

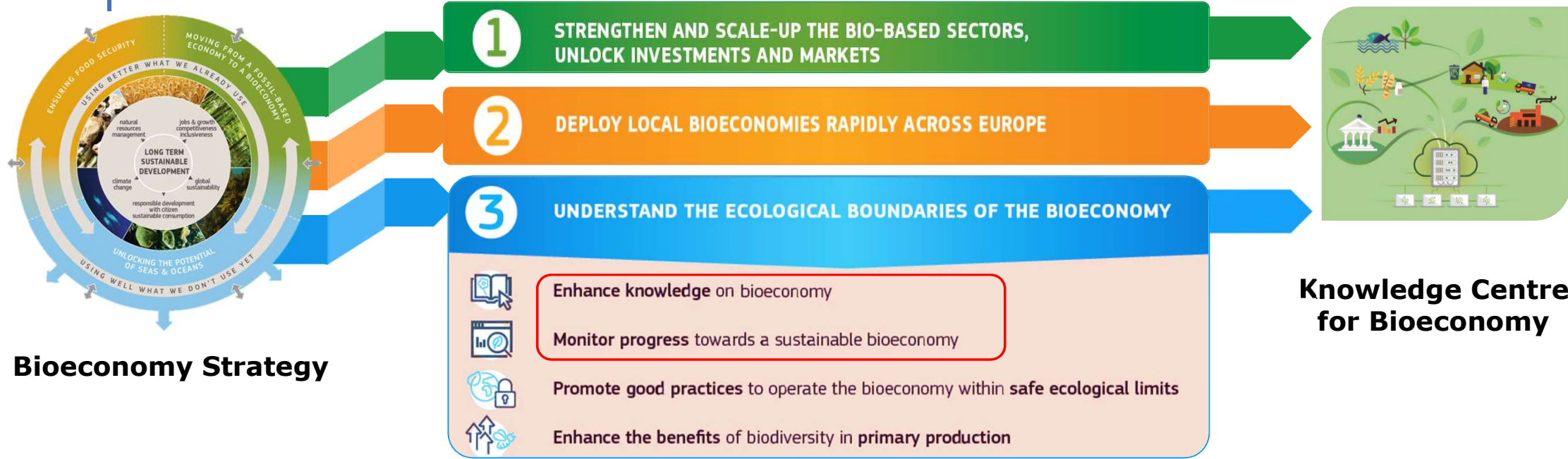
Overview of bio-based value chains in the EU, and a comparison of biorefineries in and outside the EU

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Workshop “Biobased Industries and Biomaterials – Opportunities for Acceleration”,
organized by European Commission (DG GROW), 10 May 2023, Brussels

Introduction



Bioeconomy Strategy

Knowledge Centre for Bioeconomy



Ensuring Food and Nutrition security



Managing natural resources sustainably



Reducing dependence on non-renewable, unsustainable resources



Mitigating and adapting to climate change



Strengthening European competitiveness and creating jobs

POLICY OBJECTIVES

Trends in the Bioeconomy



- First assessment based on the EU Bioeconomy Monitoring System (https://knowledge4policy.ec.europa.eu/bioeconomy/monitoring_en).
- Objective: track economic, environmental and social progress towards a sustainable bioeconomy through relevant indicators.
- Main message: Europe is generally moving towards the objectives of the EU Bioeconomy Strategy but environmental challenges persist.
- Need for policy coordination as a consequence of multiple pressures on land from biomass demand. An integrated land use assessment is started.

Biomass supply and use



- Report provides:
 - Details on biomass supply and uses for agriculture, algae, fisheries & aquaculture and forestry
 - Organic waste recovery
 - Wood trade and wood price volatility
 - Environmental impacts of biomass consumption
 - Innovative uses of biomass.
- Observed progress in terms of resource efficiency, e.g. increased wood, food and other bio-waste reuse.
- However, also trends to more production and consumption of biomass overall. This is expected given the increased substitution of the non-renewable resources for bio-based.

