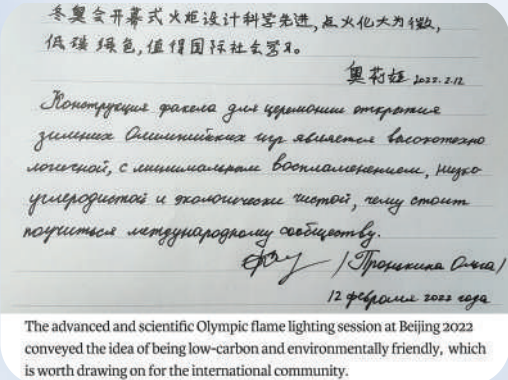
Besides, using carbon dioxide as the cooling material is also low-carbon and energy-saving. The greenhouse gas it produces is far less than using any other freezing medium.



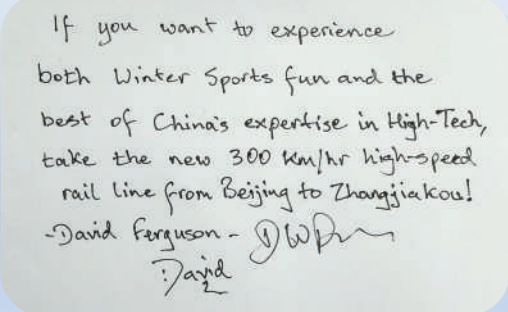
Expat's Regards



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All Photos: S&T Daily, Xinhua and VCG

Post-Games Legacy Creates Sustainable Benefits

The scientific and technological achievements such as 5G studio in high-speed trains, zero-gravity beds, and smart restaurants with robot chefs have become eye-catching highlights of Beijing 2022.

Even after the Games, these technologies will boost the nation's sustainable development, creating lasting benefits for the people in the host cities and regions.

In fact, from assisting winter sports promotion to boosting economic opportunities and proposing sustainable solutions, Beijing 2022 has already begun bringing benefits to the people.

Intelligent robots' vital role

At the opening ceremony, the most eye-catching one is the first ever underwater Olympic torch relay between two submersible robots.

During the Games, various intelligent robots have worked hard to provide contactless services.

Robot chefs are deployed in smart restaurants at the main media center to minimize contact. Once the meal is ready, the AI system plans out the optimal route, and the dish will be transported on a track and arrive at the ta-

ble. Smart burger machines, automatic woks, and robot bartenders are also common sights.

To meet medical security needs at the Games, the intelligent medical robots provide emergency medical protection and service in competition zones.

Robots perform more effectively in epidemic prevention and control. AI-powered disinfection robots with a long battery life, automatic obstacle avoidance and self-charging function, have provided various contactless services at competition venues, saving a lot of manpower. They will be widely used in cleaning and disinfection of public areas after post-Games.

Sustainable competition venues

Beijing 2022 aims to create abundant new legacies from the Games. Besides making good use of existing facilities, the newly-built ice and snow venues will be open to the public for free or at low prices.

By making use of natural carbon dioxide cooling technology for the first time, the National Aquatics Centre (known as the Water Cube) will continue to host ice sports, swimming events and large cultural performances, offering both multi-purpose and long-term

use.

Owning two venues of the National Alpine Skiing Centre and the National Sliding Centre, Yanqing competition zone will expand its tourism to outdoor culture, leisure and sports activities and offer opportunities for both summer and winter sports when the Games are over.

The non-competition venues will also leave an impact on their surroundings. The main media center will continue to operate as a conference and event facility, while the Yanqing and Zhangjiakou Olympic Villages will become hotels, apartments and a business cluster to serve the region's booming winter sports.

Green legacy for society

The green legacy of Beijing 2022 will also boost sustainable development.

Accelerated by the Games, the Zhangbei flexible direct current grid project uses wind and solar energy to transfer electricity from Zhangjiakou to Beijing. It will continue to deliver clean electricity to Beijing residents and boost the city's use of clean energy after the Games, expecting to save 49 million tons of standard coal and 12.8 million tons of carbon

dioxide emissions each year, according to official data.

Sustainable transports facilities are also a legacy of the Games. At Beijing 2022, fuel-efficient vehicles account for 100 percent of all passenger cars and 85 percent of all vehicles. After the Games, the charging facilities built at competition venues and along roads between Beijing and Zhangjiakou will be operated for community use, meeting the energy supply-demand needs of hydrogen fuel and pure electric vehicles in the future.

After Beijing set a target to hold a high-tech Winter Olympics, 133 types of technologies in a number of key areas have been applied in the early part of 2021. Since October last year, another 228 technologies have been tested and applied in test events, athlete training schedules and preparatory work for the Games, according to Wu Yuanbin, an official from the Ministry of Science and Technology.

These dazzling technologies, some of which haven't been widely applied in our people's lives yet, have received increased exposure through Beijing 2022 and expects to create more benefits for Chinese people and the global community.