北京冬奥会的人造雪获运动员盛赞：迄今为止最好的 Beijing 2022 gets high marks for sustainable artificial snow

滑雪运动员们能在冬奥雪场上顺利做出各种高难度动作，这背后有一个默默无闻的功臣，那就是人造雪。本届冬奥会的人造雪质量稳定，无毒无害，获得了多位运动员及官员的好评，更有运动员表示"这是迄今为止滑过的最好的人造雪"。

A staffer monitors the snow-making process at the Yanqing National Alpine Skiing Center in Beijing. [Photo/IC]

Beijing normally doesn't have much snow in winter, so artificial snow is being used at venues for the Beijing 2022 Olympic Winter Games, with the quality of the white snow drawing praise from many athletes, and even officials.

北京的冬天一般降雪量不大，因此 2022 北京冬奥会的比赛场地使用了人造雪，这些洁白的人造雪的质量获得了许多运动员和官员的称赞。

Artificial snow gives the courses a better and more stable quality.

人造雪给比赛现场带来了更好更稳定的质感。

"This is by far the best man-made snow I've ever skied on," American freestyle skier Ashley Caldwell said at a press conference.

美国自由式滑雪运动员阿什利·考德威尔在一次新闻发布会上表示："这是我迄今为止滑过的最好的人造雪。"

After receiving feedback from many athletes through the training period and first days of competition, Kit McConnell, sports director of the International Olympic Committee, said the participants believe the artificial snow is outstanding.

国际奥委会体育总监基特·麦康奈尔在训练期间和比赛前期收集许多运动员的反馈后表示，运动员认为这些人造雪非常出色。

"The focus is on doing this in a sustainable way, and also ensuring the athletes have an outstanding field of play on which to compete at the Olympic level," McConnell said.

麦康奈尔称："主办方致力于用可持续的方式来生产人造雪，同时确保运动员拥有奥运竞技所需的绝佳比赛场地。"

Athletes have told Bernhard Russi, chairman of the International Ski Federation's alpine committee, that the man-made snow was easy to ski on.

运动员们告诉国际滑雪联合会高山滑雪委员会主席伯恩哈德·鲁西说，在这些人造雪上滑雪很轻松。

Russi, also a former Swiss World Cup alpine ski racer and one of the course designers of the Yanqing National Alpine Skiing Center in Beijing, told China Central Television: "I think for the skiers it's just like paradise."

鲁西告诉央视记者说："我认为对于滑雪运动员来说，在这种人造雪上滑行就像在天堂一样美妙。"鲁西曾经是瑞士高山滑雪运动员，也是北京延庆国家高山滑雪中心的赛道设计者之一。

"In order to have a perfect course for alpine racing, you need man-made snow to get the quality right – compact snow for the power which these racers are able to put down on the snow," Russi said.

鲁西说："为了营造出适合高山滑雪比赛的完美赛道，你需要使用人造雪来保证赛道质量——雪必须十分密实，能承受运动员对雪地的压力。"

Although sometimes mixed with natural snow, artificial snow has mostly been used in competitions in the past five to 10 years, he added.

鲁西补充道，尽管有时雪场上也混杂了天然降雪，但是过去五到十年来滑雪比赛中用的大多是人造雪。

Snow-making machines were first deployed at the Lake Placid 1980 Winter Olympics in the United States. At Sochi 2014 in Russia, 80 percent of the snow was artificial, and the figure was 90 percent at Pyeongchang 2018 in South Korea.

1980 年美国普莱西德湖冬季奥运会首次配置了造雪机。2014 年在俄罗斯索契冬奥会上，赛场上 80%的雪都是人造的，到了 2018 年的韩国平昌冬奥会这一数字达到了 90%。

A machine makes snow at the Yanqing National Alpine Skiing Center. [Photo/IC]

Cooled water and compressed air are mixed in the snow cannon and shot out into water droplets at an angle. With the help of low temperatures, these droplets will become ice crystals.

冷却的水和压缩空气在造雪机中混合后倾斜喷射到水滴中。在低温作用下，这些水滴就会凝结成冰晶。

There are totally nine types of snow made by snow machines, with different water content. The smaller type number is closer to powder snow. The larger number means the snow is wetter.

Drier snow is used in the daytime, while No. 7 or No. 8 snow is used during the nighttime with over minus 20 degrees Celsius.

依据水质的不同，造雪机一共可以造出 9 种雪。编号数字越小，越接近粉状雪。编号数字越大，说明雪的湿度越大。比较干的雪在白天使用，而 7 号和 8 号雪在气温零下 20 度以上的夜间使用。

The use of different types of snow is factored in what's needed for each sport.

具体使用哪种类型的雪，要由各种运动项目的需求而定。

"In most cases, No. 5 snow is used," revealed Wei Qinghua, mountain operation manager of the Zhangjiakou Guyangshu venue cluster for Beijing 2022.

2022 北京冬奥会张家口赛区古杨树场馆群的运行场地经理魏庆华透露说："大多数情况下都使用 5 号雪。"

On November 7, during the preparation for the Games, Chongli District in Zhangjiakou saw its first snowfall this winter.

11月7日，在冬奥会筹备期间，张家口崇礼区降下了这个冬天的第一场雪。

But the 20-centimeter-thick snow was cleaned up, because it would be more dangerous to use natural snow as it falls off more easily and brings safety risks.

但是20厘米厚的天然雪都被清理掉了，因为使用天然雪更危险，原因是天然雪更容易塌陷，会造成安全隐患。

The snow machines work round the clock, so the staff work in three shifts.

造雪机昼夜不停地工作，工作人员也是三班倒。

However, there are concerns regarding the environmental hazards of using so much water for snow-making.

然而，有人担心使用这么多水来造雪会危害环境。

The snow machines at Beijing 2022 have completely used renewable energy since the beginning of snow production.

其实，从一开始，2022 北京冬奥会的造雪机使用的就全都是可再生能源。

"Water used for snow-making only comes from rainfall and surface runoff, and it can be recycled," Wei pointed out.

魏庆华指出："造雪只用来自降雨和地表径流的水，而且这些水都是可循环利用的。"

"For water from melted snow, we have a reservoir and two lakes which can store it so that it can then be used for agriculture, irrigation, tourism and landscaping."

"雪融化后变成的水会流入一个水库和两个湖储存起来，这样以后还可以用于农业、灌溉、旅游业和景观美化。"