BioÖkonomieRat

Background paper

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A framework for the conservation of resources

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Note

This background paper summarises the key statements and discussion points from various workshops held on this topic between May 2022 and September 2023, under the leadership of the aforementioned authors and with the participation of external stakeholders. This is not a position paper from the Bioeconomy Council. Its contents, views and conclusions do not represent recommendations for action or the results of studies carried out by the German Bioeconomy Council, rather they exclusively reflect the contents of the discussions conducted by and with experts.

Introduction and summary

The rise in the efficient use of resources and energy is the key to a sustainable bioeconomy in an economic and social system geared to the United Nation's 17 Sustainable Development Goals (SDG). The implementation of these goals must focus, in particular, on the world's increasing population, climate protection, the maintenance of biodiversity, and planetary boundaries. Besides the sea change in using raw materials, i.e. replacing fossil resources with renewable raw materials and the extraction of secondary resources from recycling, the current, predominantly linear economic model needs to be replaced, gradually, by a largely circular economic model that keeps raw materials in circulation (see also cradle to cradle), meaning products are durable, repairable and cyclical, the latter being achieved either by recycling or upcycling the products.[1]

An annual per capita raw material consumption (RMC) of between five and eight tonnes is the corridor discussed in academic papers for a sustainable consumption of raw materials in 2050.[2] The bioeconomy can play a key role in this process through innovation, design

[1] WBGU – Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (2020): Landwende im Anthropozän: Von der Konkurrenz zur Integration. Berlin: WBGU.

[2] Bringezu (2015); IRP (2014); Lehmann (2018); UNEP (2011); Dittrich et al. (2021a); Purr et al. (2019); The current RMC per capita in Germany is 16 tonnes (UBA 2022)

methods and the efficient use of waste products. Proposals in this respect can be found in the recommendations for action (HE) published by the German Bioeconomy Council.[3] Nevertheless, it goes without saying that targeted innovations will only be implemented if they are also commercially viable. Where linear supply chains are more profitable, circular supply chains will not prevail.

Consequently, the authors consider it necessary for the Federal Government of Germany to create the appropriate framework through taxes, duties and regulatory law in all areas that are relevant to the consumption of biogenic resources from domestic production and from imports. This will make it more economical to use resource-efficient processes, manufacture durable products and keep the resources in circulation. Many of these products are still not being produced using methods or resources that are part of the bioeconomy. Nonetheless, they must be viewed in this context, as the aim of the bioeconomy is to increasingly replace fossil raw materials with biogenic resources.

The "Modell Deutschland Circular Economy" (MDCE) study,[4] commissioned by World Wide Fund For Nature e. V. and conducted by the Freiburger Öko-Institut e. V. along with the Fraunhofer Institute for Systems and Innovation Research and the Free University of Berlin, makes concrete proposals for developing and implementing a national circular economy strategy by 2045. It focuses on the economic and social aspects as well as climate protection and the maintenance of biodiversity. Policy impact analyses and empirical evidence that were carried out using specific tools – abroad too – were also compiled.

Based on the MDCE study and following the results of the debates held by the German Bioeconomy Council's internal "Resource Conservation" working group, this background paper assembles sample proposals that are related to the bioeconomy and the resources required. The authors suggest discussing these proposals in a future Bioeconomy Council and as part of the biomass strategy, if necessary.

[3] Bioökonomierat (2023) Bioökonomie nachhaltig umsetzen! (Initial recommendations for action by the German Bioeconomy Council with the aim of implementing the National Bioeconomy Strategy) Retrieved: Bioökonomie nachhaltig umsetzen! E-ISBN no.: 978-3-949971-68-6 (biooekonomierat.de)
[4] WWF (2023). "Modell Deutschland Circular Economy": Eine umfassende Circular Economy für Deutschland 2045. Berlin: WWF. Retrieved: https://www.wwf.de/nachhaltiges-wirtschaften/circular-economy/modell-deutschland-circular-economy

1. Targets and indicators

The Federal Government should develop ambitious targets and indicators on how to reduce the consumption of resources, per capita and in absolute terms, within a specified time frame. The targets should be defined for each sector, such that responsibilities for individual ministries can be derived from them.[5]

2. Sector-specific regulatory proposals related to the bioeconomy

2.1 Agricultural land loss

Relevance: In Germany alone, roughly 60 hectares of agricultural land are lost to new developments – including infrastructure, residential property, commercial buildings and leisure facilities – every day. As flat surfaces are preferred for such projects, more fertile and, consequently, more productive areas are favoured. In 2002, as part of its National Sustainability Strategy, the Federal Government set itself the goal of reducing the amount of land lost to development to 30 hectares a day by 2020. The aim was to reduce this figure to zero by 2050. By 2014, the original figure of 130 hectares had been more than halved to approximately 60 hectares a day. Since then, however, the reduction in land loss has stalled.[6]

The target for 2020 was clearly missed and has now been pushed back to 2030. The production of biogenic resources, which are intended to replace fossil raw materials in a bioeconomy, depends on agricultural land. Although models are emerging on how resources for a bioeconomy can be produced with no or with significantly less land utilisation, productive agricultural land and its extensive conservation are still needed.

