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BioEnergy, a proven mine closure solution

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The South African mining industry needs to commit to and provide for sustainable land use practices during and after mining projects. Successful economic reintegration of post-mining landscapes is still to be proven and examples are urgently sought after. Renewable energy production on current and post mining-impacted land is a concept that is gaining significant traction. Solar generation projects are considered and pumped storage schemes are also in the planning phase. However, bioenergy generation provides a greater array of benefits both during and after active mining. Some of these benefits include: Climate change opportunity and resilience; Green House Emission reductions; Land contamination clean-up through phytoremediation; Reduced energy costs over time; Feasible post-mining economy. Generation of compressed natural gas (CNG) from biomass grown on mine-impacted land, such as mine waste footprints, rehabilitating open-cast, spillage sites and others has been proven and is continuing to be proven from different sites and across commodities. The CNG generated is being used for metallurgical processing, providing backup generator fuel and has great potential to power mine vehicles at lower costs than conventional fuels. Establishment of biocrops is however more expensive than conventional rehabilitation practices but delivers superior returns when compared to intensive or extensive grazing land use systems, or food crop production. Our case study has shown project break-even after five years, with an expected infrastructure lifespan of >20 years. Feasibility studies on other projects have shown five to seven-year payback periods. The economic model strengthens where significant mine-impacted water exists in proximity to impacted biocrop areas, as the cost of water treatment shifts to biocrop production to improve biomass yields and therefore CNG production. Where CNG plants and biocrop production is established during active mining to reap production and compliance benefits, the model can be extended to post life-of-mine through long-term energy offtake agreements that ensure ongoing plant operation and therefore sustainable enterprising, job creation, and a business case for land remediation.

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