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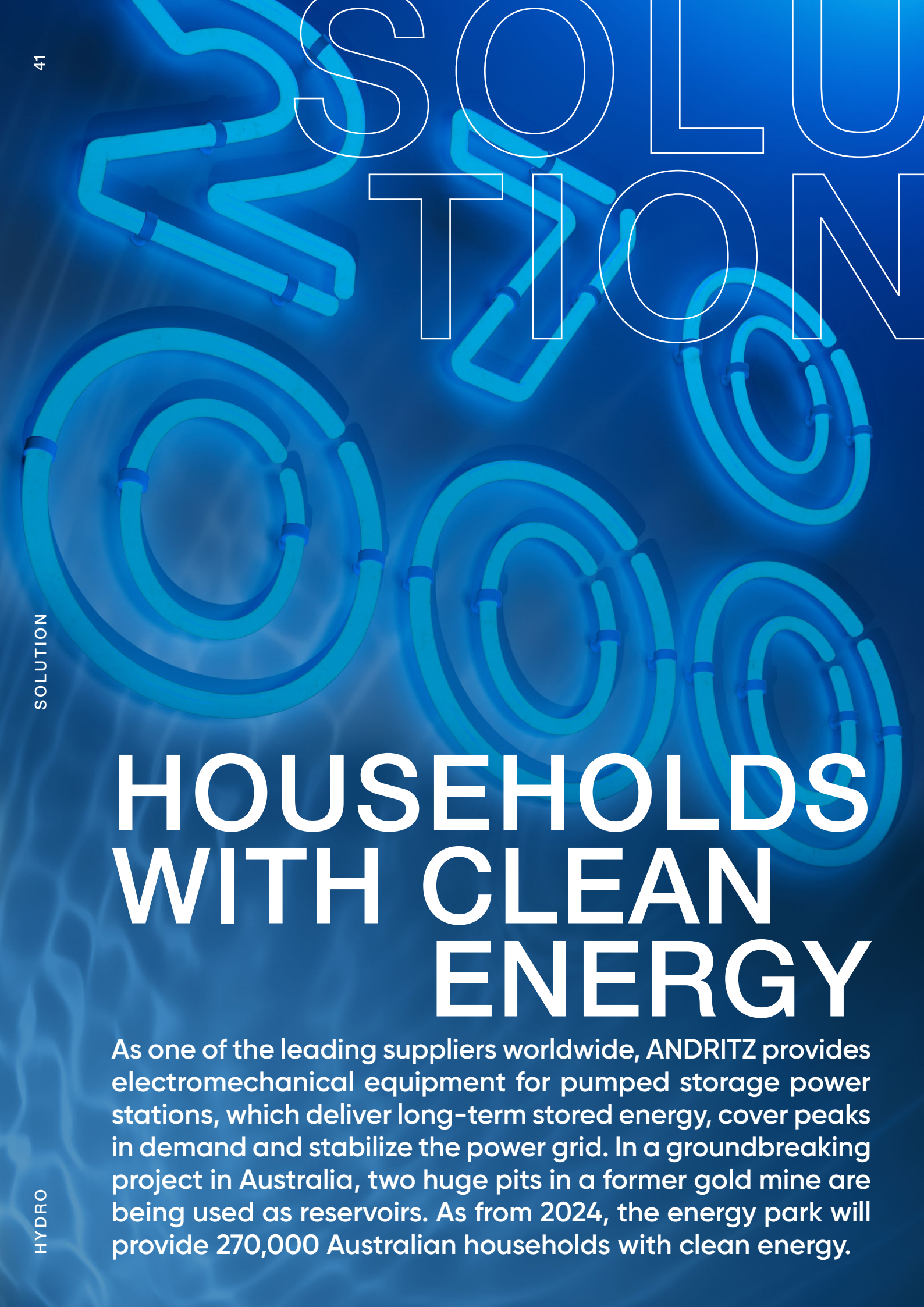
