STORING UP NE STREAMS FOR H

The age of large-scale battery energy storage for

ANDRITZ Hydro has formed a new partnership with Mercedes-Benz Energy to offer large-scale energy storage in combination with hydropower. Designed to meet the needs of a more diversified market and generate additional revenue streams for our customers, the new venture ties battery storage with hydro power to maximize the earnings potential of hydropower assets.

Large battery energy storage systems are becoming more widely accepted around the world with a growing volume of utility-scale battery storage systems already operating successfully. Typically connected to the electricity grid, large-scale energy storage supports transmission service operators (TSOs) in ensuring system stability but can also store enough renewable energy to power hundreds of thousands of homes.

The main drivers for this development are rapidly falling battery prices and ongoing technological progress that is allowing batteries to store ever-larger amounts of energy cheaply and efficiently. One of the key players in the sector is the global automotive industry, which is continuously developing smaller, cheaper, and more powerful lithium-ion batteries for electric vehicles.

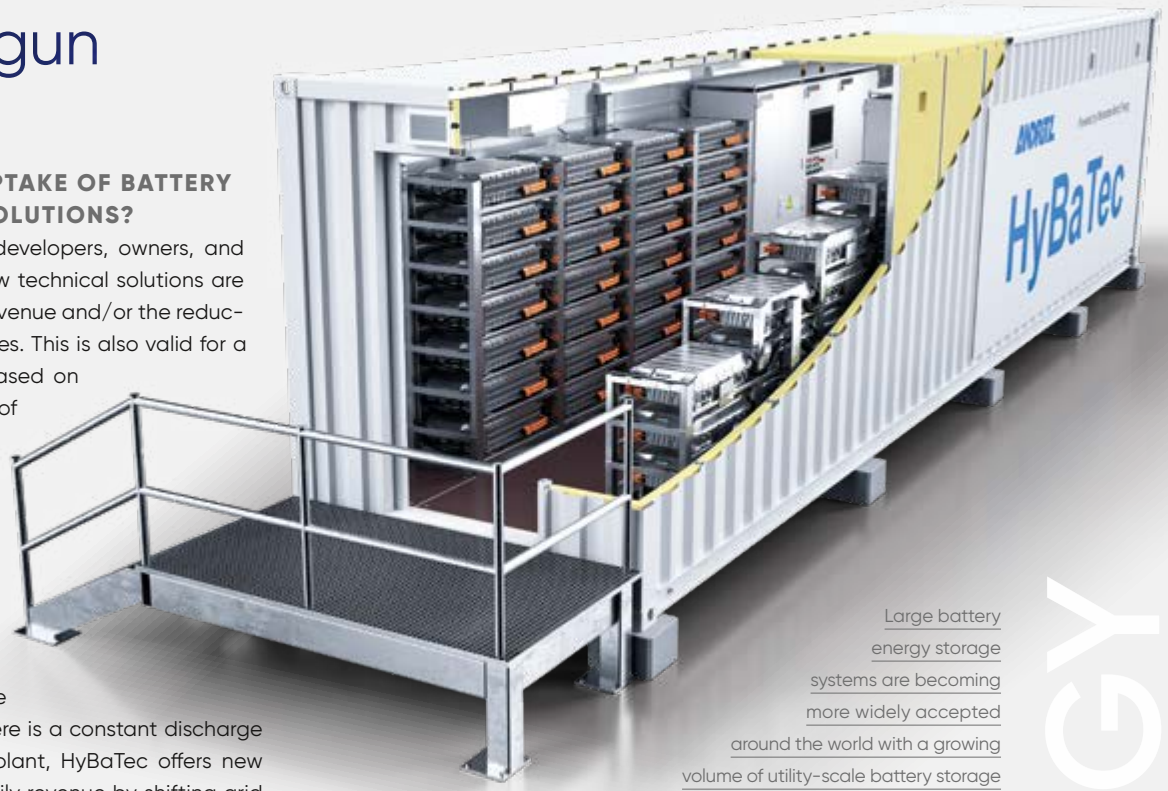
TWO STRONG PARTNERS – ONE INNOVATIVE HYBRID SOLUTION

Always a technology pioneer, ANDRITZ Hydro is one of the first global suppliers to offer a hybrid solution pairing a large battery with a hydropower plant. In December 2020, ANDRITZ Hydro and Mercedes-Benz Energy (MBE) signed a cooperation agreement to promote and supply HyBaTec – the most modern hybrid energy storage solution for the hydropower market.

TECHNOLOGY — HYBATEC

W REVENUE YDRO

hydro has begun



Large battery energy storage systems are becoming more widely accepted around the world with a growing volume of utility-scale battery storage systems already operating successfully.

WHAT IS DRIVING UPTAKE OF BATTERY ENERGY STORAGE SOLUTIONS?

