## Abstract for ICRC

**Titel:** Criticality of raw materials for the energy transition

**Context:** Major problems of today's society are climate change and high resource consumption. Promising solutions are solar and wind turbines, which require raw materials and generate emissions only in their production phase. But their use of critical elements raises new challenges.

**Content:** In order to reach climate targets, the study relies on quantifying the raw material demand of photovoltaic technologies in Germany by 2050 based on Viebahn et al. (2015) and determining possible future supply constraints by using color coding for criticality based on the methodology of VDI (2016). The methods utilized are criticality analysis and scenario technique and the scope includes the elements indium, tellurium, gallium, cadmium and selenium and the indicators depletion time and by-product dependency.

**Results:** The first result shows that today 4 of the 5 elements are critical in their availability for global usage. For the year 2050 scenarios have been developed by establishing different development lines for the global factors annual mining production and reserve and for the country-based factors photovoltaic expansion, market shares and specific material demand. The second result outlines that in 2050 the criticality is high to medium with both a high and a low global supply of raw materials. By integrating the demand of the German energy transition, high demand scenarios lead to a high supply risk while low demand scenarios lead to low criticality. Finally, indium and tellurium are indicated most frequently as critical, while for the rest no significant criticality can be indicated. The highest supply risk exists for the future usage of indium.

VIEBAHN, PETER; ET AL. (2015): Assessing the need for critical minerals to shift the German energy system towards a high proportion of renewables, in: Renewable and Sustainable Energy Reviews 49, 655 - 671

VDI (VEREIN DEUTSCHER INGENIEURE) (2016B): VDI 4800 Blatt 2 – Bewertung des Rohstoffaufwands, in: ders. (Hrsg.)(2016): VDI-Handbuch Ressourceneffizienz, Düsseldorf