One worthy initiative could be the **introduction of land designation rights that are classified according to agricultural yield and which can be traded.** These need to be reduced over a defined period by means of public land acquisition in order to achieve the set goal.

2.2. Agriculture and food

Relevance: Human nutrition and the human right to a healthy and adequate diet must take precedence over all other uses ("Food First" principle). Nevertheless, there are levers to reduce the consumption of soil, water and nutrients required for a healthy diet without having to accept agricultural intensification at the expense of natural production methods.

[5] The German Council for Sustainable Development (RNE) has proposed 2050 as the reference year: RNE - Rat für Nachhaltige Entwicklung (2021): Circular Economy, Leveraging a Sustainable Transformation. 1

[6] Umweltbundesamt (2023); Siedlungs- und Verkehrsfläche, retrieved: https://www.umweltbundesamt.de/daten/flaeche-boden-land-oekosysteme/flaeche/siedlungs-verkehrsflaeche#anhaltender-flachenverbrauch-fur-siedlungs-und-verkehrszwecke

The authors propose discussing, in particular, the following measures:

- Adjusting VAT rates to encourage plant-based diets (see also HE 33)
- Further development and implementation of recommendations made by the "Borchert Commission"[7] in conjunction with land designated for animal husbandry
- Promoting methods of cultivation with predominantly closed nutrition cycles as part of the Common Agricultural Policy (CAP) and the use of research funds for the development and optimisation of such practices (see also HE 40 - promotion of technologies such as recycling nutrients)
- The state to exercise a role model function regarding public procurement in accordance with political objectives for sustainable agriculture and nutrition[8]
- Measures to reduce food waste and post-harvest losses, for example by adjusting the quality parameters and "best before" dates on produce, or through education on nutrition. Formulating binding targets to prevent food waste

2.3 Furniture and textiles

Relevance: There is a dramatic rise in the demand for wooden furniture and cellulose fibres for producing textiles (viscose, Tencel, Lyocell). Whereas furniture production has been increasingly offshored to low-wage countries in Asia, the production of fibres used for manufacturing textiles is predominantly carried out in the global north. By contrast, the production of clothes is generally found in low-wage countries in the global south.

International **governance** and market control are important requirements here, in order to significantly reduce the consumption of resources, on the one hand, and to strengthen recycling processes on the other. The following measures are proposed in the MDCE study:

[7] These recommendations are in line with the concept proposed in Thünen Working Paper 124. The concept provides for the financing of animal welfare-friendly husbandry practices through a fund financed from consumer taxes. This would encourage adherence to higher standards without running the risk that these would be undermined by cheap imports. These taxes would have the same effect as increasing prices, meaning that less meat would be consumed and, hence, a reduction in the area needed to produce animal feed. Source: Deblitz et al. (2021); Politikfolgenabschätzung zu den Empfehlungen des Kompetenznetzwerks Nutztierhaltung. Thünen Working Paper 173. Retrieved: https://www.thuenen.de/media/ti/Newsroom/Faktencheck/Tierwohlpraemie/ThuenenWorkingPaper_173.pdf

[8] This concerns all corresponding political goals – for instance, a healthy diet. Here, reducing the amount of animal protein consumed is high up on the list of priorities. This was achieved by the city of Copenhagen. As from 2007, the public canteens (with currently 88,000 meals a day) in Copenhagen switched to serving food produced organically. A distinct fall in the amount of meat eaten was one of the results of this initiative.

- The introduction of ambitious standards in the Ecodesign for Sustainable Products Regulation (ESPR), including environmental costs (e.g. CO2, water, air, biodiversity)
- Introduction of Extended Producer Responsibility (EPR): collection, recycling and reuse, coupled with the EPR regulation model
- Export regulation: a clear definition and the criteria for differentiating between textiles that can be recycled and textile waste
- Heightening the responsibility of consumers by providing information and education

2.4 Packaging

Relevance: Packaging cannot be totally avoided. Nevertheless, the aim must be to significantly reduce the production and amount of packaging. Roughly 40% of industrially harvested wood is used in producing paper and cardboard packaging – and this trend is on the rise.[9] Based on the results of the MDCE study, the authors propose discussing the following initiatives:

