

Change in carbon responsibility for Tokyo from 1990 to 2005: evidence from carbon accounting using inter-regional input-output environmental model

Topic: Input-Output economics and industrial ecology - LCA analysis 1

Author: Shinji Kaneko

Co-Authors: Masaru Ichihashi

Cities are the engines of economic growth of a nation and this is particularly true for the mega-cities of Asia where rapid economic growth has been taking place. To maintain the momentum of sustained economic growth, cities are transforming its structure of economic activities, the efficiency of production and the patterns of consumption. As a consequence of this economic transformation, the structure of energy and material supply and demand has been changing over time with dramatic increase in the external dependency of supply.

In this context, emission of GHGs within territorial boundary and mitigation responsibilities are two different aspects. The former is physical but the latter is an attribution or allocation. City governments account mitigation responsibilities for out-of-boundary GHG emissions associated with electricity consumption in cities but do not do the same with other goods and services. How much mitigation responsibility a city takes, defined by how much emission a city attributes to itself for mitigation, is subject to the definition of its chosen system boundary?

Delineating this system boundary for carbon responsibility is not an easy task. These complexities needs better understanding but also it has important but differential policy implications for commercial and industrial cities from production and consumption perspectives.

This paper analyses the case of Tokyo whose relatively rich data availability enables us to perform complete carbon accounting over the last fifteen years from 1990 to 2005. This would be novel application of inter-regional environmental input-output model to carbon accounting at the city. We first present the territorial emissions (direct emission, SCOPE I) and compare with those with electricity consumption supplied from outside of the city (SCOPE II). We also show how embedded emissions in goods and services other than electricity that Tokyo import and exports affect responsible emissions (SCOPE III). Lastly, we discuss the determinants and factors that influence on carbon emissions with different scopes which represents different climate liabilities of Tokyo.