

Application of a Global Link Input-Output Model to Material Flow Analysis: A Case of Scarcity Metal

Topic: IO and MFA

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Establishing a low carbon society, that is, decoupling green house gas emission from economic growth is one of the important challenges for Japanese economy. Toward the decoupling, it is essential that new low carbon technologies and products will be rapidly developed and widely introduced into the Japanese economy. More consumption of some scarcity metals is sometimes necessary to spreading the new technologies like an electric vehicle, a fuel cell and a solar panel. Considering this reality, the scarcity metals needed for the new technologies will be further forced to be dependent on supply from foreign countries.

In order to achieve the decoupling in Japan with depending on foreign resources, it should be started to structurally understand the relationship between natural resources consumption in the world and Japanese product supply chain. An environmentally extended multiregional input-output (MRIO) model enables quantification of global resources consumption of Japan through international trade. However, due to the complete accounting framework of MRIO, the development of an MRIO model that includes all countries and defines detailed sector classifications generally is extremely labour intensive and expensive.

With this in mind, we applied a global link input-output (GLIO) model (Nansai et al., 2009) to estimate global requirement of a scarcity metal for Japanese economy. The model was designed to reduce the labour required for data compilation by employing a simple accounting framework that differs from that of conventional MRIO models. The accounting framework of GLIO enables the definition of about 800 intermediate sectors of the Japanese economy to be focused in this study, the inclusion of more than 200 nations and regions. As empirical studies, global scarcity metal networks (neodymium, cobalt and platinum) with regard to the Japanese economy were visually identified. Key global network were also found by analyzing the structural characteristic of each network.