MORE HYDROPOWER

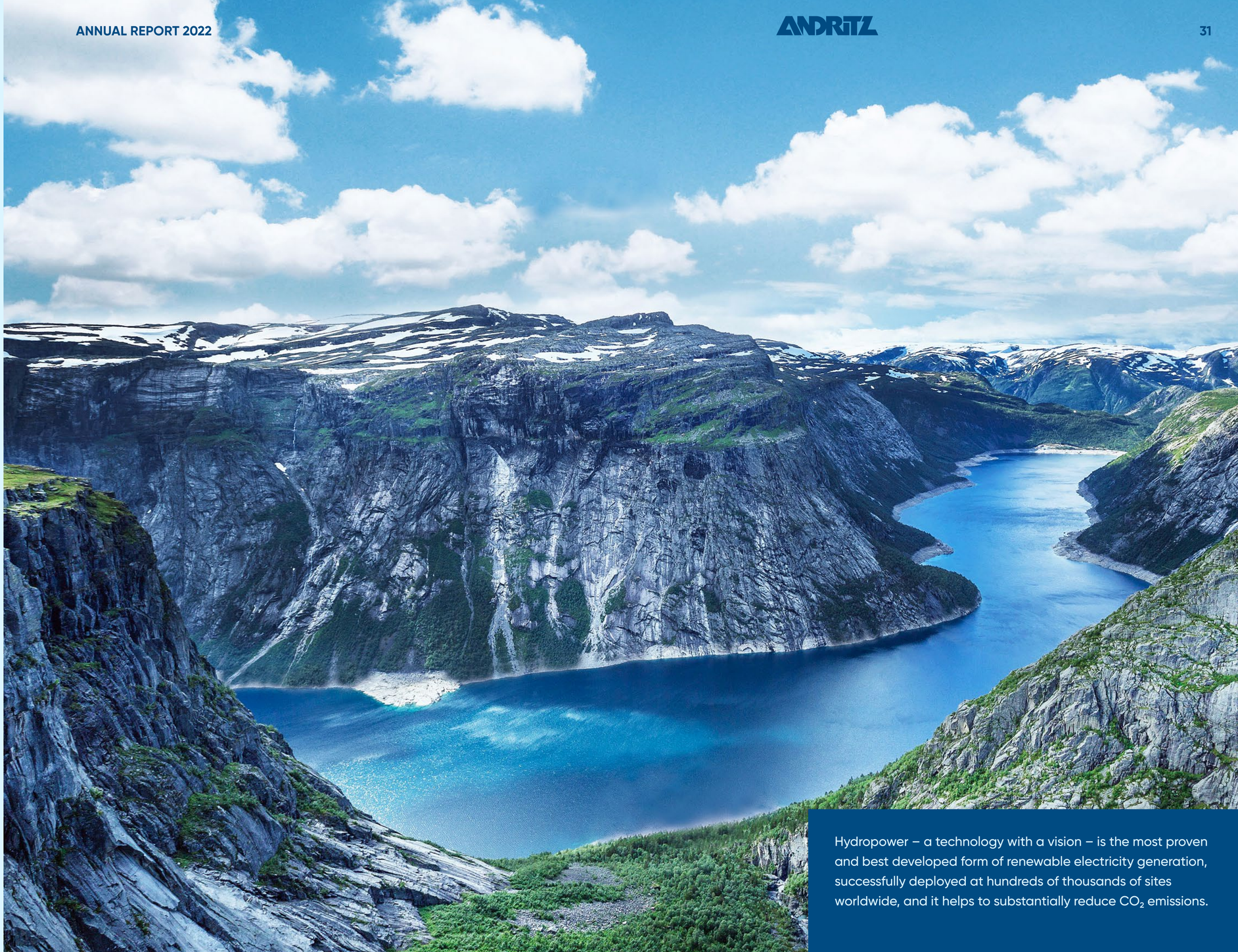
The generating capacity for renewable energy, including hydropower, will have to be increased drastically in the next few years in order to reach the climate goals.

LESS CO_2

The level of carbon dioxide emissions can be lowered effectively with the aid of hydropower. An example illustrates this: Ryburg-Schwörstadt hydroelectric power station generates an average of approximately 760 GWh per year, contributing to an emissions reduction of around 600,000 tons of CO_2 annually.