- Obligation to offer unpackaged and ecologically advantageous reusable systems in addition to the ones already in use, especially for food and online goods. The product groups, for which this obligation is to be introduced, must be specified by a commission with representation from all key stakeholders in supply chains, as well science, environmental agencies, trade unions and others
- An incentive needs to be created for unpackaged and reusable systems compared to packaged or disposable items, e.g. by taxing levies
- Labelling of packaging regarding correct separation and efficient sorting. Information such as "recycled, recyclable and/or sustainable/organic-based" could also result in this packaging being given preferential treatment compared to packaging produced from primary resources or from fossil-based resources
- Placing a levy on packaging that is difficult to recycle
- A ban on additives which complicate the degree to which high-quality material recycling can be achieved. Exceptions to this are possible where the intended use of these substances is currently vital (e.g. medical technology)

[9] a) Beck-O'Brien, M., Egenolf, V., Winter, S., Zahnen, J., Griesshammer, N. (2022); „Everything from wood – The resource of the future or the next crisis? How footprints, benchmarks and targets can support a balanced bioeconomy transition. WWF Germany."b) CEPI, "Unfold the Future: The forest fibre industry 2050 Roadmap to a low-carbon bio-economy", Confederation of European Paper Industries, Brussels, 2011.

- Introduction of an obligation to calculate e-commerce returns – e.g. a specific percentage of the value of the goods, since between 5% and 35% of the goods ordered online are returned to the sender, depending on the product group[10]

2.5 Encouraging repairs and recycling

Relevance: Often, it does not make any sense to repair everyday items. Instead, it is thrown away when it stops working and replaced by a new item. Below, the authors propose discussing instruments which make it economically more interesting to produce sustainable and repairable products without having to use regulatory law to mandate product properties.

- Changing the tax system such that income from taxes and levies is achieved more by hiking the price of resources and less by making labour more expensive. This coincides with the demands in the Green Deal, gearing tax systems less to the cost of employment and more to the consumption of resources and environmental impact[11]
- A reduction in the VAT rate for repair services

2.6 Thermal recycling of biogenic resources

Relevance: Roughly 35% of German wood production is thermally recycled, plus the burning of waste wood. As wood and other biogenic resources –suitable for energy production – are important for the bioeconomy, there is much interest in thermal recycling only taking place at the end of their sequential use (i.e. the cascading principle). The following proposals are not aimed at imposing state quotas on individual recycling channels, rather they are intended to ensure that, under general conditions, thermal recycling is not favoured over other uses.[12]

- A level playing field must be assured: when recycling biogenic resources, thermal recycling must not take precedence over the material use
- The VAT rates of all recycling channels should be aligned to stop the preference towards thermal recycling (see HE 53)

[10] Statista (2023); Statistiken zum Thema Retouren im Online-Handel. Retrieved: https://de.statista.com/themen/3112/retouren-im-online-handel/

[11] European Commission (2019); The European Green Deal, p. 17: "At national level, the European Green Deal will create the context for broad-based tax reforms, removing subsidies for fossil fuels, shifting the tax burden from labour to pollution, and taking into account social considerations.

[12] FAO (2011); "FAO Outlook Study on Sustainable Forest Industries: Opening Pathways to Low-Carbon Economy", ICFPA Annual Meeting & 52st FAO-Advisory Committee on Paper & Wood Products, Montebello, Canada.

2.7 Utilisation of CO2 from the air and enzymatic recycling

Relevance: In the future, biogenic sources of carbon for material use could compete with fodder and food production or even with environmental initiatives such as the protection of biodiversity. In this respect, the chemical or biotechnological fixation of CO2 may contribute to conserving resources. CO2 can be used as a gaseous source of carbon that occurs, for instance, in industrial or agricultural processes. This would conserve biogenic resources and reduce the pressure on agricultural and silvicultural land, reducing emissions at the same time.

Background: Whilst chemical CO2 fixation can be used very effectively to produce tiny carbon molecules (C1 und C2 molecules) , the microbial and biotechnological fixation of CO2 is favoured in the production of long-chain and complex carbon compounds. Here, gaseous CO2 can be used as a raw material (*direct air capture* or from industrial point sources) in the biological system, for instance fed into the production of material with algae or bacteria and developed for the bio-based circular economy (*Carbon Capture and Usage*, CCU). The range of possible products from fermentation could, in future, range from the production of raw materials to the development of new sources of protein for food, provided that an industrial ramp-up (scaling) is successful.[13]

Furthermore, enzymes and biocatalysts from fermentation production can make a significant contribution to the recycling of carbon compounds from both bio-based as well as fossil sources. The longer and more efficient release of carbons, irrespective of their origin, e.g. using enzymatic recycling, the greater the amount of resources that can be conserved.

The following measures should be considered in this context:

- Use and continued development, where required, of microorganisms and biocatalysts for human use
- Feeding gaseous CO2 in the biological system for synthetic use and its development for the bio-based circular economy
- Transformation of the chemical industry by establishing chemical and biotechnological processes, especially in terms of finding alternatives for current fossil-based polymers and new bio-based materials, and also regarding the utilisation of CO2 and renewal of production processes for industry
- Making bio-based and chemical products recyclable through the use of enzymatic technologies

[13] Solein (2023); homepage (https://www.solein.com/)