

BioMonitor Policy Scenarios for the European Bioeconomy to 2030 and 2050

Abstract

The BioMonitor project aims to quantify the bioeconomy's environmental, economic, and social impacts in the EU and its Member States based on a set of scenarios.

The BioMonitor scenarios are designed to inform the ongoing policy relevant discussions for the bioeconomy and its sustainable development in the wider European policy context. The aim of the work is to illustrate how different levels of policy ambition can impact on the economic, environmental and social dimensions of sustainability and to quantify the trade-offs and synergies associated with each of these metrics within different bioeconomy 'futures'.

The BioMonitor Reference scenario and the storylines and respective narratives of the alternative scenarios describe policy relevant questions that will be answered in the Biomonitor impact assessment.

Key points

BioMonitor scenarios will:

- Guide policy making through knowledge and enhanced foresight capacities.
- Form a forward-looking capacity to support policy makers and to underpin policy coherence.

Introduction

The updated EU Bioeconomy Strategy (European Commission, 2018) aims to develop a sustainable bioeconomy for Europe, strengthening the connection between economy, society and the environment.

To guide policy making, knowledge and foresight capacities are important, and there is a need to "*improve the knowledge base on all bioeconomy areas and a forward-looking capacity (modelling, foresight, scenarios), as essential elements for providing the evidence needed to support policy makers and for underpinning policy coherence*"¹²³.

The scenarios in BioMonitor aim to inform the ongoing policy discussions. The work will use a set of indicators⁴ developed within the project (Kardung et al., 2021) together with the BioMonitor Model Toolbox, (AGMEMOD, BioMat, EFI-GTM, EFISCEN, and MAGNET) to analyse the development of the European bioeconomy by 2030 and 2050, respectively. The integrated assessment will provide insights for each of the narratives on the performance of the bio-based economy across the three pillars of sustainability.

More specifically, the (i) economic (turnover, value added, etc.), (ii) environmental (GHG emissions, energy, land use, etc.) and (iii) social (employment, etc) impacts are quantified, resulting from pathway specific external drivers including climate change, land use management, land availability, water resources, economic and demographic developments, technology and innovation, consumer preferences and public policies.

BioMonitor Reference and alternative scenarios

The BioMonitor Reference Scenario (BRS) builds on the definitions and indicators developed by the project team and will serve as a 'business as usual' baseline for measuring the impacts of the alternative scenarios in the project for bioeconomy futures in Europe.

The guiding criterion behind the BRS is to characterise, within the BioMonitor modelling platform, a continuity of existing trends and social attitudes in the absence of any drastic course change by society, characterised by deviations in the aforementioned external drivers. Moreover, the BRS encapsulates a series of reasonable biomass-related public policy instruments

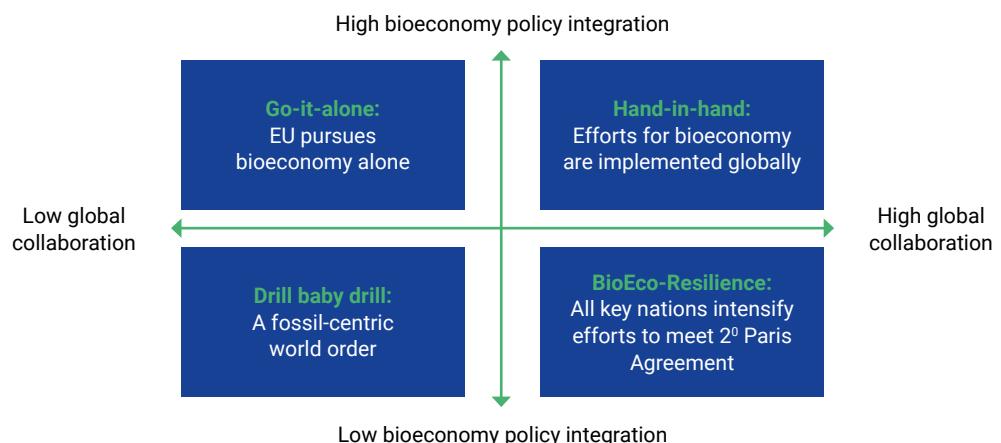
(i.e., agricultural policy, energy policy, trade policy), whose evolution and design, as far as feasibly possible, reflects current and anticipated developments.

