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Comment

EU Initiative: Towards a Circular, Regenerative and Competitive Bioeconomy

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The German Centre for Biomass Research (DBFZ) welcomes the EU Commission's initiative for a new EU bioeconomy strategy. Sustainable biomass is a key source of renewable carbon and can contribute to a net-zero economy in many ways. As the initiative outlines, the transition towards a circular bioeconomy needs to be accelerated while ensuring compatibility with sustainability requirements. The initiative lists several challenges on that path: a lack of competitiveness of bioeconomy products against fossil-based products, a lack of finance to support the bioeconomy, a fragmented policy frame and the need to better align the bioeconomy with the protection of climate and biodiversity. The following remarks highlight options to address these challenges in line with the existing EU policy framework.

Lack of competitiveness

Increasing competitiveness of biomass uses against fossil alternatives is crucial for advancing the bioeconomy.

There are **two key measures** for making bioeconomy products competitive: The first one is **financial support for bioeconomy innovations**, to lower the price of biobased products. This is already addressed by the EU bioeconomy strategy and also many EU policies and initiatives. However, additional support is needed to boost novel technologies and pathways such as combined biomass-electricity applications and multiproduct biorefineries and create a frame to allow cost reductions for biobased products. This support should not only target early stage innovations but also market entry of novel products.

The second key measure for competitiveness **is internalizing externalities from fossil products**, e.g., via carbon pricing. Similar to the energy sector, it is not enough to support renewable solutions (energy: e.g., feed-in tariffs). Fossil alternatives must be disincentivized at the same time (energy: EU-ETS). Regarding material or integrated[1] uses of biomass, there is already some support and ambitions to increase it (e.g., EU Circular Bioeconomy Fund). However, policies are lacking that disincentivize fossil alternatives in sectors like chemicals, plastics, textiles or construction.

[1] Use of biomass for multi-purpose solutions, both material and energetic.

The new bioeconomy strategy should outline the way how externalities in these sectors can be reduced. Next to carbon pricing, subsidies or direct regulation (e.g., GHG emission reduction quotas) could be applied. Similar to the energy sector that is increasingly defossilised by the EU-ETS, the strategy should **suggest a lead policy instrument for phasing out fossil feedstocks in material use sectors.**

Lack of finance

In regard to the lack of finances for promoting the bioeconomy two issues should be considered in the new EU Bioeconomy Strategy. First, as outlined above, a competitive bioeconomy requires **internalizing climate externalities** from fossil carbon also in non-energy sectors. **This substantially reduces the amount of financial resources required** for making bio-based products competitive. Internalizing fossil externalities with the help of carbon pricing even raises additional revenue that can be used to promote the bioeconomy. As GHG emissions from material uses are difficult to address with (downstream) emissions trading systems (EU-ETS), the strategy should outline how internalization of externalities could be facilitated by other means (e.g., upstream carbon tax or GHG emissions reduction quotas).

Second, when using financial means to accelerate the bioeconomy transition, it is important to note that **subsidies should be paid not for mere uses of biomass, but for bioeconomy innovations and for carbon sequestration in ecosystems**. Creating a bioeconomy by subsidizing (non-innovative) bio-based products puts high pressure on public budgets of the EU and its member states. These will most likely not suffice create a level playing field with fossil alternatives for the entire bioeconomy. Even if enough funds would be available, creating a bioeconomy mainly based on subsidizing (material or energetic) uses of biomass risks to increase carbon emissions and leads to inefficient resource use. For

example, Hurmekoski et al. (2023)[2] show that subsidizing the use of wood in construction or textile production can increase total GHG emissions. This finding is consistent with Lintunen et al. (2016)[3] who show that a cost-efficient use of forest biomass requires subsidizing not biomass products but the carbon sequestration in forests. Similar results have been obtained in regard to circularity: Relying on subsidies to boost recycling (instead of innovative recycling technologies) can lead to increased resource consumption[4] and GHG emissions[5].To sum up, subsidies should not be paid for the use of biomass (or recycling), but for innovations and carbon sequestration.

Fragmented policy frame

Creating a sustainable circular bioeconomy implies the **transformation of large parts of the entire economy** (forestry, agriculture, chemicals, plastics, textiles, construction etc.). Without a clear policy strategy, an endeavor of such magnitude within a multi-level governance system like the EU is prone to result in fragmented, contradicting and, consequently, inefficient policies possibly with non-sustainable outcomes.

To reduce the fragmentation of bioeconomy policies, two issues should be approached in the context of the new EU bioeconomy strategy. First, the strategy should make efforts to **systematically identify the root causes that impede the bioeconomy**. Currently, most bioeconomy policies in the EU target symptoms but not causes of inefficient and unsustainable biomass uses. For example, to improve wood cascading, the revised EU Renewable Energy Directive excludes certain biomass categories from energy policy

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2 Hurmekoski, E. et al. (2023): Does expanding wood use in construction and textile markets contribute to climate change mitigation?, Renewable and Sustainable Energy Reviews 174, 113152, https://doi.org/10.1016/j.rser.2023.113152.

3 Miettinen, J.; Ollikainen, M. (2024): The impacts of climate and energy policy instruments on forest bioeconomy, Forest Policy and Economics 169, 103338, https://doi.org/10.1016/j.forpol.2024.103338; Lintunen, Jussi; Uusivuori, Jussi (2016): On the economics of forests and climate change: Deriving optimal policies. In JFE 24, pp. 130–156. https://doi.org/10.1016/j.jfe.2016.05.001.

