WMF 2021: Key messages PS1

The pandemics has accelerated structural trends on Copper and Battery Materials: increased demand and regionalization of supply chains

New Green mines and Research for Substitutes will be the priorities for materials that remain/become Red: Copper, Battery Materials, Tungsten, Neodymium & Praseodymium

The introduction of a new environmental dimension has worsened the scores of some new rare earth elements (Germanium, Selenium and Tellerium become Red/Orange) and could worsen this of Nickel

PGM group materials also have a net balanced outlook given energy and car drive train dynamics.

WORLD MATERIALS FORUM

A. Balance needs to be considered between new generation of high technologies and available supply of "green" materials in countries with middle/ low geopolitical risk (Australia, North America … or Peru):

1. Processing Indonesian NPI into matte may answer short term pressure but at high environmental cost;

2. Key "green" projects need to focus on lower CO2 but even more on lower energy and water consumption: Copper Quellaveco in Peru, Nickel Sunrise in Australia or REE refining in Mountain Pass all due by 2022.

B. Supply chains move from long and lean to resilient and local:

1. European actors (BMW, Mahle …) develop electric motors with no rare earth because they cause pollution… and because they are mined in China (big automotive competitor)

2. North America technically does mine enough nickel but there are serious gaps in the supply chain (in region offtake is needed to develop nickel sulphate capaciy)

3. Long term supply contracts between miners and car makers are on the agenda

C. Lessons learnt from Battery Materials: New high technologies will need to “think” more in advance and conduct prospective studies about their future supply of raw materials

1. Europe is slowly recovering its independence in EV cells (33% in 2025 vs 7% in 2020) but there is no or little progress for PCAS, nickel sulphate, lithium hydroxide or cobalt (max 9% in 2025)

2. The road to green power will rely on a complex landscape of power generation and energy storage technologies with a resulting difficulty to predict which combination of raw materials will be required .

3. Cooper role in grid expansion & infrastructure will be a key subject of attention. Substitution thanks to Materials Science for some applications (conductivity) or transition scenarios requiring less new infrastructures (ammonia) could be key to ensure long term stable trends

4. Other materials may become critical such as Palladium for hydrogen deployment or Germanium for new generation of electronics.