Bioeconomy in socio-economic terms

– most recent data for 2020

Value added of biomass producing and converting sectors (Billion €)

€665

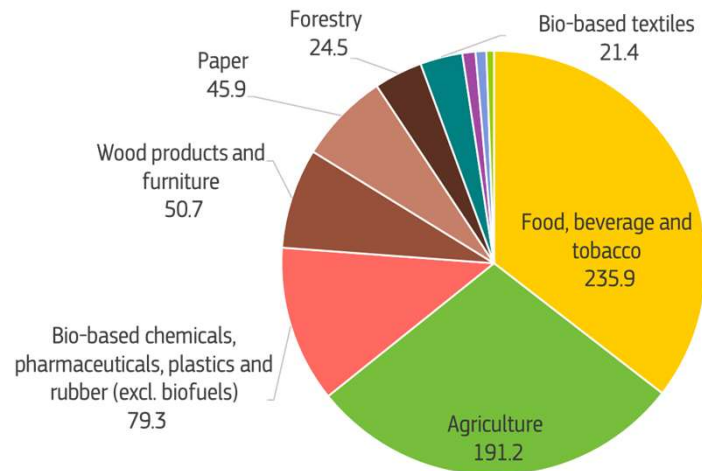
Number of people employed in biomass producing and converting sectors

17.16M

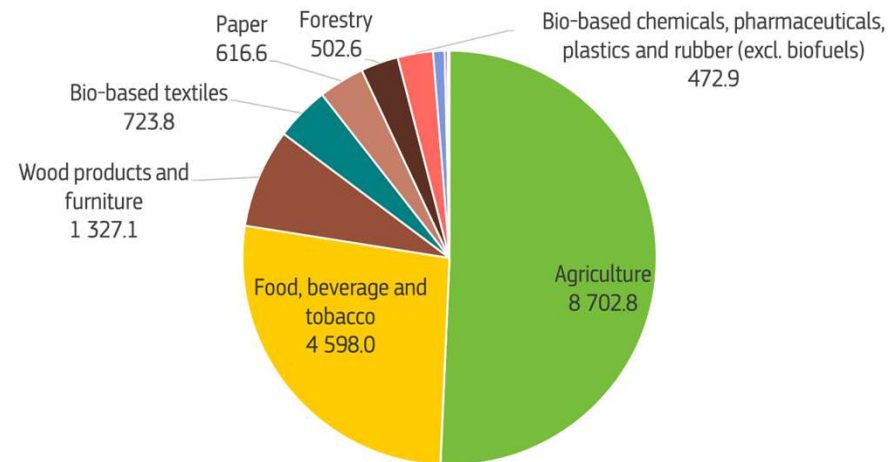
Value added per person employed in biomass producing and converting sectors

39 k€ - 39 k EU27

Value added (billion euro, 2020)



Persons employed (thousand persons, 2020)