WITH THE FLOW

Hydropower has made a significant contribution towards generating clean, renewable energy for many years. It currently produces more than half of the renewable power worldwide. In view of the challenges of climate change and the urgent need to substantially reduce CO_2 emissions, there are many good reasons to also continue focusing on hydropower, as two very different ANDRITZ projects demonstrate.



Hydropower – a technology with a vision – is the most proven and best developed form of renewable electricity generation, successfully deployed at hundreds of thousands of sites worldwide, and it helps to substantially reduce CO_2 emissions.

In spite of the rapid rise of renewable energy sources sources, for example wind power, biomass, solar power and geothermal heat, hydropower is the largest source of renewable energy, with a share of just over 50 percent. And it has several advantages: Hydroelectricity can be generated flexibly and according to needs. Hence, the power grids can be stabilized and enormous quantities of volatile wind and solar power, which are not available on demand, can be stored with the aid of pumped storage power stations.

In regions where the demand for energy will increase most rapidly in the next few years – such as Asia, South America and Africa – new large-scale plants will be built and there will be numerous smaller hydropower projects. However, there is also enormous potential in Europe and North America to resolve the "trilemma" of secure supply, sustainability and affordability of energy. Approximately half of the plants there are over 40 years old. Modernizing and upgrading them can make a substantial contribution to the energy supply. →

Stability and safety
The 300-megawatt Nenggiri hydropower plant is currently the largest renewable energy project being implemented by operator TNB Genco in Malaysia. It will stabilize the national power grid and reduce the risk of downstream areas being flooded.

Nenggiri is located in the northeast of Malaysia. Around 1.8 million people live in the state of Kelantan.

The projects handled by around 7,000 ANDRITZ Hydro employees all over the world are proof of the opportunities that these two approaches offer. This is demonstrated in two examples – from Malaysia and Switzerland.

Dawn of the Modern Age

Kelantan is a state in northeastern Malaysia with a population of around 1.8 million. In order to develop the economy here, which consists largely of small local businesses, and meet the region's growing demand for energy, the new Nenggiri hydropower station is being built in the Gua Musang district and is to be completed by mid-2026. A consortium led by ANDRITZ will supply the entire electro- and hydromechanical equipment. The order comprises design, manufacture, delivery, installation, and commissioning of two 153-megawatt turbines and generators, together with the auxiliary equipment, and the complete electrical and mechanical balance of plant.

The hydropower facility is one of several government-approved projects that are to help increase the share of renewable energy in Malaysia to 40 percent by 2035. And the plant has other advantages: "It will help to stabilize the national grid at peak load and, thanks to its ability to store large quantities of rainwater during the monsoon season, it will also play an important role in flood mitigation," says Dato' Nor Azman Mufti, Managing Director of TNB Genco, the Malaysian customer and operator of the plant. In addition, the population will benefit from a better supply of clean water. →

"ANDRITZ is a professional partner and provides excellent services. We are working together on a basis of trust."

Dato' Nor Azman, Managing Director of TNB Genco

The Ryburg-Schwörstadt run-of-river power plant is the most powerful facility on the High Rhine and supplies both Switzerland and Germany with electricity.

Good for human beings and wildlife
Ryburg-Schwörstadt is leading the way when it comes to reconciling ecological, economic and social issues. Around 20 million euros were invested to implement an array of projects. Among other things, a bypass watercourse was created to ensure smooth fish migration (on the left in the picture).

For TNB Genco, which already operates three hydroelectric schemes in Malaysia, currently with a total capacity of 2.54 gigawatts, this is the largest individual project for renewable energy to be implemented by the group at the moment. "Nenggiri guarantees a safe, reliable and sustainable supply of electricity for the population and the country as a whole," says Dato' Nor Azman. "In the long term, the project can also contribute to the socio-economic development of the region, in aquaculture, for example, or ecotourism." During the peak phase of construction work, the hydropower station will also create around 2,000 jobs for the local population and indigenous communities (Orang Asli).

For a sustainable future
Around 11,000 kilometers from Kelantan as the crow flies, on the border between Germany and Switzerland, hydropower is also the first choice. And has been for 92 years. With an installed capacity of 120 megawatts, Ryburg-Schwörstadt is the most powerful run-of-river hydropower plant on the "Hochrhein". The stretch of the river between Lake Constance and Basle has a 150-meter difference in altitude over →

“We are proud that sustainability really is practiced here, even across national borders.”

a distance of 150 kilometers. Eleven dams make use of this differential. Ryburg-Schwörstadt power station alone generates around 760 GWh of eco-friendly electricity a year.

