

# Re-using depleted mines for energy storage

thyssenkrupp Uhde South Africa has signed a pre-feasibility study with Pumped Hydro Storage Sweden for a project that involves storing renewable energy at low cost with high efficiency using depleted underground mining infrastructure.

thyssenkrupp Uhde South Africa and its international partners are now collaborating to facilitate underground mine repurposing.

Last year thyssenkrupp Uhde signed a cooperation agreement with mining rehabilitation specialist Wismut GmbH in Germany. This international cooperation agreement has now been expanded by an agreement with Pumped Hydro Storage Sweden to execute a pre-feasibility study for the Renewable Underground Pumped Hydroelectric Energy Storage project (RUPHES) on a specific site belonging to a South African mining company.

With fast increasing renewable energy generation, there is a greater need for energy storage. Renewable Underground Pumped Hydroelectric Energy Storage (RUPHES) in repurposed mines – coupled with solar and wind power – can reliably provide green energy when it is needed. Repurposing of depleted gold mines for RUPHES enables short construction schedules and significantly reduced costs because gold mines already have the underground water storage reservoirs that are commonly the mostly costly components of pumped hydro plants. They just have to be adapted to their new energy storage purpose.

This is exactly what Pumped Hydro Storage Sweden does. It is part of the

company Sustainable Energy Solutions and is currently developing a 2.0 MW/8.0 MWh underground pumped energy storage project in an abandoned iron mine in Aland, Finland. The project has the support of both the European Commission and the Swedish Energy Agency, and they are looking to commission the project in December 2023. This project demonstrates the reduced construction schedules and costs associated with utilising mining infrastructure for pumped energy storage, as did a similar project at the Kidston gold mine in Australia.

## Well-proven, cost-competitive solution serving a major trend in Africa

As probably the most mature energy storage technology currently available, pumped hydro accounts for 97% of the global storage capacity. Exceptionally high hydraulic heads and stable hard rock geology render ultra-deep gold mines ideal for implementing the concept, and for producing internationally cost-competitive, reliable green electricity as well as green hydrogen and green ammonia.

Just for comparison, in June 2021, a South African gold mining company announced that it was able to produce electricity from solar power at 1.1 c/kWh (US\$). This pricing is nearly on par with the best inter-

national solar pricing 1.04 c/kWh, achieved in competitive bidding in Saudi Arabia. The fact that South Africa has world-class solar and wind resources is gaining traction with both government and industry, particularly in the light of the fact that it is cheaper to provide electricity from South African renewables than it is to provide power by importing foreign gas.

tk-Uhde combines unique technological expertise and decades of global experience in the engineering, procurement, construction and service of chemical plants. The company is developing innovative processes and products for a more sustainable future, contributing to the long-term success of its customers in almost all areas of the chemical industry. Its portfolio includes leading technologies for the production of basic chemicals, fertilisers and polymers as well as complete value-chains for green hydrogen and sustainable chemicals.

Wismut GmbH was established in 1991 to remediate uranium-mining sites in southeast Germany left behind by the SDAG Wismut, the world's largest single uranium producing enterprise during the cold war. Wismut now increasingly focuses on developing innovative and sustainable solutions for mine closure and post-closure development and remediation.

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