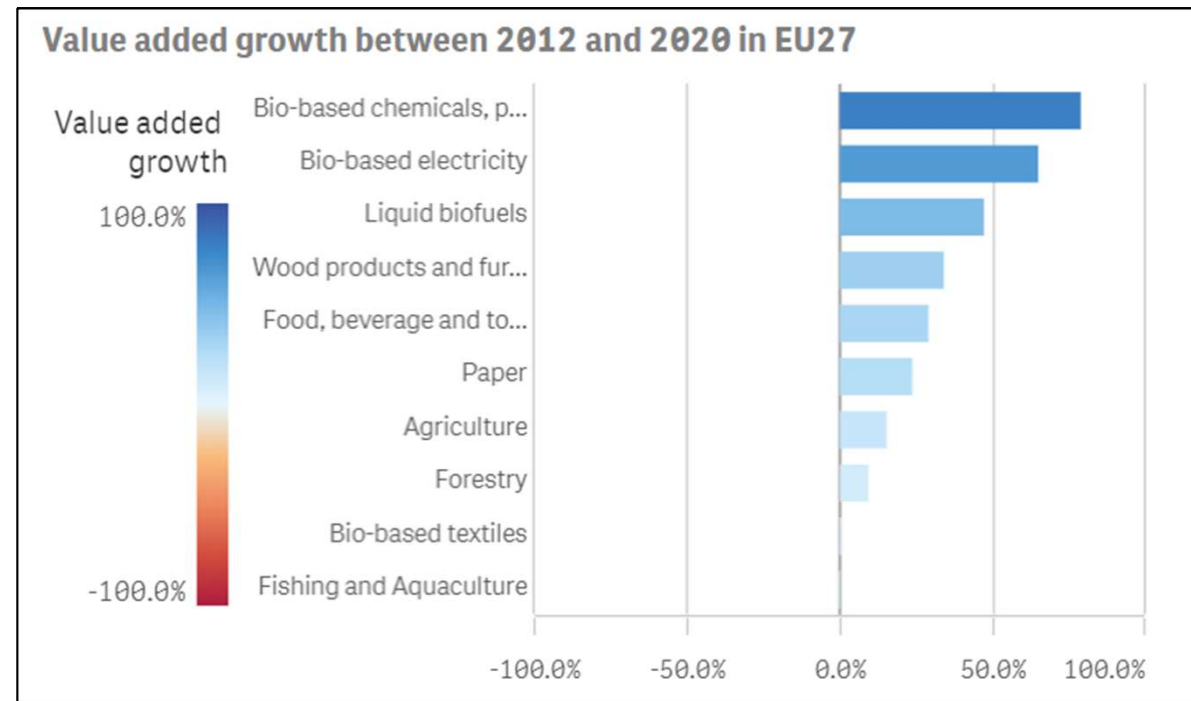


Source: <https://datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/>

Bioeconomy showing resilience

In 2020, the bioeconomy provided:

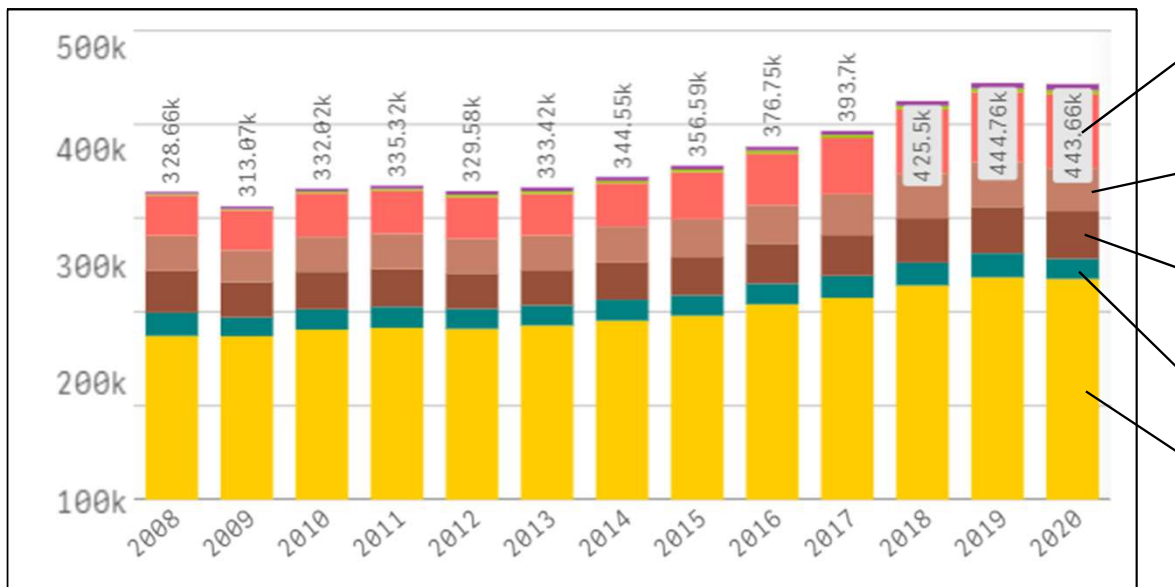
- 8.3% of total employment (similar to 2019)
- 4.9% of total value added (vs 4.75% in 2019)
- Employment in the bioeconomy registered a slightly sharper decline than the total employment (-1.7% vs -1.4% in 2019)
- Value added in the bioeconomy showed a higher resistance to the COVID-19 shock (-0.3% vs -4.0% in 2019)