4 Hoogmartens, R. et al. (2018): A Hotelling model for the circular economy including recycling, substitution and waste accumulation, Resources, Conservation and Recycling 128, 98-109, https://doi.org/10.1016/j.resconrec.2017.09.015.

5 Freire-González, J. et al. (2022): Tools for a circular economy: Assessing waste taxation in a CGE multi-pollutant framework, Waste Management 139, 50-59, https://doi.org/10.1016/j.wasman.2021.12.016.

support. This approach ignores that important causes for insufficient wood cascading are rooted in the LULUCF-sector and the zero-rating of (many) biomass-emissions in the EU-ETS.[6] In consequence, energy policies and climate policies remain fragmented and contradictory, with the **EU-ETS undermining sufficient and sustainable wood use in the bioeconomy**. An example for identifying the root causes of barriers to the bioeconomy and for creating a consistent bioeconomy policy-mix can be found in Schindler et al. (2024)[7] for the case of forest biomass.

Second, the strategy should **reflect on the type of policy instruments** that are used to promote the transition to a circular bioeconomy. **Market-based instruments such as carbon pricing might substantially reduce policy complexity and thus fragmentation.** For example, in the energy sector with the EU-ETS in place it is not necessary to define individual GHG emissions reduction quotas or emission standards for each single type of industry or even company. Instead, every industry is equally subjected to the requirement to buy emissions allowances for the same price. While more research is needed regarding which instrument types are useful for which regulatory task in the bioeconomy, it is likely that relying primarily on quotas, GHG emissions standards or other direct regulation to support the bioeconomy will result in highly complex policies that are prone to fragmentation.

Climate and biodiversity protection

Aligning the bioeconomy with climate and biodiversity targets is challenging, because the bioeconomy can have positive and negative effects at the same time. For example, as mentioned above, a strong increase of biomass uses in the EU might increase total GHG emissions. This happens when GHG emissions reductions from reducing fossil fuels are smaller

6 Lintunen, Jussi; Uusivuori, Jussi (2016): On the economics of forests and climate change: Deriving optimal policies. In Journal of Forest Economics 24, pp. 130–156. https://doi.org/10.1016/j.jfe.2016.05.001; Miettinen, J.; Ollikainen, M. (2024): The impacts of climate and energy policy instruments on forest bioeconomy, Forest Policy and Economics 169, 103338, https://doi.org/10.1016/j.forpol.2024.103338.

7 Schindler, H. et al. (2024). Sustainable forest bioenergy: Discussion paper. Leipzig: DBFZ, https://www.dbfz.de/fileadmin/user_upload/Referenzen/Statements/Discussion_paper_sustainable_forest_bioenergy.pdf.

than the reduction of carbon sinks in forests or other ecosystems due to biomass harvests.

Effects of the bioeconomy on climate and biodiversity are highly complex and often difficult to monitor (attribute), especially indirect effects (iLUC). For example, Duden et al. (2017)[8] find that increased demand for wood from South-eastern USA can contribute to both the conversion of semi-natural forests into plantations with lower biodiversity, and to a decreased loss of natural forests with high biodiversity otherwise lost to urban areas.

In regard to the new EU Biodiversity Strategy, three conclusions can be drawn from this complexity: First, **advancing a sustainable bioeconomy must be based on innovations**, i.e. creating more value from a given quantity of biomass, instead of using more biomass. Second, the available quantity of (sustainable) **biomass should be reallocated from low value to higher value uses**, to avoid increasing total biomass uses (based on harvest or imports). This might include a reallocation from energy to material uses, by reducing inefficient bioenergy subsidies. Third, it should be examined if a stronger use of market-based instruments can boost a sustainable bioeconomy in a less bureaucratic way, e.g., by applying carbon pricing and financial support for carbon sinks in the LULUCF sector. Such instruments are often better suited to deal with the high complexity of the bioeconomy (see notes above on policy fragmentation).

As a final note, the new EU Bioeconomy Strategy should consider whether climate and biodiversity protection in the bioeconomy should be addressed mainly via the use of sustainability criteria and related concepts such as PEF (Product Environmental Footprints). Creating a sustainable bioeconomy predominantly with the help of sustainability criteria carries a high risk of substantially increasing bureaucracy for businesses and governments. This can

[8] Duden, A. S. et al. (2017): Modeling the impacts of wood pellet demand on forest dynamics in southeastern United States, Biofuels, Bioproducts and Biorefining 11:6, 1007-1029, https://doi.org/10.1002/bbb.1803.

contradict the urgent need to reduce bureaucracy in the EU, as recently outlined by the Draghi report on EU competitiveness.[9] An alternative policy approach to ensure a sustainable bioeconomy could be to **systematically improve existing EU environmental policies aiming at protecting climate and biodiversity**. If these policies ensure that only sustainable biomass is harvested in the first place, screening a vast amount of bioeconomy products in regard to their compliance with sustainability criteria could be avoided or at least substantially reduced. Using sustainability criteria can then be restricted to areas of the bioeconomy where environmental policies are not effective for whatever reasons, or to prioritize subsidies or other support measures for innovative bioeconomy products. For this purpose, the approach of the EU Renewable Energy Directives could be developed further into a Renewable Products Directive that includes sustainability criteria to ensure sustainable biomass uses also in material applications. Such an extension of sustainability criteria does not only cover additional biomass uses but also takes into account that, for example, biorefineries often produce material and energy outputs at the same time.

[9] The future of European competitiveness. Part A | A competitiveness strategy for Europe, https://commission.europa.eu/topics/eu-competitiveness/draghi-report_en#paragraph_47059.