Top-ranking technology: solutions designed to address major challenges

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Milan-Cortina 2026
The technology behind the Games

The countdown has begun: from 6 to 22 February, the spotlight will be on the 25th edition of the Milan-Cortina 2026 Winter Olympic Games, followed by the Paralympic Games from 6 to 15 March. For the occasion, all eyes will be on Italy, which, in truth, is already well prepared for this event. The first time was in 1956, when Cortina hosted the 7th edition of the Games; the second was half a century later, in 2006, when Turin and the Piedmont mountains took centre stage at the 20th Winter Games. As the excitement builds for the return of the Olympic flame to Italy, a symbol of peace and brotherhood among peoples, the work is in its final stages, with extensive technological innovations in the name of sustainability, energy efficiency and optimal snow and ice conditions for athletes, and the restoration of historic symbols of the past, such as the iconic 1956 Cortina ski jump.

Milan-Cortina 2026 brings with it something unique, even in its name: Milan, the metropolitan capital of culture, fashion, innovation and economics, joins forces with the pearl of the Dolomites, which, thanks to their unique natural architecture, contrasting colours and breathtaking views, have been a UNESCO World Heritage Site since 2009.

This will be a particularly widespread edition, because in addition to the two leading cities, three regions are involved – Lombardy, Veneto and Trentino-Alto Adige – covering a total of 22,000 square kilometres of territory. There will be over 90 participating countries, more than 3,500 Olympic and Paralympic athletes, 16 Olympic sports and 6 Paralympic sports, with 195 medals to be awarded. New for this edition: the debut of ski mountaineering.

A laboratory of sustainability

From the very outset, Milan-Cortina 2026 has operated according to a strategy of **sustainability**, **impact** and **legacy**. The design choices aim to reuse existing structures, reduce environmental impacts and create a lasting legacy for the territories. For example, in Milan, the Olympic Village built in the redeveloped area of the Porta Romana railway yard will become a large student residence after the event, while iconic slopes such as the Olympia delle Tofane and the Stelvio di Bormio will remain centres of excellence for skiing, combined with a vision of responsible tourism and circular economies.

Overall, Milan-Cortina 2026 has selected 11 SDGs (UN Sustainable Development Goals) as priorities, integrating them into its operating model and reporting system.

The sports

Biathlon*
Bobsleigh
Nordic combined
Curling*
Freestyle
Ice hockey*
Figure skating
Speed skating
Ski jumping
Ski mountaineering*
Alpine skiing
Cross-country skiing*
Short track
Skeleton
Luge
Snowboarding*

* Also Paralympic sports

Competition venues

LOMBARDY
Livigno Aerials & Moguls, *Livigno*
Livigno Snow Park, *Livigno*
Milan Ice Skating Arena, *Milan*
Milan San Siro Olympic Stadium, *Milan*
Milan Santagiulia Ice Hockey Arena, *Milan*
Milan Speed Skating Stadium, *Milan*
Milan Rho Ice Hockey Arena, *Milan*
Stelvio Ski Centre, *Bormio*

TRENTINO ALTO-ADIGE
Anterselva Biathlon Arena, *Anterselva*
Predazzo Ski Jumping Stadium, *Predazzo*
Tesero Cross-Country Skiing Stadium, *Tesero*

VENETO
Cortina Curling Olympic Stadium, *Cortina d'Ampezzo*
Cortina Sliding Center, *Cortina d'Ampezzo*
Tofane Alpine Skiing Centre, *Cortina d'Ampezzo*
Verona Olympic Arena, *Verona*

The great journey of the Olympic flame

The journey of the flame begins on 26 November with the lighting ceremony in Olympia (Greece), arriving in Rome on 4 December. From there, it will set out across the country, carried by 10,000 torch-bearers over a distance of 12,000 km. The relay will involve 60 stages and will conclude in Milan with the opening ceremony on 6 February 2026. Highlights of the journey include its arrival in Naples on Christmas Day, the welcome of the new year in Bari and, on 26 January, a stop in Cortina to commemorate the 70th anniversary of the Opening Ceremony of the 1956 Winter Olympic Games.