Source: <https://datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/>

Growing importance of bio-based industries in the Bioeconomy

Development of value added growth in the bio-based industries between 2008 and 2020 in EU27 (mio €)



- Bio-based chemicals (10.6 bn €)
- Pharmaceuticals (65.4 bn €)
- Plastics and rubber (3.4 bn €)
- Paper (46 bn €)
- Wood products and furniture (50.7 bn €)
- Bio-based textile (21.4 bn €)
- Food, beverage and tobacco (236 bn €)

+ 6.4% compared to 2019

BB industries in EU*

- 7.8 million workers
- €444 billion of value added

*Construction and waste treatment are not accounted for

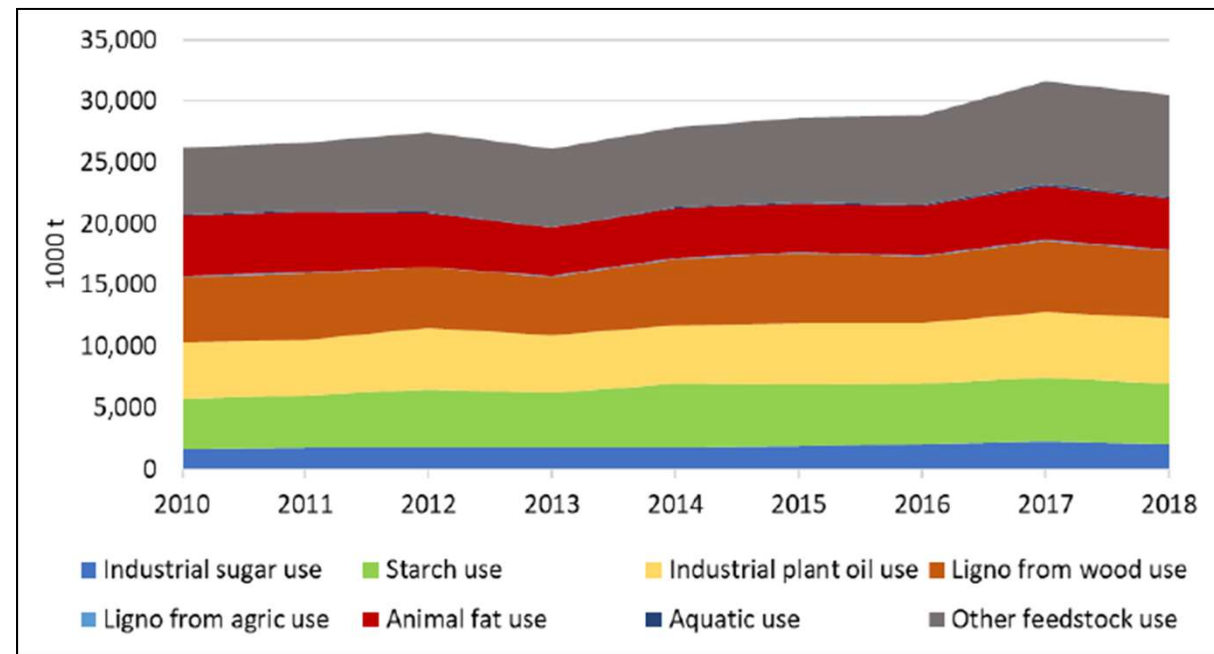
Source: <https://datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/>

Feedstock for bio-based chemicals

Insights:

