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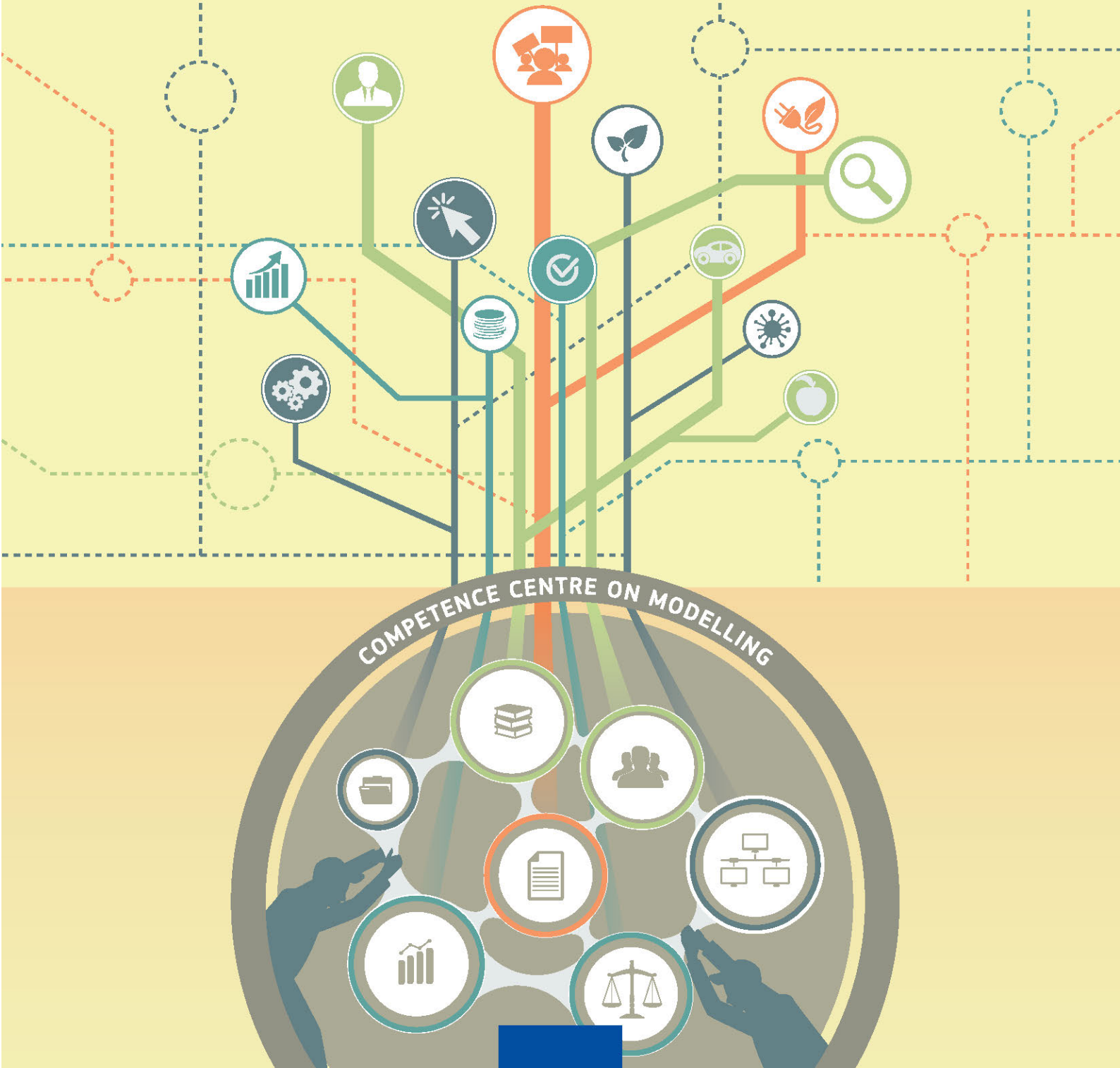
Abstracts



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Modelling markets of bio-based chemical products with BioMAT

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The updated EU Bioeconomy Strategy (European Commission, 2018) aims to develop a sustainable bioeconomy for Europe and addresses the competing use of biological resources, encompassing multiple sectors and policies to achieve policy coherence and synergies. To guide policy making, knowledge and foresight capacities are needed, including quantitative models. The review of existing modelling capacities reveals that one of the most significant gaps is the pure coverage of the emerging bio-based products, i.e. chemicals, which are currently predominantly produced using non-renewable and fossil resources in existing models (Lovrić et al, 2020).

