

## **Choices and consequences of sector allocation of embodied emissions in global production systems**

Topic: Environmental input-output modeling V

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There are two main approaches of common use to quantify and allocate emissions responsibilities to countries: the production based approach and the consumption based approach. The first one is used by Kyoto Protocol to set appropriate national reduction targets. The second is widely used in the literature and increasingly included in policy measures (in the European Union Emission Trading Scheme, for example). The origin of the consumption base approach is not only the concern about fairness in the responsibility attribution to developing and developed countries, but mainly, and related to it, the concern about the role of consumption and international trade in the environmental impact of economic activities. In fact, globalization and offshoring process and the increasing international trade allows separating production and consumption activities, so the environmental impact of them are different and goes beyond the national borders. To analyse the complex network of global supply chains multiregional input-output (MRIO) models are very useful since they allow tackling with different technologies of production and environmental impacts by country or region considered. Sometimes and depending on the purpose, bilateral trade input-output models (BTIO) are also useful, although these do not take into account the full complexity of global value chains. Both models provide unique allocation of emissions with no double-counting and both provide the same total amount of emissions. But while MRIO treats intermediate traded consumption endogenously, BTIO treats them exogenously as well as final exports. This different treatment of intermediate exports implies a different emission allocation at sector level related to consider also at this level either a consumption based-principle or a production one. We analyse the consequences of using either a MRIO or a BTIO model in the assessment of the impact of international trade on the environment. Data used for both methods come from WIOD database.