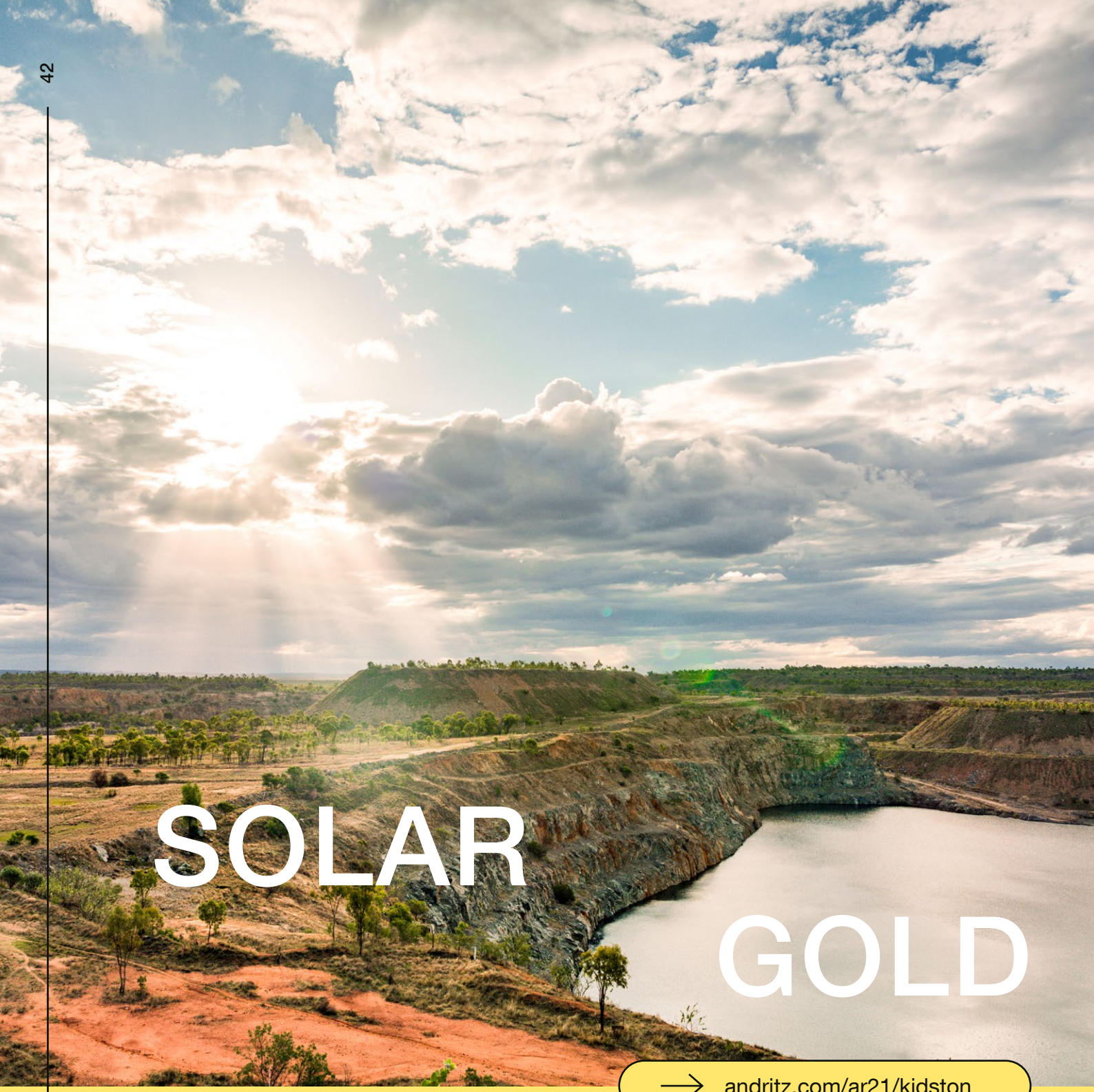
STORING RENEWABLE ENERGIES