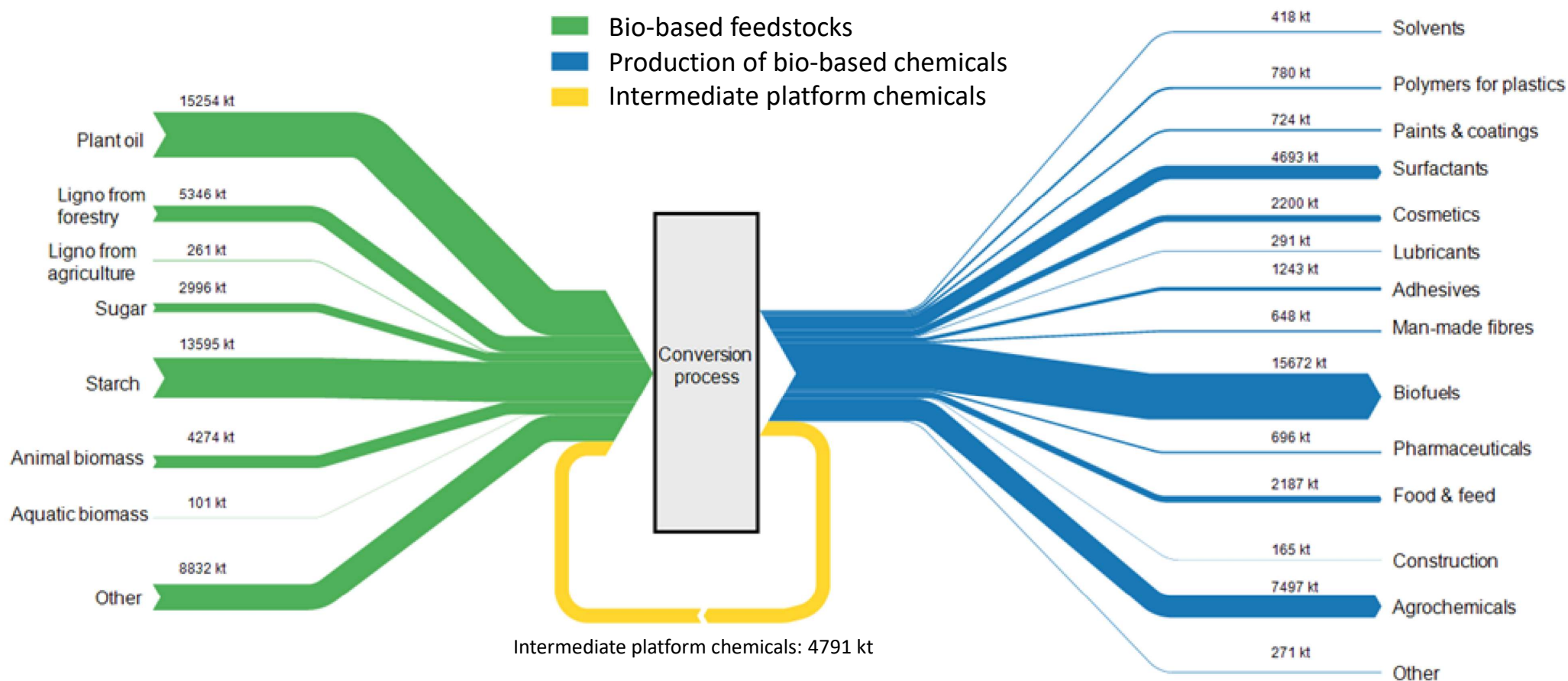
- Share of bio-based products in total organic chemical products (C20): 14%
- Total biological feedstock use by chemical industry in the EU
 - 25 Mio t for biofuels
 - 30 Mio t for non-biofuels
- Dashboard & dataset fully available here: https://datam.jrc.ec.europa.eu/datam/mashup/MARKETS_BB_CHEMICALS/

Development of use of different bio-based feedstocks by the chemical industry (excl. biofuels) in the EU



Source: Sturm et al., 2023, <https://doi.org/10.3390/su15043064>

Use of biological resources for production of bio-based chemicals in the EU in 2018



