Hydro-Electrical Power Potentials in the Peruvian Mining Industry

Y Feldmann[1], G Blauermel[2], M Roth[3], B Alapfy[4], T Hillig[5] and BG Lottermoser[6]

1. Research Assistant, Institute of Mineral Resources Engineering, RWTH Aachen University, Aachen Germany 52062. Email: feldmann@mre.rwth-aachen.de
2. Research Assistant, Institute of Mineral Resources Engineering, RWTH Aachen University, Aachen Germany 52062. Email: blauermel@mre.rwth-aachen.de
3. Research Assistant, Chair of Hydraulic and Water Resources Engineering, TUM Munich, Munich Germany 80333. Email: moritz.roth@tum.de
4. Research Assistant, Chair of Hydraulic and Water Resources Engineering, TUM Munich, Munich Germany 80333. Email: bertalan.alapfy@tum.de
5. Managing Director, Dr. Thomas Hillig Energy Consulting - THEnergy, Munich Germany 80333. Email: thomas.hillig@th-energy.net
6. University Professor, Institute of Mineral Resources Engineering, RWTH Aachen University, Aachen Germany 52062. Email: lottermoser@mre.rwth-aachen.de

Keywords: hydropower, tailings, heap leaching, mineral processing

HYDRO-ELECTRICAL POWER POTENTIALS IN THE PERUVIAN MINING INDUSTRY

For the last decades, the mining sector has mainly relied on fossil fuels to meet its energy demand in the extraction and processing of mineral resources. Recently, mining companies have increasingly begun to incorporate renewable power sources into their operations. In Peru, hydropower has traditionally been a reliable major source of energy but in recent decades its share in national power generation has fallen significantly. Simultaneously, the energy demand of the Peruvian mining sector is expected to further increase.

The multi-national collaborative research project SmartH_2OEnergy aims to develop comprehensive concepts and applications that help to unlock the untapped hydroelectric power potential in the mining sector of Peru. In a first step, mine water balances were analyzed for large water volumes resulting in points of interest, which were further investigated regarding water quality and drop height. This analysis resulted in 7 potential scenarios for the utilization of hydro-electric power production within the mine site or in the direct vicinity of Peruvian mines. Evaluation of scenarios was done with freely accessible data gathered by satellite images, technical reports, and simulations. Detailed evaluations and analyses show promising results and were done for scenarios covering natural waters in the direct vicinity of mines, process waters in mineral processing, hydraulic tailings transportation, and precipitation on heap leaching pads. Available and unconventional technologies for generating hydroelectric energy were evaluated and selected according to suitable criteria for each scenario and verified by CFD-simulations.

It is expected that the installation of small hydropower schemes at or around mine sites could have manifold positive outcomes: (a) The establishment of much-needed and long-lasting power infrastructure for local communities, (b) reduction of the reliance on unreliable electricity networks, and (c) reduction of the dependence on fossil fuels, and lowering of carbon dioxide emissions of the industry.