Sources:
www.olympics.com/it/milano-cortina-2026

The technology **behind the Games**

It is difficult not to be captivated by the sight of athletes racing down the slopes or gliding elegantly across the ice, with dizzying descents, technical manoeuvres and time trials. We rarely stop to consider that behind all this lies a world of logistical and technological solutions designed to ensure safety, performance and operational continuity. Behind the Milan-Cortina 2026 games there is also a complex system of ski slopes, ice rinks and Olympic villages that demand efficient facilities and the expertise of technicians, engineers and industrial suppliers.

The unseen protagonists of the Winter Olympic Games also include **electric pumps**, which are essential for **artificial snowmaking**, **ice rink cooling**, **fire protection systems**, **drainage**, **wastewater treatment**, as well as for **heating** and air **conditioning** at the sports facilities and Olympic villages.

For these critical functions, Caprari has established itself as an industry leader thanks to its expertise in fluid-mechanics gained over decades of experience and its unique ability to deliver solutions for complex systems, such as those created for international events of this scale.

The engineering challenges are considerable and require highly reliable solutions: this is why it is essential to support OEMs with high-performance products and specialised assistance. This is the only way to create systems capable of operating continuously, even in variable climatic conditions and under extreme workloads.

It is within this context that the quality of the pumps and expertise in integration become crucial, enabling OEMs to develop safe, efficient and high-performance systems. This is where sport meets innovation, transforming the Olympics into not only a stage for thrilling competitions, but also a genuine technological laboratory. Caprari has already contributed to several editions of the Winter Olympic Games with its solutions. This is due to its role as a reliable partner for leading OEM companies that manufacture snowmaking applications, for which it is capable of supplying the most suitable and high-performance technology at every stage of the system, from water extraction to pumping and line feeding.

COMPREHENSIVE ALL-ROUND SUPPORT FOR OEM CUSTOMERS

► Technological innovation

► A customer-centric approach and customised solutions from the design stage onwards

► Excellent product lead times

► Qualified assistance and immediate availability of original spare parts

REQUIREMENTS FOR "OLYMPIC" PUMPING SOLUTIONS

► Reliability and continuity of service

► High hydraulic performance

► Energy efficiency

► Resistance to high pressures and extreme conditions

► Ease of maintenance

How water becomes snow

The Olympic Games require the slopes to be usable for the entire duration of the event, with uniform competition conditions and guaranteed safety for the athletes. However, the magic of having perfectly snow-covered slopes wouldn't be possible without pumps. In fact, climate change has made it increasingly essential to use systems designed to transform water into artificial snow. This is also known as automated snowmaking, because these systems start automatically when the right conditions are detected: sub-zero temperatures, low humidity and no wind.

In the transformation of water into snow, pumps are used both in the phase of collecting the water from storage basins and conveying it to the snowmaking system, and in pressurising the snow generators. Perfectly sized, high-performance pumping solutions are required at every point in the system to meet the water-related challenges present at high altitudes.

Snowmaking systems require:

► high operating pressures, constant flow rates even at significant differences in height, and intensive 24-hour operation during cold periods;

► resistant materials and guaranteed operation even with impurities present in the natural water;

► reduced and simplified maintenance, thanks to a design that allows for rapid interventions and integration with predictive models for scheduled maintenance;

► energy efficiency, achievable through hydraulic efficiency, high-efficiency motors and electronic pump control. This makes it possible to reduce overall water consumption, optimise the use of natural resources and limit plant operating costs.

The construction of snowmaking systems capable of guaranteeing high performance, resilience and low environmental impact therefore becomes a key factor in the success of the Winter Games, as well as a stimulus for technological evolution in complex environments like high mountains and investments in the future of alpine tourism.

The perfection of the ice rinks

On skating, hockey or curling rinks, the formation and stability of the ice depend on complex refrigeration systems, with electric pumps at their core. They circulate the refrigerant from the chillers to the dense network of coils laid beneath the rinks, maintaining ideal ice surface conditions during training sessions, matches and Olympic competitions.

The pumps are used to achieve:

► ice uniformity, as without constant circulation, soft or excessively hard areas would form;

► temperature control, since even minimal variations affect the performance and safety of athletes;

► system reliability, as Olympic matches require redundant systems and high-efficiency pumps;

► energy efficiency, with smart pumps equipped with inverters enabling significant savings in overall energy consumption.