In order to succeed in changing to a sustainable energy supply and also achieve climate protection goals, we have to build hydropower plants and also wind and solar farms all over the world. However, as wind turbines and solar cells don't provide a regular supply of electricity, electrical energy storage devices will be needed on a large scale. Technologies like lithium-ion batteries alone will not suffice.



HOUSEHOLDS WITH CLEAN ENERGY

As one of the leading suppliers worldwide, ANDRITZ provides electromechanical equipment for pumped storage power stations, which deliver long-term stored energy, cover peaks in demand and stabilize the power grid. In a groundbreaking project in Australia, two huge pits in a former gold mine are being used as reservoirs. As from 2024, the energy park will provide 270,000 Australian households with clean energy.



SOLAR GOLD

andritz.com/ar21/kidston

There is no shortage of dust and heat in Kidston, north-eastern Australia. At one time, there was gold here as well. The town flourished at the beginning of the last century when the search for precious metal began there. Workmen and gold-diggers came to the largest gold mine in the country at the time. The mine finally closed down in 2001, and Kidston became a ghost town. But now it's coming back to life – with the energy supply of the future.

A project by the listed company Genex Power in Sydney, specialized in developing projects to generate and store renewable energy, is looking into new uses for the site, which is the size of around 1,000 football fields. With help from ANDRITZ, an energy park is being built that will supply 270,000 Australian households with clean electricity as from 2024. The first stage is already complete – a 50-MW solar power plant has been generating electricity since 2017. Simon Kidston, co-founder of Genex Power, and the company's CEO James Harding explain how this unusual project came about and why it is a game-changer for the reliable use of renewable energy sources.

Simon, your last name is Kidston – also the name of the former gold-mining town where the energy park planned by your company, Genex Power, is being built. Just a coincidence?

SK No, Kidston was named after my great-great-grandfather William Kidston, who was Premier of Queensland when the gold rush began in 1907. I am proud that we are able to breathe new life into the town and that it has such an innovative project as the Kidston Clean Energy Hub.

What is this exactly?

SK The two disused pits that were the old gold mine will be transformed into a pumped storage hydropower project that is unique worldwide. The Kidston Pumped Storage Hydro Project is the first of its kind in Australia. This is a very large project, with a total investment volume of 800 million Australian dollars.

AUSTRALIA NEEDS MORE HYDROPOWER AND ALSO LARGE, ADDITIONAL QUANTITIES OF WIND AND SOLAR ENERGY.

Simon Kidston, co-founder of Genex Power

Why is it a good idea to use the abandoned mine in this unusual way?

JH The difference in height provided by the pits, which are almost 350 meters deep, and the huge amount of water they can hold guarantee high electrical efficiency. In times of low power demand, the turbine pumps the water from the lower reservoir to the upper one. When demand rises, the water is released into the lower reservoir again in order to generate electricity. And there is also good infrastructure available there, for example a landing strip so that the workmen can get to Kidston, camp accommodation for them, and the necessary building material.

Focusing on the power of Mother Nature and the "green energy" business model: Simon Kidston (l) and James Harding

What are the biggest challenges in such a project?

JH Of course, a project of this kind in a remote area is always a challenge in terms of both logistics and manpower. The mine is a long way away from the existing power grid, so we need a long power transmission line to connect to the pumped storage power station. However, the fact that the Queensland government is providing a large part of the funding for the new power transmission line shows how important the project is for the state. Another aspect concerns the water on the site: We have undertaken to manage it with great care.

So far, Australia has been known more for its coal industry. Is there now a wind of change?

SK Essentially, Australia embarked upon changing its energy sources several years ago. Individual states, particularly New South Wales, South Australia and Queensland, are working very hard to promote renewable energy sources. Our project, for example, will help Queensland achieve its goal of 50% renewable energy by 2030. That's why the state government is providing 150 million Australian dollars for extension of the transmission line. At the COP26 climate summit in Glasgow, the Australian government also announced that it intends being climate-neutral by 2050. On the whole, we need more hydropower in addition to large quantities of wind and solar energy.

So we will also need storage devices for all this energy?

JH Exactly. In addition to technologies like lithium-ion batteries for short-term storage, a pumped storage power station like the one being built in Kidston is a very important way of providing large amounts of energy for longer periods as well, covering peaks in electricity demand, and stabilizing the grid. What is more, it contributes towards

> ANDRITZ WILL HANDLE COMPLETE OPERATION AND MAINTENANCE OF THE POWER STATION FOR A PERIOD OF TWELVE YEARS AND PROVIDE A GUARANTEED MINIMUM LEVEL OF PLANT AVAILABILITY.
>
> James Harding,
> CEO of Genex Power

creating 900 direct and up to 3,000 indirect jobs. It is sustainable in terms of ecology, economy and society.

What made you decide in favor of ANDRITZ as supplier of the pump turbines and the complete electromechanical equipment for the hydroelectric power station?

