Identifying Environmentally-Important Industrial Clusters Using Multi-way Clustering Method

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For climate change policies, Japanese government has proposed the "Sectoral Approaches" which are tools to reduce carbon dioxide emissions with a focus of carbon dioxide intensities of the particular sectors in question. However, the "Sectoral Approaches" do not afford an incentive to cooperate with other sectors on the carbon mitigations. In contrast, the "Cluster Approach" is clearly one of the alternatives. This study presents a novel method to detect industrial clusters combining input–output analysis with spectral graph analysis. In addition, we employ the multi-way cut method in spectral graph theory. The method is used to detect industrial CO_2-intensive clusters in Japan with industrial structure of 2000 and 2005. Furthermore, the structural decomposition analysis using the cluster information enables not only to visualize the structural changes in the industrial CO_2-intensive clusters, but also to examine the effects of the changes in the inter-industry transactions within the clusters on emission of carbon dioxide. Detecting the industrial CO_2-intensive clusters and analyzing the changes in the industrial clusters by the structural decomposition analysis, we specify the clusters which increased emission of carbon dioxide and the clusters which decreased the emission. Finally, we propose the policy unit and approach in order to decrease the emission of carbon dioxide.