Key drivers for investors, developers, owners, and operators interested in new technical solutions are the potential increase in revenue and/or the reduction in operational expenses. This is also valid for a hybrid battery solution. Based on the rapid response time of the whole system and the wider energy range, additional, and until now untapped, business opportunities are potentially available for owners that can deliver additional revenue streams from services like primary control. Where there is a constant discharge through the hydropower plant, HyBaTec offers new possibilities to increase daily revenue by shifting grid supply from base load to peak load tariff periods. There are other economic benefits too. A lot of hydropower plants around the world are older than 40 years and the challenge of modern grid codes and the volatility of renewables like wind and solar have a direct impact on the mechanical components of a hydropower plant. HyBaTec has the potential to reduce these impacts and smooth the operation of the units. This reduces stresses and leads to an extended lifespan.

"ANDRITZ Hydro's HyBaTec is a dedicated hybrid solution for the hydropower industry, combining a turbine-generator unit with a battery able to meet new requirements and future demand."

WHEN SHOULD I CONSIDER A HYBRID BATTERY SOLUTION?

It doesn't matter if it's a greenfield or brownfield hydropower plant – it is always possible to benefit from a hybrid energy storage project. At the project development stage, it could offer new technical designs that can reduce the civil and electro-mechanical capital investments needed. For existing projects, it provides an interesting solution to emerging market challenges by widening the energy output range and increasing the flexibility of the plant.

→

WILL HYBATEC FIT MY PLANT?

Battery-based hybrid solutions have a huge variety of possible applications in hydropower and can be integrated into all types of plants. Low head, high head, run-of-river and across all output sizes from the smallest to the largest hydropower projects, every plant is suitable for additional battery storage capability. Typically, battery capacities range from 500 kWh up to 30 MWh, depending on the specific use case.

In large-scale applications, HyBaTec is able to provide a new approach to compensate for the mechanical stresses found inside penstocks. For mid- to small-size or run-of-river stations, the most requested additional functionalities provided by the HyBaTec system are energy shifting (arbitrage) from base load to peak load or for providing ancillary services for the grid. Island operation or black start capability is also possible, another particular advantage in some communities and rural areas, for example.

In addition to conventional hydropower applications, HyBaTec is also able to integrate with new hybrid technology approaches such as floating PV, or co-located smaller wind, solar, or tidal current energy generation.

AUTHOR

Jens Päutz
hydronews@andritz.com

HYBATEC PRODUCT PORTFOLIO

- HyBaTec Grid (services)
- HyBaTec Storage (energy arbitrage)
- HyBaTec Lifetime

A combination of more than one of these functions is possible, as well as additional features such as virtual inertia, black-start capability and island operation.

HOW DOES HYBATEC WORK?

The hydropower plant – Renewable hydropower technology is proven and reliable but can face limitations to smooth operations during rapid responses needed to manage grid volatility.

Battery energy storage system (BESS) – Featuring the most modern automotive Li-Ion battery solution for rapid response short-term storage capacity.

The HyBaTec controller – Managing operational setpoints for both the hydropower plant and the BESS, the controller takes into account all necessary parameters such as required operations, schedule, hydropower unit and battery status, for example.

Result – A wider operational energy range, faster response times, the highest operational flexibility and longer asset lifetimes.

COOPERATION WITH MERCEDES-BENZ ENERGY

A cooperation agreement with Mercedes-Benz Energy fuses more than a century of market-leading expertise in hydropower technology with cutting-edge innovative battery technology. This partnership opens up new opportunities for hydropower asset owners and operators.

"The cooperation with a world-renowned automotive manufacturer enables us to offer a top-tier, powerful and innovative large battery energy storage system to add value for our customers."

Different battery types are used in Mercedes-Benz AG's electric and plug-in hybrid vehicles depending on the application

The Mercedes-Benz battery is one of the most efficient in its class. An automotive battery made to the highest quality and safety specifications (TS 16949), it originates from the same production line as the batteries used in Mercedes-Benz AG's electric and plug-in hybrid vehicles.

A NEW DIMENSION IN ENERGY MANAGEMENT

Compared with a conventional hydropower application, the hybrid energy solution offered by ANDRITZ Hydro and Mercedes-Benz Energy can significantly enhance the operational range and flexibility of a hydropower unit.

Increasing revenue and decreasing operational expenditure are key to improving the economics of a hydropower plant. Both are addressed by HyBaTec. For proven and hardworking hydropower plants, the rapid response capability of the battery can smooth the impact of grid volatility and therefore contribute to a longer healthy lifetime. HyBaTec also opens up new and previously untapped business opportunities in a growing market.

MERCEDES-BENZ ENERGY GMBH

Mercedes-Benz Energy develops innovative energy storage solutions based on automotive battery technology used in Mercedes-Benz AG's electric and plug-in hybrid vehicles. Based in Kamenz, Germany, the company is a subsidiary of Mercedes-Benz AG. Mercedes-Benz Energy GmbH, in cooperation with partners from the energy industry, is bringing batteries from the electric vehicle to the grid. The spectrum for large-scale storage applications includes time shifting renewables, peak load balancing, black start (starting power plants without grid power) and uninterruptible power supply systems. The company is particularly focused on second-life battery storage applications, maximizing the potential of a battery by extending its life cycle. Their first second-life battery storage system went online in Lünen, Westphalia in October 2016.