To address this gap in modelling capacities we develop a multi-regional partial equilibrium model named BioMAT (Bio-based MATerials), a new consistent framework for modelling value chains of bio-based materials in the EU and its Member States. BioMAT aims to provide a proper representation of bio-based commodity markets, tracking feedstock and bio-based material flows in its recent history, projecting their future developments and reflecting the influence of demand and supply drivers and the policy framework. BioMAT is developed within the frame of the Biomonitor project and focuses currently mainly on bio-based products produced within the complex **chemical sector** (NACE C20).

The key source of inspiration by development of BioMAT was the experience gained by modelling the agro-food value chains in **AGMEMOD** (Agriculture Member State Modelling) (https://agmemod.eu/). Fig. 1 shows the bio-based value chains that will be covered by BioMAT.

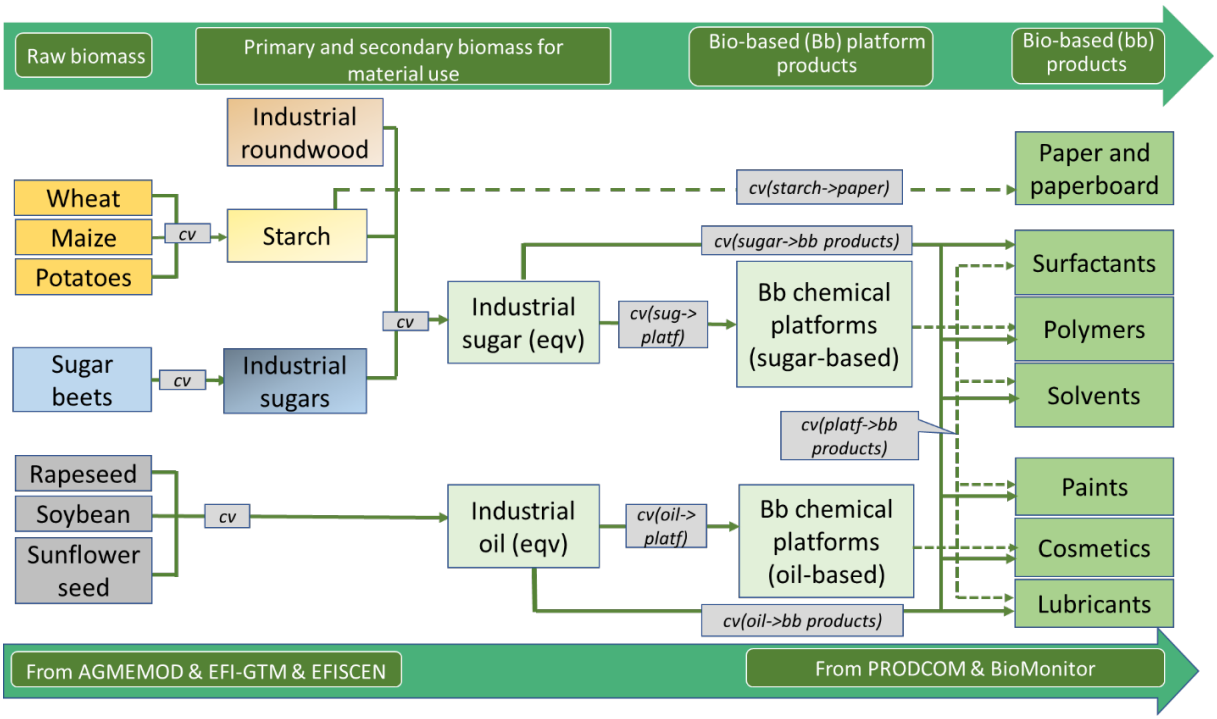

Figure 1: Bio-based value chains to be covered in BioMAT (Version V1)
Source: Reproduced from BioMonitor project deliverables (forthcoming)

