

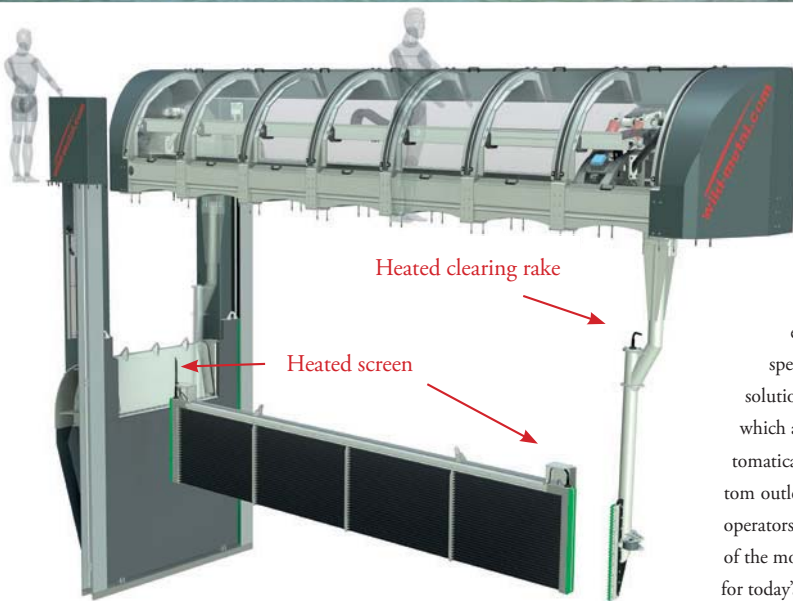


HYDRO



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WATER INTAKE AT SUSASCA POWER PLANT



In the autumn of 2015 modifications were undertaken on the La Jenna water intake of the Susasca Power station in Susch, Switzerland. The main point of the project was the conversion to a fine grid with a new horizontal machine for clearing the grid. The decision was taken to install a purely electromechanically driven version from Wild Metal, the South Tirol-based specialist in water-related steel structures. This was both an efficient and a robust solution. The machine is protected against the weather by a closed Plexiglas canopy which also acts as a safety barrier. Fine and coarse flotsam is now removed fully automatically by the screens at all times of the year. Wild Metal also supplied the bottom outlet and the sluices which also incorporated further innovative solutions. The operators of the power company OESS SA were clearly delighted. Wild Metal is one of the most innovative companies in the field of modern water-related steel structures for today's alpine hydropower requirements.



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We clean water

Two Francis turbines made by GUGLER Water Turbines GmbH guarantee green power is generated effectively at the Zapece hydro-plant in the Bosnian constituent republic of Srpska.