The possibility to include in the BRS a harmonised set of assumptions regarding market developments (i.e., output, trade) for both traditional (e.g., agriculture, forestry, etc.) and emerging bioeconomy sectors (e.g., biochemicals, biopharmaceuticals, etc.) across all models will be considered. Within the policy arena in Europe (especially within energy and climate policy), both 2030 and 2050 serve as a point of reference, which has also been adopted within the BioMonitor project.

A key source for the design and implementation of the BRS is the Global Energy and Climate Outlook (GECO) to 2050 published by the European Commission's Joint Research Centre (Keramidas et al., 2018; Weitzel et al., 2019). The GECO has previously been employed in long-term bioeconomy impact assessment scenarios (M'barek et al., 2019; Philippidis et al., 2020).

The BRS will serve as a basis for assessing the impacts of two alternative storylines, each subdivided into two narratives that diverge gradually from the BRS starting from 2020. This means that the Bio-Monitor foresight study will encompass five scenarios in total (Figure 1).

Figure 1: Biomonitor's Alternative Scenarios



Go-it-alone

The EU pursues its vision of the Green Deal for 2030 and 2050. Within this context the sustainable bioeconomy is expected to boost the efficient use of resources by moving to a clean, circular economy and to safeguard biodiversity and cut pollution, without waiting for international commitments. All (potentially) bio-based primary and manufacturing sectors contribute to achieving this vision. As such, the EU will introduce an aggressive domestic support policy that encourages significant increases to the demand and supply of biomass from agriculture, forestry and fisheries/aquaculture for industrial and energy applications. EU Trade preferences for bio-based products will also reflect the EU's desire to maintain product standards and "fair" trade practises.

Hand-in-hand

A world in which the EU and other key players on the global stage are acting in tandem to promote the bioeconomy. The reduction/elimination of tariffs (under the assumption that all willing participants are engaging in sustainable bio-based production practises) on global trade for bio-based products ensures a more open market, eases the global transition to a more bio-based economy and supports all regions in the pursuit of domestic policies. For less developed countries to be further implicated in this transition pathway, greater social responsibility on the part of developed regions is assumed.

BioEco-Resilience

All key nations worldwide participate in seeking to achieve the 'two degree'

target from the Paris Agreement through major reforms of the energy markets and relevant climate policies. This scenario aligns with the vision of an environmentally conscious society and will principally examine stronger energy and climate assumptions.

Drill baby drill

The world follows a continuation of the linear ‘take-make-dispose’ model of human development and relies on a fossil-centric world order, where all types of public policy support mechanisms to the bioeconomy are abandoned in favour of greater reliance on traditional carbon-based resources for energy and material needs.

Conclusions and Policy

Recommendations

In this context, the overall objective of the BioMonitor project is to quantify the bioeconomy’s environmental, economic, and social impacts in the EU and its Member States and perform scenario based quantitative and qualitative assessment to inform future policy making in this domain. The BioMonitor Reference Scenario and the four Alternative Scenarios aim to respond to current debates about the future development of bioeconomy in Europe and worldwide by 2050 with an intermediate timeline to 2030.

This time horizon reflects current policy and future target settings within the following policy mix:

- The **European Green Deal** (COM (2019) 640 final) is the new sustainable growth strategy that aims to transform every aspect of the European economy, environment and society, including energy use, food use, production and consumption of products. The bioeconomy is included as an integral part of the Commission’s strategy to implement the United Nations 2030 Agenda and the Sustainable Development Goals.
- The European Commission’s post Covid-19 **Recovery plan for Europe** aims to deploy a reinforced EU budget

to help repair the immediate economic and social damage brought by the coronavirus pandemic, kickstart the recovery and prepare for a better future for the next generation. The **Next Generation EU** with €750 billion as well as targeted reinforcements to the long-term EU budget for 2021-2027, will bring the total financial firepower of the EU budget to €1.85 trillion.

