

## Summaries

**Maria Backhouse & Malte Lühmann: Material Flows and Knowledge Production in the Global Bioeconomy: The Continuity of Global Inequalities.** The European Union and Germany are pursuing a global transformation project by fostering the bioeconomy. Through research and technological innovation, they strive to support the transition from using fossil resources to renewable resources (biomass) and the establishment of a circular economy. However, since colonial times, the global production of biomass has been permeated by unequal relations of exchange between biomass producing semi-/peripheries and biomass processing (technology-)centres. As countries around the world are now engaging with/in the bioeconomy, the question arises whether this will change global inequalities in the flow of materials and the production of knowledge. Drawing on new strands of world-systems theory on unequal ecological exchange and global knowledge production, we show how the bioeconomy's transnational material and technological exchange relations are updating existing global inequalities between centres and semi-/peripheries. Among other things, this analysis expands the field of research on states' bioeconomy strategies and the political debates surrounding them, which has, to date, primarily focused on Europe and North America. Through taking a global inequalities perspective, as is familiar within critical development theory, this paper offers an indispensable shift in point of view.

**Eugen Pissarskoi, Stefan Ouma, Kerstin Schopp, Leiyo Singo & Thomas Potthast: Which Bio\_economy for what Kind of Future? Towards Re-politicization of a Discourse from the Global North through Insights from Tanzania.** Several critics have warned that the proliferation of the bioeconomy discourse is further entrenching the coloniality of markets and knowledge engrained in formally postcolonial North-South relationships. In this paper, we only partly agree with this line of reasoning. As we claim, critics of the global power of the bioeconomy discourse understand bioeconomy in too narrow of terms. An unanimous core of the bioeconomy discourse, we argue, is the quest for visions and ways to organise institutions that enable human flourishing ("economy") in ways that comply with the requirements of inter- and intragenerational justice and that take all morally considerable beings into account ("bio"). To open up this "space of possibilities", we strategically reappropriate the notion of "bioeconomy", instead using the term "bio\_economy", with the underscore signifying a broad variety of ethically justifiable visions of how the "bio" ought to be entangled with the "economy". As we demonstrate in the context of Sub-Saharan Africa, the full range of national policy discourses on the future of agriculture contain potential for the development of critical visions of bioeconomy. We demonstrate the latter by turning to two articulations of agricultural discourse in Tanzania: land-use and genetically modified organisms. These cases provide evidence of the diversity of bio\_economy visions already endorsed, albeit implicitly, by different interest groups in Tanzania.

**Axel Anlauf: The Extractive Basis of the Bioeconomy. Synthetic Fertilisers, Peak Phosphorus and Alternative Technologies.** Various bioeconomy strategies aim to replace fossil resources with renewable agrarian resources without departing from the agro-industrial model. Paradoxically, the bioeconomy model is an extractive system itself, dependent on the constant supply of mineral resources to replace the nutrients extracted from the soil. Using a historical-theoretical approach, this article first analyses the flows of nutrients in this system and then focuses specifically on the nutrient phosphorus and the raw material phosphate rock. Classified as a “low-cost bulk commodity” for decades, since 2007 phosphate rock has become a strategic resource and scholars have started debating the possibility of reaching “Peak Phosphorus” by 2030. By analysing state and private actor strategies to adapt to this emerging situation, it becomes clear that the control over flows of phosphorous is increasingly contested. This article argues that bioeconomy strategies are aggravating existing conflicts over phosphate supply, as well as global inequalities, which *inter alia* become evident in food crises. Technological innovations, which are promoted within bioeconomy strategies, only reduce the extractive character of industrial agriculture in a limited way, while also securing the interests of dominant actors.