It should also be noted that the pumps must meet specific requirements depending on the sport.

Hockey requires hard, fast ice, so the pumps must ensure lower temperatures and extremely stable circulation to prevent soft or uneven areas; for figure skating, the ice must be softer to promote grip and control, so the pumps must allow very precise flow-rate adjustment; finally, for curling, a perfectly uniform and highly stable ice rink is required. It is no coincidence that the ice itself is the guardian of one of the secrets of this sport, namely “pebbling”. In practice, small droplets are deposited on the surface of the ice to make it slightly rough, thus influencing the friction and trajectory of the curling stone.

Pumping solutions for comfort and safety

Within the context of the Milan-Cortina 2026 games, electric pumps also play a key role for ensuring comfort, safety, efficiency and sustainability within the Olympic facilities. For the Olympic villages, athlete accommodations and support services, pumps are essential for feeding the HVAC systems and heating and air-conditioning circuits. They are used to collect, lift and distribute water for sanitary use, toilets, laundries and kitchens. Pumps are also integrated into the recycling systems and rainwater or wastewater management systems. Safety is also a crucial aspect. All buildings must be equipped with adequate fire protection and pumping solutions capable of feeding the hydrant networks, sprinklers, and pressurisation and emergency systems. All these applications require pumps designed to meet high standards of reliability and energy efficiency, deliver long-term performance, and adapt to different operating conditions. In fact, the Games’ governance requires an integrated (environmental, economic and social) approach to sustainability that covers the entire life cycle of the facilities, from their design, construction, and use during the Games to their transformation into a post-event legacy.

Pumping solutions **for every challenge**

PM multi-stage pumps

The PM series pumps are particularly robust and versatile surface pumps, designed to ensure maximum reliability, operational continuity and high performance even under severe conditions. These are **horizontal multi-stage centrifugal electric pumps**, ideal for applications requiring **extremely high pressures**, up to 100 bar, such as pumping water to high-altitude stations for use in snow cannons. **The range of flow rates is also very wide**, and the pumps are available in various materials, including cast iron, stainless steel and duplex. The optimisation of the shape of the impeller and diffuser profiles ensures **high efficiency at the b.e.p.**, which represents a key strength of the series. The wet end section is equipped with **an axial thrust compensation system** that minimises wear, while vibration propagation is also very limited, resulting in reduced noise, especially when multiple pumps are installed at the same site. **The stainless steel shaft is fully protected** and features double support at both ends, thanks to **permanently greased ball bearings, which are generously sized for both radial and axial loads**. The pumps can be supplied in a double configuration, with either a **mechanical seal** or a **packing seal**. In the first case, perfect adjustment and zero leakage are ensured; in the second, ease of assembly and maintenance is guaranteed. Installation flexibility is provided by **the suction body with an adjustable outlet**; in addition, **complete base units** with distinctive features are also available, including frame cementing to the foundation, pump-motor adjustment and alignment, and unobstructed access in the event of motor replacement. Thanks to all these features, PM pumps represent the state of the art in terms of reliability, performance and versatility of use, and are recognised as a global benchmark in the snowmaking industry.

K+ submersible pumps

K+ pumps are submersible pumps designed to deliver high performance, energy efficiency and long service life even under the most demanding operating conditions. Whether drawing water from a reservoir or conveying wastewater , these particularly robust and reliable pumps ensure **exceptionally high performance thanks to their excellent hydraulic profiles, enhanced by IE3 efficiency class motors**.

They are available in versions with either a single-channel impeller, vortex impeller, multi-channel impeller or high-efficiency open two-blade impeller, delivering efficiency levels of over 80%. **The anti-clogging system** guarantees maximum operational safety and the largest free passages available on the market.

The motor is protected by a double mechanical seal, which can be easily accessed without dismantling the electric motor. If the first seal should fail, the control panel receives an alarm signal from the conductivity probe in the oil chamber, covered by an international patent, further enhancing the product's reliability. Another international patent, standard on all models, is **the DRY WET oil cooling system**, which allows operation both in tanks and in dry chambers, with the dual advantage of requiring no additional maintenance and not absorbing energy, thereby improving the pump's performance.

