

How is Austrian RMC developing over time? A methods comparison extended

Nina Eisenmenger, Anke Schaffartzik, Dominik Wiedenhofer

Institute of Social Ecology, Alpen Adria University Klagenfurt Wien Graz, Schottenfeldgasse 29, A-1070 Vienna, Austria
nina.eisenmenger@aau.at

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Summary

The exchange of goods and the physical flows related to it gains high importance in discussing the sustainable use of resources of individual economies. Within the material flow accounting (MFA) framework, trade flows are considered at the time the good is crossing administrative borders. For a consumption based perspective, which is interested in accounting for all resources used for satisfying final demand of a country, the additional integration of upstream material use (also termed raw material equivalents, RME) of traded goods is required. Accounting methods for RME have been rapidly developed in the past century. For Austria, material consumption in the year 2007 increased from 25 t/cap (measures as DMC) to 32 t/cap (representing RMC).

Currently a number of different methods to calculate RME exist, mostly based on input-output tables applied in single-region- or multi-region input-output models, or hybrid LCA-IO methods. A methods comparison for Austria for the year 2007 presented the results of seven different calculation methods and found very different results. This methods comparison for 2007 is now expanded by a time series that is available for three MRIO and three hybrid LCA-IO models. With the time series analysis, we can compare trends in different calculation methods; in particular we can investigate whether all models identify Austria as a country that is increasingly outsourcing material use to other countries or not.

Abstract

Growing international trade activities require new indicators of material consumption within the material flow accounting (MFA) framework. Domestic material consumption (DMC = domestic extraction + imports – exports) no longer suffices to adequately reflect an economy's share in global resource use. The raw material equivalents (RME) of trade are calculated to include the upstream material inputs into the production of traded goods within material flow accounts and to provide a consumption based MFA indicator, termed raw material consumption (RMC) or material footprint. For Austria, for example, the RME of imports were about 3.5 times as high as the imports themselves in 2007 indicating that significant amounts of material were mobilized in other economies in order to produce these goods. At the same time, however, the RME of Austria's exports was about 3.4 times as high as the exports themselves because a relevant share of the economy's material imports was used in the production of exports. Thus, material consumption increases from 25 t/cap (measures as DMC) to 32 t/cap (representing RMC which includes RME of imports and exports).

Although indispensable to our understanding of international resource use, the calculation of RME is not yet part of standard material flow accounts and currently a number of different methodological

approaches exist. These range from single-region input-output (SRIO) to multi-region input-output (MRIO) approaches and from coefficient to hybrid methods, incorporating both input-output data and coefficients (most commonly derived from life cycle inventories). In a methodological comparison we calculated Austrian RMC for 2007 by using 7 different calculation methods: three hybrid IO-LCA approaches, among those an application of the Eurostat RME coefficients, and four MRIO approaches, i.e. GTAP, WIOD, EORA, and EXIOBASE. These 7 different methods result in very different results: RMC ranges between 21 t/cap (which is even lower than DMC) and 33 t/cap.

We will further expand this methods comparison for 2007 to a comparison of time series. The calculation of RMC data in time series is possible for the three hybrid LCA-IO approaches, as well as three MRIOs, i.e. WIOD, Eora, EXIOBASE. The comparison for the year 2007 highlighted the possible deviation of results. With the time series analysis, we can investigate whether the differences stay constant or change over time, i.e. whether the different approaches are different in levels but constant in trends. The analysis of time series, in particular will address the question whether Austria is increasingly outsourcing material use to other countries producing goods for domestic final demand. With these findings, we hope to make a contribution to the current debate on calculating RME (or material footprints) in order to understand RMC results and move towards a harmonization of approaches and international applicability.