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## Press Release

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## Ensure reliability of renewable South African energy - thyssenkrupp Industrial Solutions (tkIS) signs MoU with Wismut to deliver Renewable Underground Pumped Hydroelectric Energy Storage (RUPHES) projects in depleted gold mines

*thyssenkrupp Industrial Solutions (tkIS) South Africa combines global expertise and expertise from Wismut, with local project execution know-how for efficient, reliable, flexible and cost-effective delivery of Renewable Underground Pumped Hydroelectric Energy Storage (RUPHES) projects.*

Following the successful court judgement against NERSA, industrial consumers will be paying R 1.28/kWh for electricity by April 2021. Consumers may be wondering why they should pay this in South Africa, a country that has abundant, world-class renewable resources.

These abundant renewable resources translate into cheap renewable power. The actual agreed energy tariff with IPP's in 2016 was R0.62/kWh for new solar and wind. There are current reports that renewables could drop further to R0.40/kWh.

The challenge with renewables is ensuring reliability. For this customers need energy storage. Converting renewables to synthetic fuels provides a level of back-up and is likely to be part of the energy mix, specifically for green synthetic aviation fuel or heavy haulage trucks. The round-trip efficiency for conversion of electricity to hydrogen and then to back electricity, is around 30%. With battery and pump storage the round-trip efficiency is 80%. The primary difference between batteries and pumped storage is that pumped storage plants last for

50 years plus using a tried and tested technology while equivalently priced batteries of lower maximum capacity last for less than 10 years.

Not only is South Africa endowed with cheap and abundant resources, the country also has the capacity for extensive underground pumped energy storage in its gold mines. Many of the gold mines are either depleted or are approaching end-of-life. Gold mines are perfect for a number of reasons. Firstly, the hard rock provides a stable geology and keeps stored water clean. Secondly, many gold mines are below water-rich karst aquifers that supply clean water to the mine below. Thirdly, South African gold mines are some of the deepest mines in the world up to four kilometres deep, which allows more energy storage per unit of water. Lastly, the gold mined in the past has already fully paid for the excavation of large underground void space needed to store water, significantly reducing construction costs.

thyssenkrupp Industrial Solutions (tkIS) has signed a Memorandum of Understanding (MoU) with Wismut. This builds on extensive work that Professor Frank Winde undertook with a consortium including South African and other German research organisations in 2017. Prof. Winde was then with the Mine Water Research Group, and now with Wismut in Germany.

Current financial constraints in the power sector and decision to suspend these projects provides an opportunity for customers who wish to self-generate, or utilise an IPP to generate. tkIS with Wismut are now in the position to offer feasibility studies leading to full project execution for cheap reliable renewable energy. As an added benefit the revitalised mine with a RUPHES provides clean water indefinitely in water scarce regions. With power increasing to R1.28/kWh these projects have an attractive business case.

tkIS has engaged with IPP's and are looking to participate in the fifth independent power procurement program. Corporate customers have the option to focus on their core business and allow the IPP to invest in the RUPHES self-generation and thereby use this image-enhancing environmentally friendly and sustainable technology.

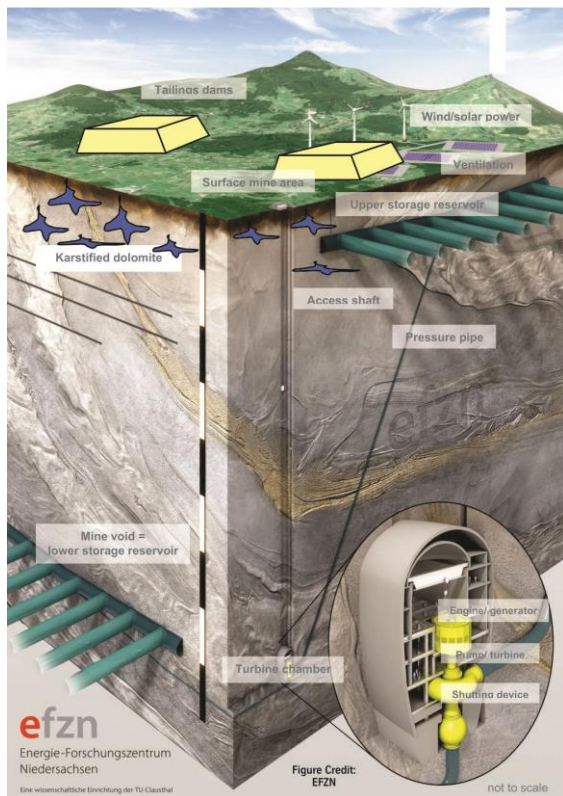
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About us:

thyssenkrupp Industrial Solutions AG is a leading partner for the engineering, construction and service of industrial plants and systems. Based on more than 200 years of experience we supply tailored, turnkey plants and components for customers in

the chemical, fertilizer, cement, mining and steel industries. Around 11,500 employees worldwide form a global network with a technology portfolio that guarantees productivity and cost-efficiency to the highest extent possible.

For more information visit: [www.thyssenkrupp-industrial-solutions.com](http://www.thyssenkrupp-industrial-solutions.com)



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