When building the database for BioMAT, we try to exploit official statistics as much as possible. The ProdCom statistics of Eurostat include more than 550 codes within the chemical sector (NACE C20), each covering one or several chemical products. As chemical products are in general diverse and/or processed as composites and have different positions in the value chain, it is impossible to make market models for each individual product. For that reason, the individual products, all with a specific ProdCom code, are clustered to product application groups. Current BioMAT database covers 9 applications: 7 semi-final categories such as "paper and paperboard", "surfactants",

"polymers", "solvents", "paints and coatings", "cosmetics and personal care", "lubricants" and 2 intermediate product categories, i.e. "sugar-based platform chemicals" and "oil-based platform chemicals" (Figure 1).

The production of each bio-based product application requires the intermediate use of sugar-/oil-based platform chemicals and/or the direct use of sugars (from starch, industrial sugar or wood-based sugar) and/or oils (from plants), which on their turn require the use of different raw materials such as cereals, potatoes, sugar beets, oilseeds. Conversion rates ("cv" in Figure 1) ensure that the ratios between the production quantities of bio-based products and the required quantities of different feedstocks are maintained.

The supply of agricultural feedstocks for production of bio-based materials modelled in BioMAT is the outcome of AGMEMOD model. As BioMAT builds on both the conceptual framework and IT infrastructure of AGMEMOD, this data exchange can take place through a "hard link" between both models. This linkage allows to investigate the interaction between markets for agricultural and bio-based products.

In the Biomonitor project, BioMAT and AGMEMOD together with three other models (MAGNET, EFI-GTM, EFISCEN) form the core of the BioMonitor toolbox. Enriched with a suite of other analysis technics (input-output, trend and econometric analysis) the BioMonitor toolbox will enable the quantification of the bioeconomy and its economic, environmental, and social impacts in the EU under different scenarios (Figure 2) (Verkerk et al., 2021).

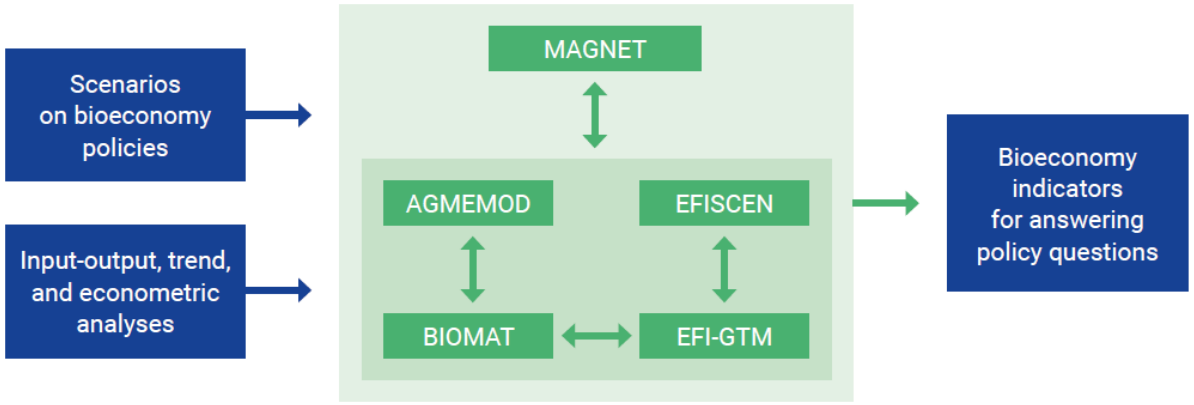

Figure 2: BioMonitor toolbox
Source: Reproduced from BioMonitor Infopack#1 (https://biomonitor.eu/)

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Modelling food waste and loss in a computable general equilibrium framework

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How does changing consumer food choice pattern affect economic, social and environmental sustainability: A computable general equilibrium modelling approach

Introduction

With ever more mouths to feed worldwide, policy makers are engaging in ways to develop more sustainable and climate friendly systems of economic development that avoid further increases in harmful greenhouse gas emissions and reduce the burden on our natural biophysical