A hidden environmental burden: including capital in the material footprint of final consumption

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The global use of materials has been expanding rapidly in the last century. As the manufacturing of goods becomes more globalised, international trade volumes keep rising and the supply chains of products become increasingly complex, making global flows of materials more difficult to follow. Environmentally extended multi-regional input-output analysis (EE MRIO) can be used to trace these material flows and to calculate consumption-based (CB) indicators of material use, which assign resource use to final consumers rather than producers. CB indicators, such as the material footprint, have been used to analyse whether countries have succeeded in decoupling resource use from economic growth. These indicators, however, are not well suited to calculate the resources embodied in the goods for final consumption, since they do not include the materials embodied in the capital goods. As roughly 50% of metals and 60% of non-metallic minerals are destined for capital formation, the material footprint of consumption as it is currently calculated greatly underestimates the materials used to produce final consumer products. In this paper, we introduce a new indicator of material use, which includes all the materials used along the supply chain, including those embedded in capital goods. Using the EXIOBASE3 EE MRIO database, we apply this indicator to calculate new material footprints that enable to assess whether an actual decoupling of material use from economic growth can be achieved, looking both at specific types of raw materials as well as aggregated measures of material use.