

Weir highlights big energy-saving opportunities in comminution

At a COP28 panel discussion in UAE in December, Paula Cousins, Chief Strategy and Sustainability Officer at Weir revealed the highlights of a comprehensive study into opportunities for reducing energy use and emissions in crushing and grinding operations.



The Weir Group PLC, a global mining technology leader, has completed a comprehensive study that highlights a significant opportunity to reduce energy use and emissions in comminution – the rock crushing and grinding process that is key to minerals extraction and consumes around 3% of the world's electrical power each year. The study shows that replacing conventional technology with innovative solutions can cut energy use by 40% while also avoiding 50% of CO₂e (equivalent) emissions.

Speaking at a COP28 panel discussion hosted by the Ministry of Economy, Trade and Industry of Japan and moderated by the World Business Council for Sustainable Development (WBCSD), Paula Cousins, Chief Strategy and Sustainability

Officer at Weir revealed the details of the study that demonstrates how using innovative technologies to crush and grind rocks can yield significant sustainability benefits at lower operating cost.

The findings of the study come at an important time. Metals, such as copper, nickel and lithium are critical elements of the technologies that will power a low carbon future and it is widely accepted that a substantial increase in the production of these metals is needed for the transition to net zero. In response, the mining industry is actively seeking to adopt innovative technologies that extract and process those metals in more energy efficient and sustainable ways, alongside increasing the use of renewable power.

Weir's study focuses on comminution – the crushing and grinding process

that turns big rocks into tiny particles to expose the entrapped minerals so they can be extracted later in the process. Comminution is the most energy intensive stage of a typical mine site process. It is already electrified and is responsible for at least one-third of an average mine's energy use and CO₂e emissions and globally consumes around 3% of the world's electrical power. [CEEC International, 2021: Mining Energy Consumption: <https://www.ceecfuture.org/resources/mining-energy-consumption-2021>].

Given its energy intensity, the decarbonisation opportunities in comminution are huge, with the basic comminution process not having changed significantly for many decades. Weir is collaborating with customers and other partners to redefine the process, developing innova-

tive combinations of proven technologies to make significant improvements to efficiency and environmental performance.

Unveiling the study during the panel discussion at COP28, Paula Cousins, Chief Strategy and Sustainability Officer at Weir said: "The need for technology solutions in mining is compelling – the world needs more transition metals to achieve net zero, but the mining industry needs to extract these using significantly less energy and water.

"Our new, externally assured study highlights the potential for energy savings of 40%; and for 50% of CO₂e emissions to be avoided in comminution, the most energy-intensive stage of mining processes. By adopting a systems-based approach to technology collaborations, we can help the mining industry scale up and clean up at the same time."

About the avoided emissions study

The study is the first to utilise World Business Council for Sustainable Development's (WBCSD's) Guidance on Avoided Emissions to study mining processes – and the avoided emissions' results have been independently assured by SLR Consulting Limited. Three of Weir's technology combinations were evaluated against a conventional comminution circuit design for an archetypal mine processing 15-million tonnes of copper ore per year in Chile.

The SLR avoided emissions assessment and compared GHG emissions resulting

from four different mining circuit configurations. These four assessments evaluate three optimised technology combinations against a conventional comminution circuit design for a mine processing 15-million tonnes of copper ore per year.

Each circuit is based on a 'rock to recovery' system boundary – reducing rock direct from the mine to a size that enables the mineral to be recovered. The conventional comminution circuit and the three improved configurations are:

- A conventional comminution circuit based on a semi-autogenous grinding (SAG) mill and a ball mill: used as the traditional base line for the study.
- The use of a Weir Enduron® HPGR (high pressure grinding roll) to replace the SAG mill at the initial grinding stage.

- The use of the Weir Enduron® HPGR with a vertical stirred mill (VSM) to replace both the SAG mill and the ball mill, respectively.
- The addition of a coarse particle flotation (CPF) unit to the above configuration, which was the optimal energy-efficient combination.

All three of the energy-efficient Weir technology combinations (2, 3 and 4) have shown yield sizeable benefits versus the traditional circuit (1). In the optimal combination (4), the comminution process consumes around 40% less energy and can avoid up to 50% of the CO₂e emissions compared to a traditional circuit.

Importantly, there is no trade off elsewhere, as the redefined processes all also use less water.

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Hytec SA empowers Harrismith communities

Hytec South Africa recently provided funding for Reel Life to combat food poverty, insecurity and malnutrition in Harrismith, South Africa. It recognised the need for self-sufficiency and donated 300 units of Garden in a Box through Reel Life.

The communities of Skoonplaas, Intabazwe and Tshiame were chosen for their pressing need for social development and the significant challenge of food insecurity. A total of 150 Garden in a Box units were distributed in the Tshiame Community and another 150 across Skoonplaas and Wilgepak. Each unit contains envelopes for each month of the year and includes 60 seed sachets of seasonal vegetables for all four seasons; organic fertiliser sticks; and a watering spout. Training was provided to the communities and all households planted their gardens by late last year.

The Garden in a Box serves as an ideal initiative to foster sustainable food security solutions in communities facing food and hunger challenges. The project further contributes to cultivating and enriching communities' agricultural and entrepreneurial capabilities, equipping residents with skills to generate income from their harvested produce.

"We are proud to say that this community can now potentially have food security for over 1 200 people in the area. We look forward to the progress of these gardens through regular weekly and monthly visits, which will be carried out by Reel Life," said Patricia Dodgen, Hytec South Africa.

"Reel Life's overarching goal is to achieve food security for 500 000 beneficiary partners by 2025," says Dineo Mahasha, Managing Director, Reel Life. "This ambitious objective relies on valu-

able partnerships like the one established with Hytec," she concludes.

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