

## INTERNATIONAL TRADE AND GREENHOUSE GAS EMISSION PATTERNS BETWEEN BRAZIL AND THE ORIGINAL BRICS COUNTRIES

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This Discussion Paper examines the greenhouse gas (GHG) emissions embedded in trade between Brazil and the original BRICS countries – China, India, Russia, and South Africa – in 2022, using an environmentally extended multiregional input-output (MRIO) model based on Exiobase data. The study highlights the environmental and economic implications of these trade relationships, revealing significant asymmetries in emissions flows and sectoral contributions.

China emerges as the dominant player, both as the primary destination for Brazilian exports, absorbing 23.1 billion tons of CO<sub>2</sub> (TCO<sub>2</sub>), and as the largest source of emissions embedded in Brazil's imports, totaling 52.8 billion TCO<sub>2</sub>. This imbalance reflects China's dual role as a major market for Brazilian commodities and a key supplier of emission-intensive intermediate and capital goods. The analysis also shows that Brazil's export-related emissions are heavily concentrated in sectors such as Food production (30.9%) and Animal farming (19.2%), underscoring the

country's reliance on primary sectors with high environmental impacts. On the import side, emissions are linked to industrial inputs like machinery, chemicals, and fertilizers, revealing Brazil's dependence on carbon-intensive production chains.

Among other BRICS partners, Russia stands out as a significant destination for Brazilian exports (5.7 billion TCO<sub>2</sub>), primarily raw materials, while importing minimal emissions in return (0.7 billion TCO<sub>2</sub>). India presents a more balanced trade relationship, with 3.8 billion TCO<sub>2</sub> exported and 5.5 billion TCO<sub>2</sub> imported, largely in petroleum products and industrial goods. South Africa's role remains marginal, with limited emissions exchanged.

The findings underscore the urgent need for policies that reconcile economic growth with environmental sustainability. Recommendations include promoting decarbonization in high-emission sectors through sustainable practices and technological innovation, diversifying Brazil's export basket toward lower-emission goods, and strengthening intra-BRICS cooperation to advance

# SUMMARY

renewable energy and green industrial policies. Additionally, aligning trade measures with climate goals, such as adopting carbon-adjusted border mechanisms, could incentivize cleaner production globally.

In conclusion, the study highlights the complex interplay between trade and emissions within the BRICS bloc, emphasizing China's central role and Brazil's structural challenges as a commodity-dependent economy. Addressing these issues requires coordinated strategies that enhance environmental accountability while fostering equitable development, positioning BRICS as a key actor in the transition to a sustainable global economy.