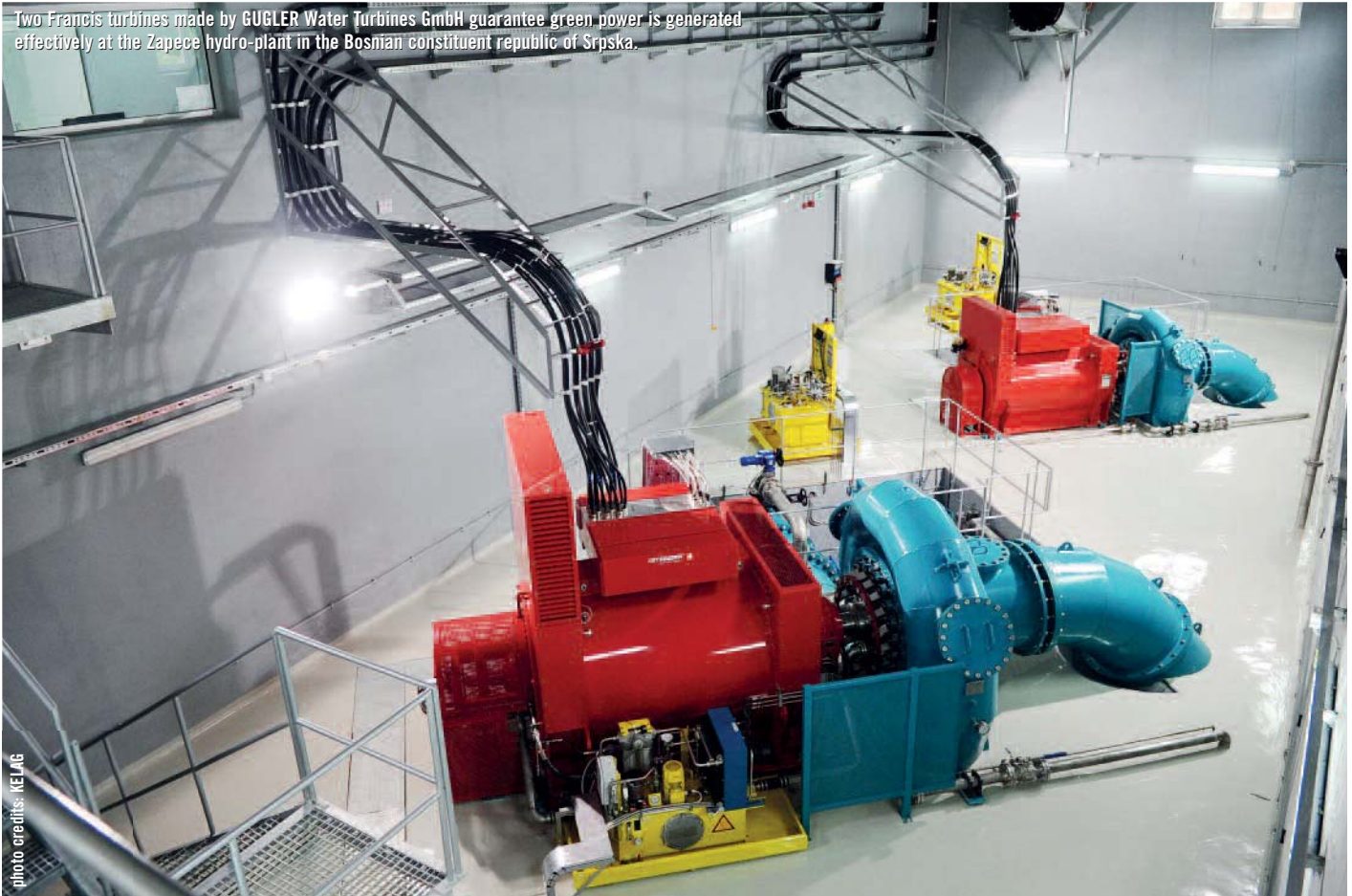


photo credits: KELAG

ZAPECE POWER PLANT CONTRIBUTES TO ENHANCED ELECTRICITY SUPPLY IN REPUBLIKA SRPSKA

The Zapece hydroelectric power plant in the Bosnian constituent republic of Srpska was completed in 2015. Consequently, KELAG, one of Austria's leading energy providers, now operates another plant at the western end of the Balkans. The power station project was managed by a 100% subsidiary of KELAG – KI-Kelag International GmbH (KI) – and went online after a construction phase of around two years in the spring of 2015. Two Francis turbines manufactured by GUGLER Water Turbines GmbH were installed to enable the plant to produce more than 15 GWh per year. The commissioning of the plant means the Carinthian energy providers can now make a significant contribution to the improvement of the electricity supply situation in the region.

The KI subsidiary was founded in 2009 by KELAG with the declared aim of expanding the energy provider's influence into south-eastern Europe. KI Project Manager Ingo Preiss explained the direction of the company's activities: 'Part of KELAG's strategy is based on the principle of ensuring we can produce energy for all our customers ourselves from renewable sources. In addition to using Austria's own waterbodies, this goal is also well-served by cooperating with states that were previously part of Yugoslavia, particularly due to their geographical proximity to Carinthia.' The volume of electricity currently produced by KELAG in the Balkan regions is around 200 GWh covering the annual consumption of approximately 33,000 average households.

BALKAN CONNECTION SINCE 2009

KI's involvement in the western region of the Balkans began around 7 years ago with the takeover of Interenergo d.o.o, a Slovenian

company that already had several licenses for the construction and operation of hydroelectric power plants in former Yugoslavian countries. As part of the takeover KELAG



The powerhouse shortly before it was commissioned in early 2015.

automatically acquired the right to implement existing plans and operate completed Interenergo plants in the entire Balkan region. KELAG subsidiaries are now responsible for running 11 small-scale power plants in Bosnia, Serbia, Kosovo and the Bosnian constituent republic of Srpska. Plans for another plant are currently being implemented in Kosovo.

UPSTREAM PLANT ALSO NEW

The Interenergo Zapece power plant on the River Ugar was commissioned for KI at the beginning of 2015. The new small-scale plant can produce a maximum power output of 3.5 MW and was built on a site very close to the upstream Novakovici plant completed in 2014. Two new Francis spiral turbines made by the Austrian manufacturer GUGLER Water Turbines GmbH form the centrepiece of the new plant.

The Upper Austrian turbine specialists from the town of Goldwörth had already previously supplied the hydroelectric infrastructure for the Novakovici plant. Consequently, the company was already well acquainted with the specifics of the locality and was able to submit the most attractive bid when the call for bids arrived. Another 'plus' was that GUGLER Water Turbines GmbH already possessed the requisite license to carry out hydroelectric projects in the Bosnian constituent republic of Srpska, having previously entered into a cooperative agreement with a regional partner.