ANDRITZ was awarded the order to extensively refurbish all four Kaplan turbines here by 2027, including design, engineering, manufacture of new parts, factory overhaul, installation, testing and commissioning. The aim of this rehabilitation project is to guarantee the service life and operational safety up to the end of the concession period, which was extended until 2070 a few years ago.

“We are making the plant into a state-of-the-art facility, increasing its efficiency, and we can use it more effectively than ever in future in all operating modes,” says Beat Karrer, Managing Director of Ryburg-Schwörstadt AG power station. Particular attention was paid to ecological aspects by installing oil-free bearing systems on the wicket gates and oil-free hubs for the new runners. “In this way, we can reduce the risk of oil accidentally leaking into the water, during operating disruptions for example, to virtually zero.” →

“FROM WATER-TO-WIRE” – HYDROPOWER BY ANDRITZ

Hydropower projects are technically demanding, complex and cost-intensive. They require technical know-how, experience, due care, and extensive knowledge of the region concerned. That is why many investors, project developers and customers rely on ANDRITZ.

What sets us apart:

180 YEARS
of experience in turbine design

7,000
employees at 65 locations and 10 test stands worldwide

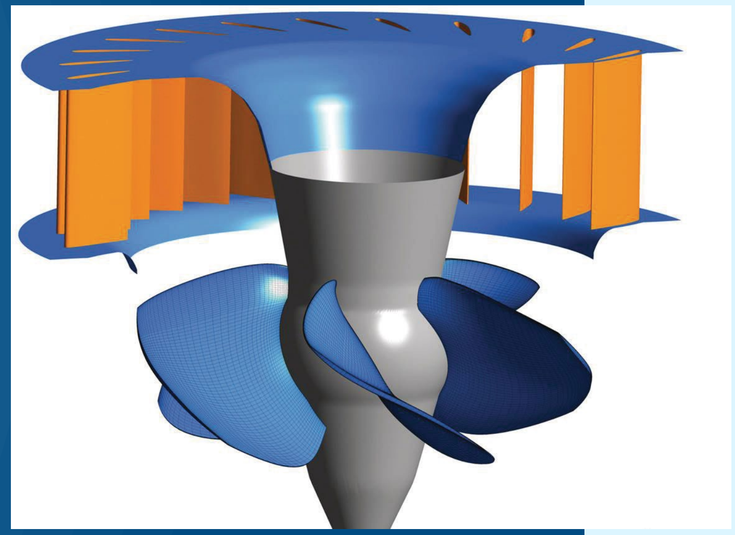
32,000
turbine units delivered

Complete portfolio for capacities up to more than
800 MW

471,000 MW
of installed and modernized capacity

The ANDRITZ subsidiary in Kriens, Switzerland, is responsible for project management, logistics and transport, engineering, installation, and start-up.

Manufacture of the new Kaplan impellers and factory overhaul of the large turbine components will be carried out at ANDRITZ's manufacturing facility in Ravensburg, Germany.



