

TRENDS AND OPPORTUNITIES – MINING AND METAL WASTE

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CURRENT TRENDS IN THE MINING AND METAL WASTE SECTOR

- High-grade resources are becoming depleted while there is a growing demand for minerals and metals (critical mineral raw materials - Europe)
- **Waste is a resource**; reuse and recycling of waste material will contribute to satisfy the growing demand for resources worldwide
- **Drive to develop technologies** for treatment of metal-containing waste. Plant simplicity and cost-effectiveness are key factors
- **Metal recovery** from the wastes can finance relocation and remediation
- **Alternative uses** of waste materials e.g. the use of slag in manufacturing of bricks, road construction material and concrete. Contribute to employment generation, economic development
- Drive to optimise current extraction processes to lower energy consumption, generate smaller carbon footprint, increase efficiency and **minimise waste production (harmless)**
- **E-waste management**: collection, development of cost-effective recycling processes, raising public awareness (multi-faceted)

OPPORTUNITIES FOR THE MINING AND METALS WASTE SECTOR

Waste from extracting and processing mineral resources is one of the largest waste streams in South Africa

- Historic mine dumps (Au and U) from previous operations
 - Inefficient extraction processes, potential for AMD generation
- Tailings from current mining operations
 - Recovery of Au, U, PGMs and base metals
- Slags, slimes and dust from ferrochrome, steel plant industries
 - Cr recovery, re-use slags for road and building construction
- Brines and sludges produced during water treatment processes
 - Recovery of potentially saleable compounds, reduce disposal cost
- e-waste (electronic and white goods, light bulbs, batteries)
 - Fastest growing waste stream in South Africa
 - Recovery of Au, Ag, PGMs, rare earths, base metals
 - Job opportunities for both the formal and informal sector

OPPORTUNITIES FOR THE MINING AND METALS WASTE SECTOR

Technologies for reprocessing of mine tailings and metallurgical residues

- Upgrading of waste material, using minerals processing techniques
 - Scale of operation for treatment of gold tailings is massive
 - Flotation, gravity and magnetic separation, sensor sorting
- Extraction/refining of metals:
 - Hydrometallurgy, bio-hydrometallurgy (bioleaching), pyrometallurgy

Technologies for e-waste treatment

- Technologies are available, but are costly to import
- Opportunity for local development of technologies for recycling of e-waste
- Challenges include collection, sorting and treatment of complex, heterogeneous products
- Use of nanomaterials introduce a new spectrum of materials

OBSTACLES TO MOVING FORWARD

- SA waste legislation is in line with global trends, however, enforcement and monitoring difficult.
- Policy, bureaucratic processes and slow licencing can in some cases constrain innovation e.g. waste classification. Reuse therefore not always viewed positively by industry.
- Collaborative efforts between academia, research institutes and industry required for waste technology development.
- Technologies are available for the treatment of waste streams, but in many cases need to be demonstrated on larger scale. Lack of adequate funding can be a stumbling block.
- Although waste is a potential resource, treatment processes have to be financially viable compared to landfill.
- E-waste – collection, awareness, legislation, need for data, cost of treatment processes.