

Carbon Footprint Reduction with Continuous Mining Equipment

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ABSTRACT

The mining industry started to establish carbon emission reduction goals. There are different ways to reduce the carbon footprint in mining. The major source of carbon emissions in the mining process is the transport/haulage of ore and waste, especially over large horizontal and vertical distances. Diesel fuel is mainly used in trucks. Leveraging new technologies such as green hydrogen as replacement for diesel may be one option. Another option is to shift the energy consuming transport to conveyor technology driven by electricity produced by renewable fuels.

RWE TI is an international mining consulting firm, and the RWE group owns and operates three mines in Germany with an annual output of 90 mill. tonnes of brown coal and a waste removal of more than 450 mill. bank cubic meters. For more than 60 years, the enormous amount of material is moved by shiftable in-pit conveyors driven by electricity. Experience gained in this application of the largest in-pit belt conveyors in the world (38 000 t/h, 250 km total length, 7.5 m/s, 2.8 m width) has been transferred into other commodities like copper and iron ore successfully for many years. Since the coal based electricity production will cease in Germany by 2038, RWE committed to be a global leading provider of renewable energy and innovative engineering services.

The authors performed a comparison of a shovel and truck base case with an adopted classical strip mine utilizing different In-Pit Crushing and Conveying (IPCC) technologies, hence continuous mining and transportation variants. The required change in mine planning, the new technology components and specific equipment productivities are considered on the basis of RWE's experience. CAPEX, OPEX and the potential reduction in GHG emissions are calculated for life of mine. The results show a significant carbon reduction (30-85 %) potential depending on the energy mix used, accompanied by significant savings in OPEX.