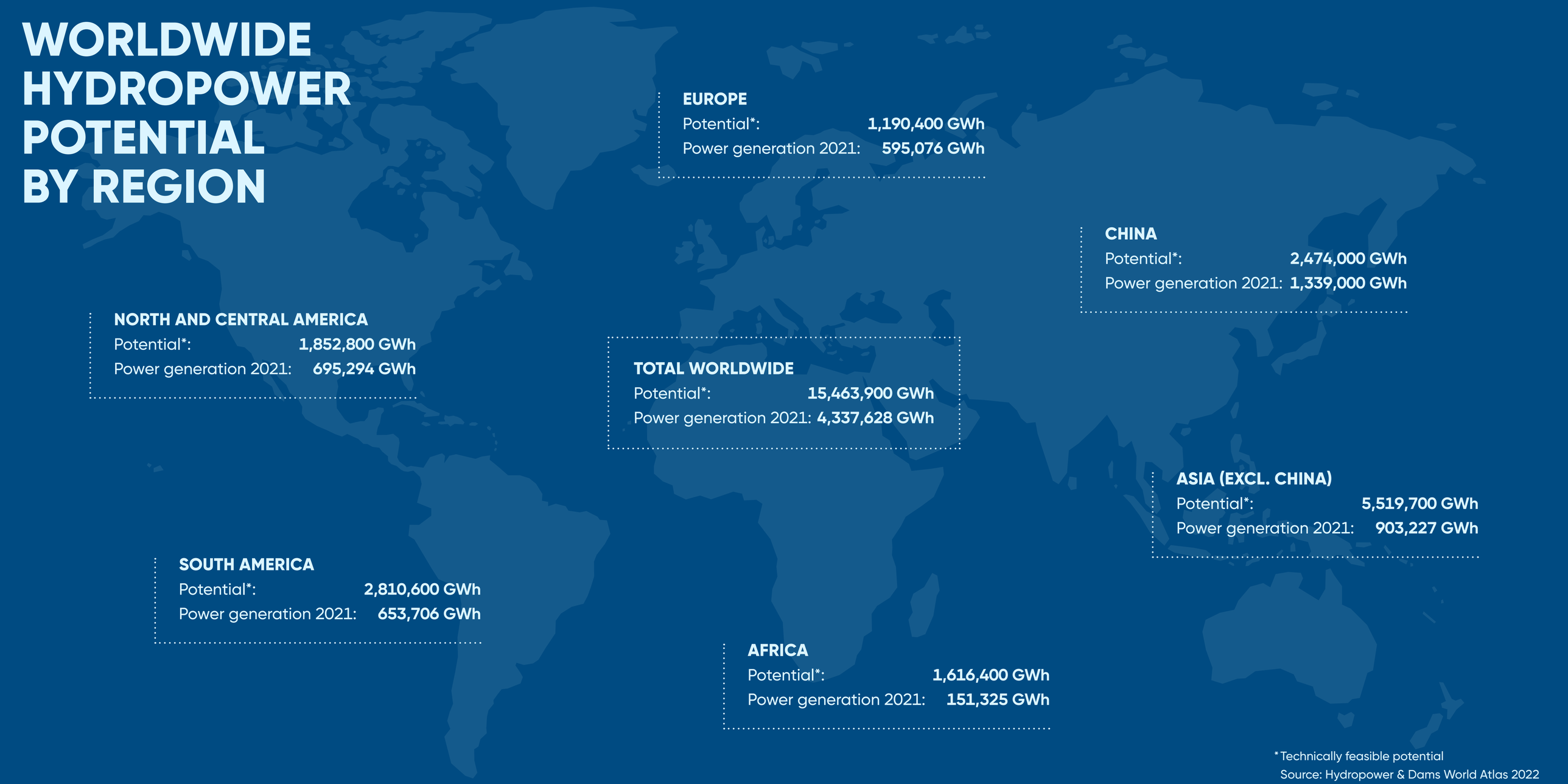
3D rendering for optimal turbine design. The impellers will be designed and the model tests conducted subsequently at the ANDRITZ site in Tampere, Finland.

Considerable efforts were also made elsewhere to harmonize ecological, economic and social aspects in Ryburg-Schwörstadt. "Over eight years ago, we installed an ecological advisory commission in which we debated, adopted and regularly assessed measures together with policy makers, environmental organizations and local residents," Beat Karrer explains. Around 20 million euros were invested in order to implement a whole set of measures: A bypass channel was built, for example, to guarantee unobstructed fish migration, compensation areas were created with exit points for wildlife in order to make it easier for animals to cross the Rhine, zones were set up to protect plants and small animals, and hiking trails were established.

"We are proud that sustainability really is practiced here, even across national borders," says Beat Karrer. "When efficient technologies, ecological will and economic efficiency work in harmony together, hydropower is an outstanding way of generating green energy."

andritz.com/ar22/hydropower

WORLDWIDE HYDROPOWER POTENTIAL BY REGION



EUROPE
Potential*: **1,190,400 GWh**
Power generation 2021: **595,076 GWh**

CHINA
Potential*: **2,474,000 GWh**
Power generation 2021: **1,339,000 GWh**

NORTH AND CENTRAL AMERICA
Potential*: **1,852,800 GWh**
Power generation 2021: **695,294 GWh**

TOTAL WORLDWIDE
Potential*: **15,463,900 GWh**
Power generation 2021: **4,337,628 GWh**

ASIA (EXCL. CHINA)
Potential*: **5,519,700 GWh**
Power generation 2021: **903,227 GWh**

SOUTH AMERICA
Potential*: **2,810,600 GWh**
Power generation 2021: **653,706 GWh**

AFRICA
Potential*: **1,616,400 GWh**
Power generation 2021: **151,325 GWh**

*Technically feasible potential
Source: Hydropower & Dams World Atlas 2022