INSIGHTS FROM APPLYING DIFFERENT ASSESSMENT METHODS FOR METALS RESOUCE USE

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Society's increasing metal demand raises a number of concerns. In the shorter term, there may be risks to for constraints on expanding extraction to meet a rapidly increasing demand, causing supply disruptions and price volatility which especially affects import-dependent regions. The ongoing transition to renewable electricity production based on wind and sun and to electrified vehicles may even be delayed because of lack of required metals. In the longer term, continued extraction depends on decreasingly concentrated ores and may risk to eventually cause depletion. Metal use is also associated with significant environmental impacts, through life cycle energy use and locally from mining. The social impacts of so-called conflict minerals are undisputable. Companies and public policy makers wishing to act on these concerns are faced with a multitude of issues and potential solutions, such as circular economy, may involve trade-offs between different issues and consequently require decisions on what issues to prioritize. Ex-ante assessments can offer such decision-makers the opportunity to study potential implications of different actions before-hand. However, it may be challenging to discern the purpose of the multitude of methods that exist and what aspects of metal resources they in fact address. Furthermore, can methods be used in a complementary way or are they overlapping? Are they appropriate for any context? This contribution aims to present insights gained from having applied a selection of different assessments methods to study how circular economy solutions affect metal use. The methods are life cycle assessment, criticality assessment, dynamic material flow analysis and circularity indicators. All are applied for studying various aspects of circular economy solutions for electric traction motors in passenger cars – an essential part of the drivetrain of all types of electric vehicles and one that requires several metals such as iron, copper, aluminium and rare earth elements. The methods have been applied in separate studies performed over several years (Huisman et al. 2017, André and Ljunggren 2020, Løvik et al 2021, Jerome et al. 2022) and have pointed to different potential actions to take for decision makers. In this contribution, the studies will be presented and compared to illustrate typical questions addressed regarding metal resource use and differences and similarities between methods. This may support a discussion on what methods to apply in what contexts as well as what methods to apply in a complementary manner, what methods to further integrate and what methods to develop. The goal is to support a purposive and more comprehensive and assessment of actions to reduce concerns about society's metal resource use.

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