Best Practice

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Economic and life cycle evaluation of the peanut supply chain in North China

The agriculture and food industry often has long, complex supply chains that hide significant, underreported carbon emissions. Peanut oil production exemplifies this complexity, involving cultivation, transportation, processing, and distribution before reaching consumers. A systematic quantitative assessment remains lacking. This study aimed to provide the peanut oil industry with a clear, data-driven "roadmap" for green development of the whole peanut industry chain by:

- **Quantifying the carbon emissions and composition of peanuts from planting to sales**
- **Identifying key emission links and analysing the main influencing factors**
- **Recommending targeted emission reduction paths.**

Project activity

We applied a Multi-Region Input-Output (MRIO) model that traces how the purchase of a bottle of peanut oil in a Beijing supermarket drives upstream production activities, while calculating associated carbon emissions at each stage.

Our model breaks the supply chain down into agriculture, processing, transportation, warehousing, and wholesale/retail sectors. This framework generates a comprehensive database linking inter-industry transactions, final demand, and carbon emission intensities across 87 cities.

It found that carbon emissions in the peanut oil supply chain are marked by high concentration and significant spatial separation. Processing is the core emission driver in the supply chain. Production-based carbon emissions (PBAs) are

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highly concentrated in cities such as Junan and Nanyang. In contrast, consumer-based carbon emissions (CBAs) are broadly distributed across urban centres like Beijing and Tianjin, where emissions are low, but consumption is high. These cities are net carbon importers, appearing "clean" locally while shifting significant emissions responsibility to distant production regions.

Key findings and recommendations

Our preliminary policy recommendations are:

- **At the production end:** promote energy-efficient technologies in processing centers and encourage green agricultural practices
- **At the consumption end:** promote green consumer behaviour and develop cross-regional ecological compensation mechanisms to equitably redistribute environmental responsibility.

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For more information about the AgriLoop Project, visit:

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