Rebound effects in the bio-based Economy

Topic: Thematic IO analysis: Sustainable Production, Consumption, Technology and Innovation
Author: Gerhard STREICHER
Co-Authors: Mathias Kirchner

Rebound effects in the bio-based Economy
Gerhard Streicher, Mathias Kirchner

Current research in the fields of chemistry and microbiology will likely lead to major shifts in the kind of physical resources used in industry. In this article we explore the possibility of replacing fossil feedstock (provided by the petrochemical industry) with feedstock derived from bio-based materials (biomass produced in agriculture and forestry) in the production of polymers and plastics. The immediate impact will be to shift demand for resources away from oil producers to suppliers of biomass. Not least, this offers the potential for much more "local" sourcing of inputs used in the polymer industries.

However, insofar as these bio-based inputs have to be produced themselves, this will lead to higher output in the agricultural and forestry sectors. This can be met by either increasing the area under development or increasing the intensity of cultivation; either way, at least part of the reduction in demand for fossil fuel in the plastic industry will be offset by higher demand for energy inputs to satisfy the higher demand for biomass (â€œtechnological reboundâ€•). Also, trade linkages are likely to adapt to these new demand aspects. Using a combination of three models, a global agricultural model (GLOBIOM, provided by the International Institute for Applied Systems Analysis IIASA), a regionally highly disaggregated agricultural model for Austria (PASMA[grid], developed by the Institute for Sustainable Economic Development at the University of Resource Sciences in Vienna) and WIFO's own multiregional econometric IO model (FIDELIO resp. ADAGIO), we attempt to identify these regional and â€œproductionalâ€• shifts in the agricultural and forestry sectors. A key issue will be the estimation of the â€œtechnological rebound effectâ€•.