COMPLICATED PIPE LAYING PROCEDURE

KELAG's authorised representative and project manager Ingo Preiss is an important point of contact between the Carinthian head office and the foreign subsidiaries. He described the installation of 5,744 m high pressure pipeline as the greatest challenge posed by the entire hydroelectric power plant project: "Without a doubt building the high pressure pipeline was the toughest challenge we faced. Almost the entire pipe trench along the bed of the River Ugar was flanked by steep slopes. This meant it was only possible



The tried and trusted one-third-to-two-thirds combination of two Francis turbines enables the plant to optimise the exploitation of often strongly fluctuating flow volumes.

to install short sections of pipeline at one time. In order to minimise the risk of damage due to hillside slippage, as soon as the pipeline sections had been laid the trenches were filled in immediately."

Furthermore, there were considerable difficulties in keeping water out of the trench and it was necessary to take steps to minimise the risk of flood damage. The entire pipeline was constructed using DN 1800 GRP pipes made by the German manufacturing company AMIANTIT and delivered by the Austrian pipe distributors Etertec GmbH & Co KG.

KELAG COOPERATES INTERNATIONALLY

In general, when awarding contracts and implementing hydroelectric projects in Balkan countries, KELAG relies on a blend of local and Central-European companies. KELAG kept faith with this proven approach when building the power station at Zapece. The water catchment system was equipped with a self-cleaning Coanda protection rake made by Wild Metal GmbH of South Tyrol.

Wild Metal was responsible for the fine grade grille of the 'Grizzly' Coanda systems; whereas the remainder of the steel water catchment structure was constructed by a Bosnian company. The rest of the steelwork of the weir system, plus the production and installation of the feed and flush protection structures, was provided by another local business in accordance with KELAG's own planning documents.

1/3-TO-2/3 SOLUTION ENSURES OPTIMISED ENERGY PRODUCTION

The well-tried and trusted 'one-third-to-two-thirds' machine solution was chosen for the power plant in Zapece to deal with the extreme fluctuations that can be expected in the flow volumes of the River Ugar. To this end GUGLER Water Turbines GmbH supplied and installed two differently dimensioned Francis spiral turbines.

The smaller machine is used when there is little available water and can produce 1335 kW of power, rotate at 1000 rpm and deal with a water volume of up to 1.85 m³/s. The larger turbine can generate a maximum output of 2537 kW, and cope with a flow volume of 3.65 m³/s at 750 revolutions per minute. Current transformation is done by two horizontally coupled synchronised Hitzinger generators.

GUGLER Francis spiral construction turbines are the ideal technical solution for effective, environmentally friendly energy production under local conditions with a medium gross head water drop of 82m. "One of

Technical Data

- Flow Rate: 5,77 m³/s
- Head: 82 m
- Turbines: 2 x Francis
- Manufacturer: GUGLER Water Turbines GmbH
- Output Turbine 1: 2.537 kW
- Output Turbine 2: 1.335 kW
- Generators: 2 x Synchronous
- Output Generators: 2.950 kVA/1.550kVA
- Manufacturer: Hitzinger
- Penstock: 5.744 m
- Material: GRP DN 1800
- Annual Energy Capacity: 5,77 GWh



The most complicated part of the construction process at the Zapece power plant was the laying of around 5.5 km of DN 1800 high-pressure pipeline.



The Carinthian energy provider KELAG now operates more than ten small-scale power stations in the Balkan regions via its subsidiaries.

these tried and trusted machines can work to a capacity of 10 MW and with their standardised design they are extremely effective. The turbines are exceedingly economical and have a very long working life” outlined the company’s chief executive Alois Gugler. On top of the turbines and generators, the company – now run by the third generation of the family – also supplied, assembled and installed the hydraulic power units used to regulate turbine performance, as well as two butterfly valves: DN 1100 and DN 800.

ONLINE SINCE SPRING 2015

Delivery and installation of the entire range of electro-technical equipment for the plant was carried out by the electrical technology specialists ABB via the company subsidiary in Zagreb. Modern SCADA interface control and monitoring technology enabled the power plant

to be hooked up with KELAG’s headquarters in Klagenfurt, the capital city of the province of Carinthia, allowing it to be completely remotely controlled. “We achieve additional operational security by employing well-trained staff at the site who are notified via e-mail and text messaging whenever there are operational interruptions at the power plant, and can react immediately if necessary”, explained Ingo Preiss. KI’s project manager drew a positive general conclusion as regards the power plant that went online officially in the spring of 2015. Overall it was a very wonderful and challenging hydroelectric project. Despite the accompanying difficulties it was implemented excellently. The new power station is particularly beneficial for the local population. The commissioning of the plant marked a further important step towards achieving full-coverage electricity provision throughout the region.

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