E submersible pumps

The E series submersible pumps are designed to guarantee reliability, operational continuity and high hydraulic efficiency in applications involving the collection, extraction and transfer of water from deep wells, reservoirs and natural or artificial basins.
Thanks to their specific configuration, they are the ideal choice in contexts where high heads (up to 770 m), continuous operation and minimal maintenance are required.
Manufactured in accordance with the principles of **Eco Design** and the **Extended Product Approach**, and using **the most advanced production and casting technologies**, the range guarantees market-leading performance. Highly efficient hydraulics and integration with the dedicated range of submersible motors result in particularly significant energy savings.
Reliability and long service life are achieved thanks to the use of carefully researched materials and the robust structures of the cast iron, bronze and stainless steel components. In addition, in order to provide exceptional resistance to corrosion, the patented **DEFENDER** system has been developed, accelerating the passivation of the stainless steel components and protecting the pump from the moment it is installed.

NMC standardised monobloc pumps

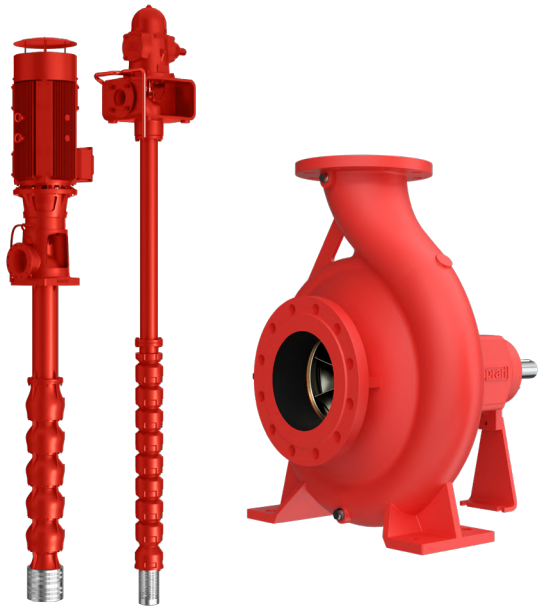
The NMC series pumps are normalized monobloc pumps made in Italy in compliance with EN733 (DIN 24255). Ideal for recirculating clean water within systems, they are certified for drinking water applications. They are available in a wide range, offering **multiple configuration options**. One of the strengths of the range is its high energy savings, achieved thanks to excellent hydraulic efficiency, which in turn is ensured by optimised profiles and integration with IE3 and IE4 efficiency class motors.
The excellent quality of the materials, the considerable thickness of the components, and **the generously sized shaft and bearings** ensure maximum operational reliability even for the most demanding applications.
The Back Pull Out system allows the wet end section to be removed from the rear without disconnecting the motor and pump casing from the pipework. The pumps are also built with maximum interchangeability in mind, with the advantage of only needing to have a few spare parts in stock.

CVX and CVD vertical multi-stage pumps

The CVX and CVD range of vertical multi-stage stainless steel electric pumps features in-line suction and delivery and **high energy efficiency motors**. Ideal for pressurisation systems and for recirculating clean water within installations (also certified for drinking water applications), all the parts of these pumps in contact with the liquid are made of stainless steel, ensuring a long service life and resistance to wear. The most distinctive features of this **wide range of products** are their quality, reliability and compact dimensions, with the in-line inlet design and replaceable cartridge mechanical seal ensuring low installation costs and simplified maintenance.

NR and NCE circulation pumps

High-efficiency circulators are required for the air conditioning and domestic hot water systems in the Olympic buildings. On the one hand, comfort must be guaranteed, with an immediate response to the thermal load variations typical of high-traffic complexes. On the other hand, it is essential that they also ensure low energy consumption, for systems increasingly geared towards sustainability. The use of inverter-controlled permanent magnet synchronous motors and the integration of on-board electronics deliver particularly impressive results, translating not only into decreased power consumption but also into **a drastic reduction in water waste**, thanks to the circulators' ability to instantly adapt their operation to the system's actual requirements.
Moreover, in contexts requiring constant monitoring and centralised management, such as Olympic buildings, it is strategic for circulators to be designed for connectivity, enabling remote control, predictive maintenance, and integration with supervision and home automation systems.