- The economic transition towards a climate-neutral economy as outlined in the **2050 Long-term Strategy** (COM(2018) 773 A Clean Planet for all), in line with the Paris Agreement objective to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C, is closely linked to the bioeconomy. On the one hand, it contributes reducing emissions and resource intensity from the food system and other biomass usages. On the other hand, it provides carbon sinks and contributes to the decarbonisation of the industry with clean (bio)technology.
- The new **Circular Economy Action Plan** leads the way to transform the European production and consumption system to reduce its environmental footprint and, among others, create new, circular and bio-based business opportunities.
- With a view to the importance of the agri-food and forest sectors in the bioeconomy, the new **Farm to Fork Strategy** and the **Biodiversity Strategy** will be instrumental to support the food security and sustainable natural resource management objectives of the bioeconomy.
- For the bioeconomy as a dynamic and partly infant industry, the EC’s Action Plan on **financing sustainable growth** can be a central tool to re-orientate capital flows towards sustainable investments.

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This project has received funding from the European Union's Horizon 2020 research and Innovation programme under grant agreement N°773297.

Notes

- 1 European Commission SWD/2018/431. A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment
- 2 EU's strategic foresight report. Charting the course towards a more resilient Europe. 2020. https://ec.europa.eu/info/sites/info/files/strategic_foresight_report_2020_1.pdf
- 3 https://ec.europa.eu/info/strategy/priorities-2019-2024/new-push-european-democracy/strategic-foresight/2020-strategic-foresight-report_en
- 4 http://biomonitor.eu/wp-content/uploads/2019/10/BioMonitor_Deliverable_1.1_Update_1.pdf

Bibliography

- Kardung, M., Cingiz, K., Costenoble, O., Delahaye, R.; van Leeuwen, M., M'Barek, R., van Meijl, H., Piotrowski, S., et al. (2021) Development of the Circular Bioeconomy: Drivers and Indicators. *Sustainability* (2021), 13, 413. <https://doi.org/10.3390/su13010413>.
- Keramidas, K., Tchung-Ming, S., Diaz-Vazquez, A.R., Weitzel, M., et al. (2018). Global energy and climate outlook 2018: Sectoral mitigation options towards a low-emissions economy – global context to the eu strategy for long-term greenhouse gas emissions reduction. Publications Office of the European Union, Luxembourg.
- M'barek, R.; Philippidis, G.; Ronzon, T. (2019) Alternative Global Transition Pathways to 2050: Prospects for the Bioeconomy - An application of the MAGNET model with SDG insights, EUR 29862, Luxembourg: Publications Office of the European Union, 2019, ISBN 978-92-76-11335-5, doi:10.2760/594847, JRC118064.
- Panoutsou, C., O. Arrekul, T. Christensen, A. Singh, H. Verkerk, G. Philippidis, M. van Leeuwen, V. Sturm, R. M'barek and J. Wesseler (2020) Report on description of baseline scenario for EU bioeconomy and of alternative scenarios for EU's bioeconomy future. Deliverable 6.1. BioMonitor project.
- Philippidis, G., Shutes, L., M'barek, R., Ronzon, T., Taber, A., van Meijl, H. (2020) Snakes and Ladders: World development pathways' synergies and trade-offs through the lens of the Sustainable Development Goals, *Journal of Cleaner Production*, v267, <https://doi.org/10.1016/j.jclepro.2020.122147>.
- Weitzel, M., Vandyck, T., Keramidas, K., Amann, M., Capros, P., del Elzen, M., Franck, S., Tchung-Ming, S., Diaz Vasquez, A., Saveyn, B. (2019) Model Based Assessments for Long Term Climate Strategies, *Nature Climate Change*, 9, 343-347.