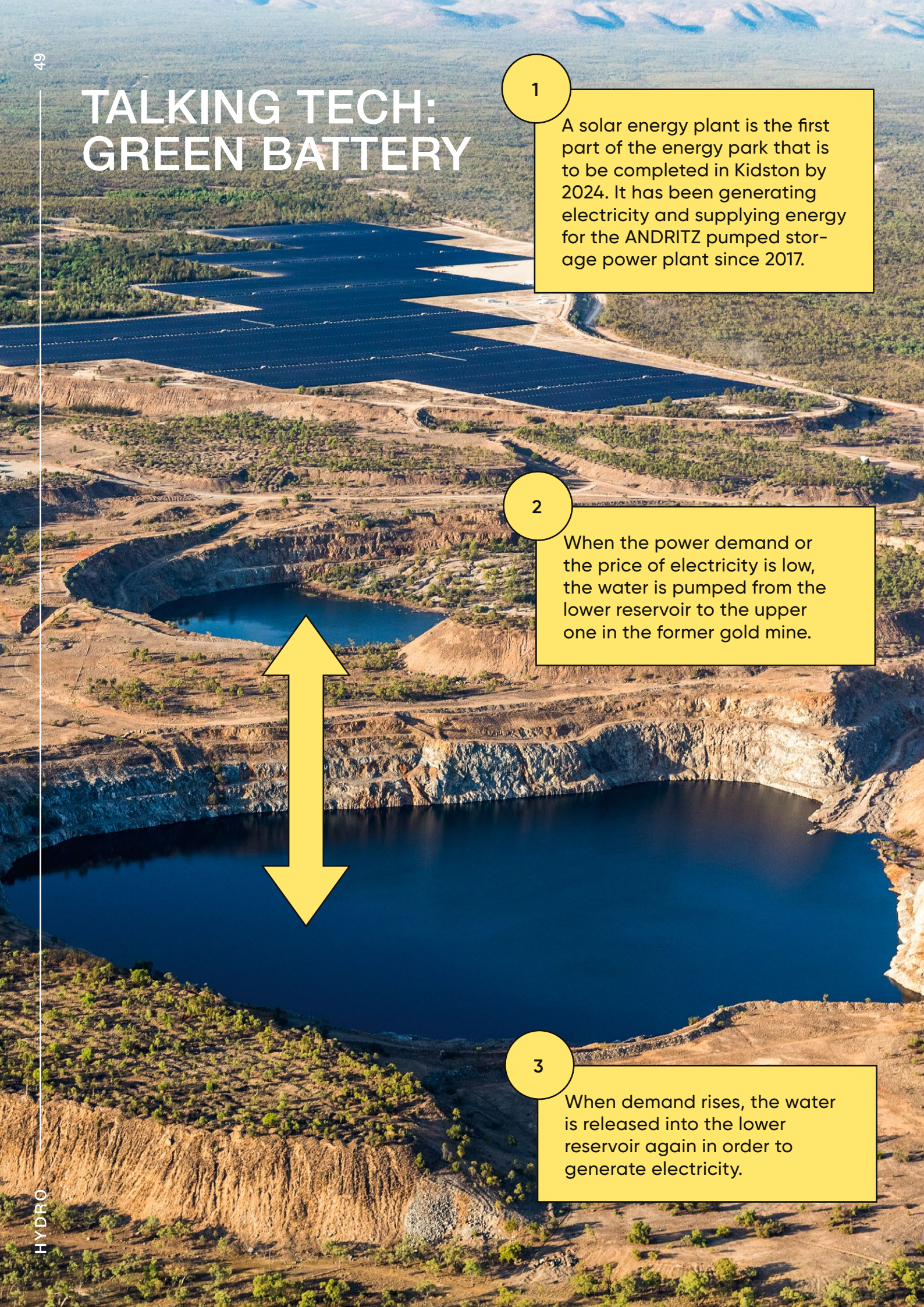
JH ANDRITZ is world-class from the technological point of view. And its local presence in Australia was another important consideration. Right from the beginning, we wanted our partners to be involved in every stage of the project so that we could develop and optimize the plant design step by step and keep the investment and operating costs as low as possible.

How will you organize service and maintenance work after completion of the plant?

JH ANDRITZ will handle the complete operation and maintenance of the power station for a period of twelve years and provide a guaranteed minimum level of plant availability. This was a very important risk mitigant when it came to financing the project. Several ANDRITZ experts will take charge of this work on site, assisted online by ANDRITZ specialists in Austria and Italy: a complete package that has convinced us and our investors.

Moving on: Simon Kidston and James Harding have already set their sights on the next project.

TALKING TECH: GREEN BATTERY



1

A solar energy plant is the first part of the energy park that is to be completed in Kidston by 2024. It has been generating electricity and supplying energy for the ANDRITZ pumped storage power plant since 2017.

2

When the power demand or the price of electricity is low, the water is pumped from the lower reservoir to the upper one in the former gold mine.

3

When demand rises, the water is released into the lower reservoir again in order to generate electricity.