NC and P pumps for fire-fighting systems

Fire protection in Olympic buildings and infrastructure requires pressurisation systems capable of ensuring continuity of operation, immediate response and absolute reliability. The pumps must comply with the requirements of **EN 12845 and UNI EN 12259-12**, and operate efficiently in complex and highly critical environments such as Olympic villages, indoor arenas, and temporary and permanent sports facilities. For these applications, alongside the standardised and vertical multi-stage pumps, the P series vertical lineshaft pumps are also available, designed for tank or well installations and offered in a wide range of metallurgies. The configuration with a submerged pump casing and continuous lineshaft ensures **high efficiency and reliable operation** even under harsh conditions. In installations with fully submerged impellers, the pumps do not require priming, a feature that is particularly valuable for Olympic facilities where automatic remote start-up and continuity of service must be guaranteed under all operating conditions.

An Olympic history **of reliability**

Over the years, Caprari technology has been used in numerous editions of the Winter Games, supporting facilities, infrastructure and water systems. Our solutions have been integrated by OEMs into complex projects, ensuring reliability and operational continuity even under extreme conditions.

Turin 2006 Winter Games

To ensure consistent snowfall even at lower altitudes, new **high-pressure pumping stations** were built, designed to continuously and efficiently feed the automated snowmaking systems. Caprari supplied PM series high-pressure multi-stage pumps. These systems made it possible to increase the available water capacity, stabilise the pressure across the distribution networks and ensure optimal slope conditions, regardless of altitude or temperature fluctuations.

Sochi 2014 Winter Olympics

The morphological complexity of the Caucasus required highly flexible fluid-mechanics solutions. **Modular pumping stations integrated with multi-stage centrifugal pumps** were installed, designed to guarantee high pressures and constant flow rates across lengthy and complex networks. The use of remote control enabled continuous monitoring of operating parameters.

PyeongChang 2018 Winter Games

One of the most complex challenges was dealing with a particularly dry climate. In this context, it was necessary to install **high-efficiency lifting systems**, designed to optimise every stage of water transfer and ensure adequate flow rates to the snowmaking systems without waste. This made it possible to address the climatic conditions while maintaining a sustainable approach.

Beijing 2022 Winter Games

The entire snowmaking system was entrusted to **a network of high-capacity pumping stations**. In order to compensate for the near total absence of natural snow, **artificial storage reservoirs** were built, while the continuous operation of the snowmaking system was ensured by **state-of-the-art, electronically controlled boosters**.

Caprari pumping solutions were used by the Games' suppliers to construct the **National Alpine Ski Centre at Mount Xiaohaituo**, one of the most technically complex sites of the entire event. The pumps were installed in water tanks and booster stations to ensure continuous pumping to the snowmaking systems located at higher altitudes. The project involved the use of 32 horizontal high-pressure multi-stage pumps, with power ratings between 400 and 560 kW, electronically controlled to adapt to varying operating conditions. The pumps lifted water from an altitude of approximately 1,285 metres to 2,170 metres, ensuring uniform slope coverage and constant snow production even under extremely challenging climatic conditions. The high hydraulic efficiency, compact design and long operating life of the installed solutions ensured continuity of service and reduced energy consumption. At the same time, Caprari's experience in the submersible pump sector contributed to the overall smooth operation of the system, reaffirming the reliability of the technologies employed in a scenario requiring high performance, resilience and maximum operational precision.

High-performance Caprari pumps, integrated into automated snowmaking systems, were used in the construction of the **National Biathlon Centre**. The solutions installed included high-pressure horizontal pumps equipped with 355 kW motor units and submersible well pumps designed to ensure continuous water transfer to pumping stations located at higher altitudes. In this complex system, the submersible pumps draw water and convey it directly to the snowmaking boosters, while the surface pumps provide the high pressures required for the snow generators' optimal operation. Their reliability and ability to operate continuously made it possible to meet the site's demanding requirements, significantly improving the snowmaking system's overall performance. This was a key intervention in a particularly challenging climate, where the entire snowmaking process relied on advanced technological infrastructures.

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