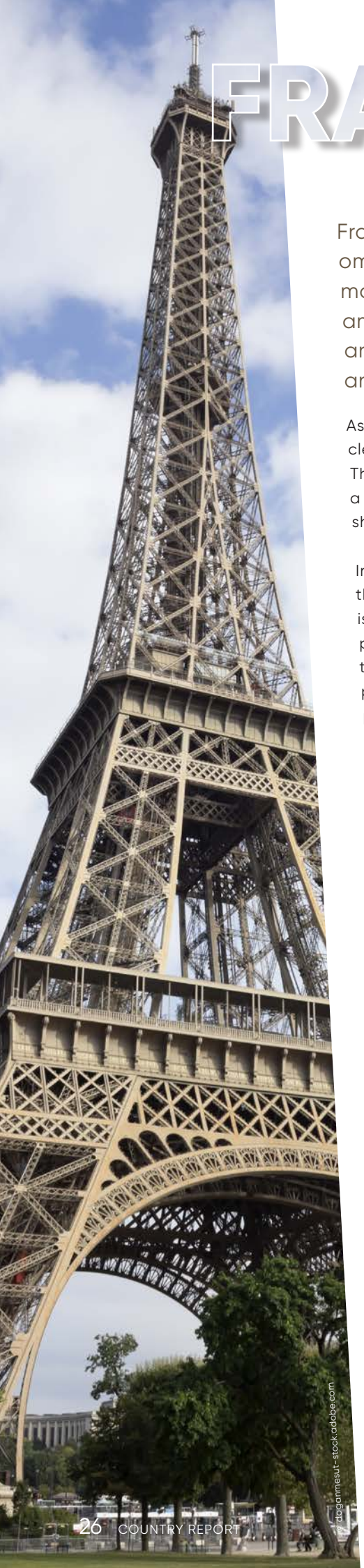

FRANCE

BIG ON ELECTRICITY

France is a developed country with the world's sixth-largest economy by nominal GDP and the third largest in Europe. One of the most modern countries in the world, France holds a leading position among European nations. Key sectors of its diversified economy are the chemical industry, a developing manufacturing industry and tourism – France is the most visited destination in the world.

As one of the world's largest producers of electricity, France is primarily reliant on nuclear power, which accounts for about 72% of total national electricity production. Though renewable energies have generally been slow to take off, France does use a significant volume of hydroelectric power to produce electricity with a production share of about 20%.

In 2018, France was ranked third in Europe for its hydroelectric production with 11% of the continental total, behind Norway and Turkey. Total installed hydropower capacity is about 25.5 GW from the country's roughly 2,400 hydropower plants. Annual hydropower production of 69 TWh sees France ranked 10th in the world. In order to increase the use of renewable energy resources, France is seeking to increase hydropower capacity by at least 3,000 MW by 2020. Currently, there are about 330 MW of hydropower capacity under construction.

Because of the mountain ranges of the Alps, the Pyrenees, and the Massif Central, the hydroelectricity sector in France has great potential with about 120,000 GWh. Though this potential has already been exploited to a very large degree, there is still a remaining commercial potential estimated at about 10 TWh/year. This potential largely comes from small hydropower and pumped storage hydropower plants, as well as rehabilitation of existing facilities.

ANDRITZ HYDRO IN FRANCE

ANDRITZ Hydro history in France started in 1874 with the foundation of predecessor company Ateliers de Bouvier in Grenoble. Since then, ANDRITZ Hydro has had a major role in the supply of electro-mechanical equipment with over 1,000 references in the country. The company has been also involved in large-scale projects such as the supply of Bulb turbines for the world's first tidal power plant at La Rance in 1968 (240 MW). ANDRITZ Hydro also served as supplier of original electro-mechanical equipment for major power plants such as Sisteron (240 MW), Villarodin (600 MW), Bort les Orgues (230 MW), Grand Maison (1800 MW), and many more. Today, the activities for the service and rehabilitation market in France are attended to, and coordinated by ANDRITZ Hydro in Switzerland.

Our set-up in France has become one of our leading sites for small hydropower, engaging specialists with long-term international experience. Over recent months, we have been awarded with contracts for more than 10 units for our new Mini-Grid range of products (turbines below 69 kVA). Among these projects are Breuche, Membrey, Cessey, Dienay and Lucenay.

LA BATHIE, SAVOIE ALPS

In 2013, a program to increase the total power of the La Bathie plant by 100 MW was initiated. ANDRITZ received a contract for the supply of six Pelton runners

MicroGuss at 20 tons and 103 MW each as well as 12 injectors. The power increase was achieved through numerical flow simulations combined with model tests. With the first five units already successfully commissioned and exceeding performance expectations, the last unit will be commissioned in 2019.

LA COCHE, ISÈRE VALLEY

ANDRITZ received in 2016 the order to supply a turbine generator unit with an output of 240 MW for the extension of the La Coche pumped storage power station. The new Pelton turbine completes the existing four reversible pump turbines and features extremely good part load behavior. Due to the high sand content in the water and the resulting severe abrasion, the turbine will receive a high-grade, erosion-resistant coating extending its life cycle significantly. Works are currently well advanced, the commissioning is scheduled for 2019.

RENOUVEAU PROGRAM

In 2013, a major 10-year rehabilitation program was launched involving more than 230 hydropower units in France including the renovation of the speed governors and excitation systems. In 2014, ANDRITZ signed a frame agreement for more than 100 units. To date, 25 units have already been successfully commissioned. A further 10 units are being manufactured.

The project also includes an innovative service contract called "MCO", aimed at maintaining the equipment in good operational conditions and extend its lifetime. This contract comprises the provision of a centralized web-based platform to store all project data, spare parts inventory management, services and support, as well as monitoring material life cycles.

Valve in manufacturing, Grand Maison, Romanche Valley

GRAND MAISON, ISÈRE, ROMANCHE VALLEY

With two powerhouses and a total of 12 units, Grand Maison is currently the most powerful pumped storage hydropower plant in France. It can inject up to 1,800 MW into the French electricity grid within three minutes. ANDRITZ has executed several orders during the course of a recent rehabilitation program; for example, the upcoming supply of static excitation systems capable of performing back-to-back starts between all Pelton and Francis units.

TO KNOW

GENERAL FACTS

Population: **67,118 Mio.**
Access to electricity: **100%**
Installed hydro capacity: **25,517 MW**
Hydro capacity under contruction: **301 MW**
Share of generation from hydropower: **10%**
Hydro generation per year: **53,600 GWh**
Technically feasible hydro generation potential: **120,000 GWh**

ANDRITZ HYDRO IN THE COUNTRY

Installed and/or rehabilitated capacity: **11,029 MW**
Installed and/or rehabilitated units: **1,150**
Locations: **Grenoble, Paris**

Source Facts:The World Bank, IHA, CIA Factbook, Hydropower & Dams World Atlas 2018

Roselend Dam, La Bathie, Savoie Alps