**Janina Puder & Anne Tittor: Bioeconomy in Argentina and Malaysia: Promising Social and Ecological Development through Industrial Upgrading in Agriculture?** Justified by the need for resource conservation and climate protection, the bioeconomy model aims to turn away from fossil energy and production regimes. Argentina and Malaysia have both adopted this approach. In both these semi-peripheral countries, the agricultural sector has succeeded in anchoring its interests in national bioeconomy agendas, which aim to transform the bioeconomy into a development strategy promising industrial, social, and environmental upgrading. By encouraging the processing of agricultural products (especially of soybeans and palm oil) and the development of industrial plants in rural areas, Argentina and Malaysia are promoting the adding of value and the creation of jobs. Compared to previous development strategies, this represents a shift that aims to overcome position of semi-peripheral countries as exporters of raw materials or partially processed agricultural goods. However, the critical debate in industrial sociology has shown that the assumption industrial upgrading would automatically lead to social upgrading has been proven wrong in the past. Based on the world systems and global commodity chain approach, this article shows that social upgrading through bioeconomy can hardly be expected in Argentina and Malaysia. If the chosen path is continued, neither the sustainability nor the social goals proclaimed by bioeconomy proponents are likely to be achieved.

**Michael Spies & Henryk Alff: Overcoming Path Dependencies in the Bioeconomy? Agricultural Intensification Processes from a Social-Ecological Perspective.** The “transformation” to a bio-based economy as propagated in international and national bioeconomy strategies implies profound changes in agricultural systems to increase production. In countries of the Global South, however, such processes have

usually been accompanied by unintended – or deliberately accepted – negative consequences, such as environmental degradation or a widening of social inequalities. Yet, existing knowledge about the risks of agricultural interventions is hardly considered in bioeconomy strategies, which, on the one hand, focus on economic and technical approaches to “sustainable” intensification through agro-technological innovations, and, on the other hand, an expansion of production areas. These strategies lack any plausible ideas on how production increases can be made ecologically and socially sustainable, and previous experience with agrarian interventions give reasons for concern. Using two historical examples – the Green Revolution in the Punjab of Pakistan and the Virgin Lands Campaign in Kazakhstan – this article outlines the complex social and ecological consequences of large-scale agricultural interventions to increase production and examines the extent to which these experiences can (and should) be taken into account in bioeconomy strategies. In this context, the role of institutional path-dependencies in shaping present and future developments should be critically reflected on. As past experience in the agricultural sector has shown, bioeconomy strategies must take their claimed “systemic” approach seriously, which implies that technology and productivity-oriented goals must always be subordinated to social and ecological goals.

**Fabricio Rodríguez: South-South Relations and Bioeconomy. The Chinese-Brazilian Trade Axis.** China became Brazil’s most important trading partner in 2009. For the South American country, this new situation implies lower levels of economic dependency on the USA. But does this new situation automatically translate into a more equitable axis of South-South relations? And, to what extent can Sino-Brazilian trade be reconciled with the vision of a global, low-carbon bioeconomy? This article addresses these questions by means of a qualitative analysis of the trade relations between China and Brazil over the period 2000–2018. The Sino-Brazilian case is interpreted as an important axis of South-South relations in the context of the emerging bioeconomy. The paper shows that, despite greening policies on both sides, trade relations between the two countries are by no means developing in the direction of a low-carbon transition. Although Sino-Brazilian trade is treated bilaterally as an expression of South-South cooperation, its constitutive elements and dynamics do not break with classical centre-periphery hierarchies. Instead, the article highlights the construction of new inequalities, with much relevance for the bioeconomy in the making.

**Heidi Grunebaum: Between Nakba, Shoah and Apartheid: Reflections on Complicity and Memory.** This paper addresses personal implication into three fundamental catastrophes of the 20th century. While these are disjunctive, they are nevertheless interconnected. Such interconnection is demonstrated and exemplified here by germane episodes of the author’s own life and family experience. Her Jewish South African background lets her probe into the remnants of a Palestinian village buried beneath a “South African” Forest in Israel, for which she once raised money as a child; brings her to the small town in Upper Hesse whence her grandmother made

a narrow escape to South Africa from Nazi terror; and confronts her with the blank space of what once was Cape Town's sprawling District Six which lies in the vicinity of where she lives and from where the inhabitants were deported by the Apartheid regime. All three spaces have in common that what makes them important in this reflection has been obliterated by force and political fiat. In recounting her own experience, including the making of a film on the three contexts, the author traces ways to retrieve mnemonic traces, on a personal level and beyond. At the same time, she demonstrates entanglements of complicity in the processes addressed that any serious treatment has to confront. Such engagement is set against the simplistic and destructive answers to complicity and complexity, ethno-nationalism and identity politics.