Source: Sturm et al., 2023, <https://doi.org/10.3390/su15043064>

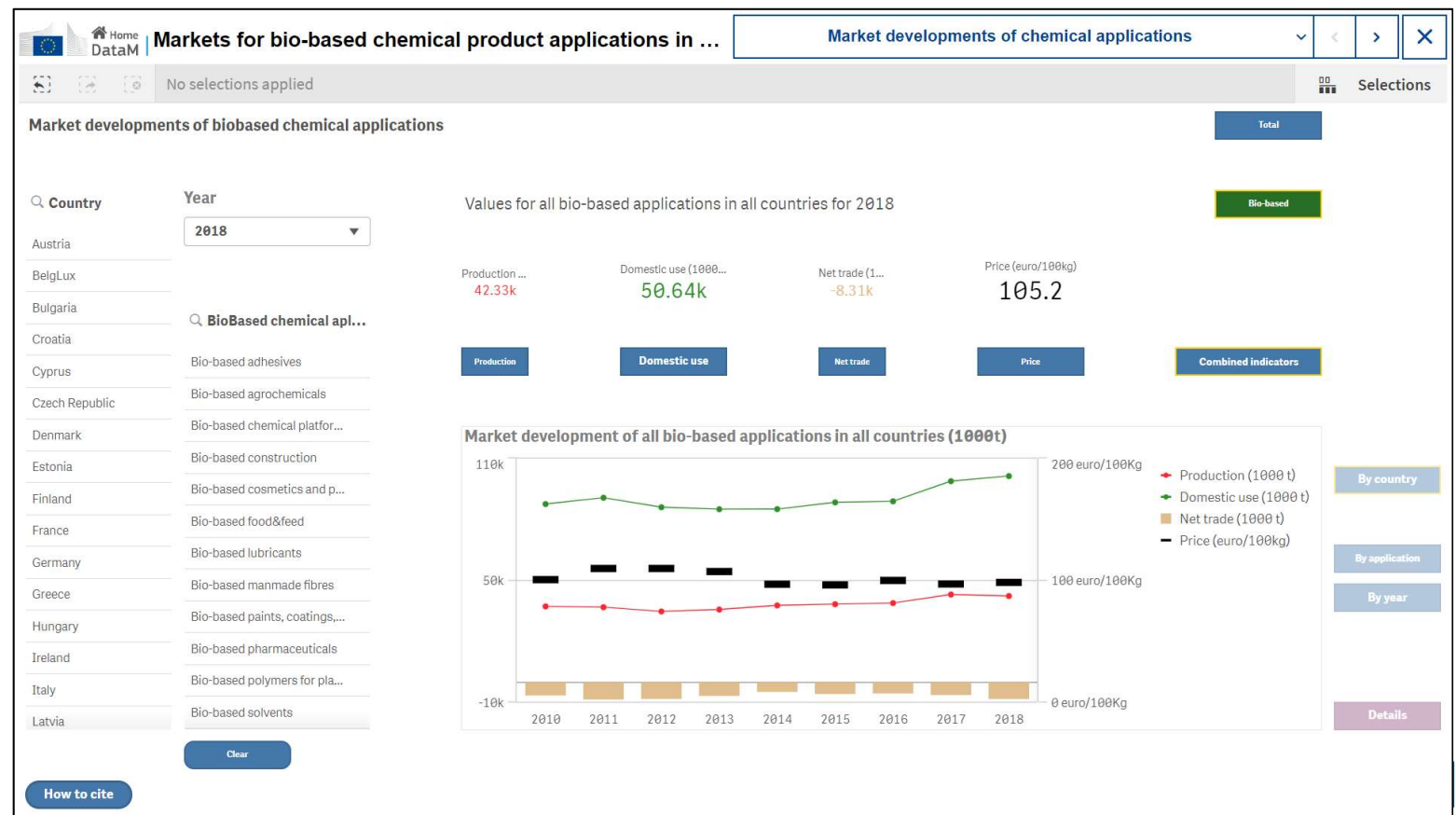
Markets for bio-based chemical product applications in EU member states - Dashboard



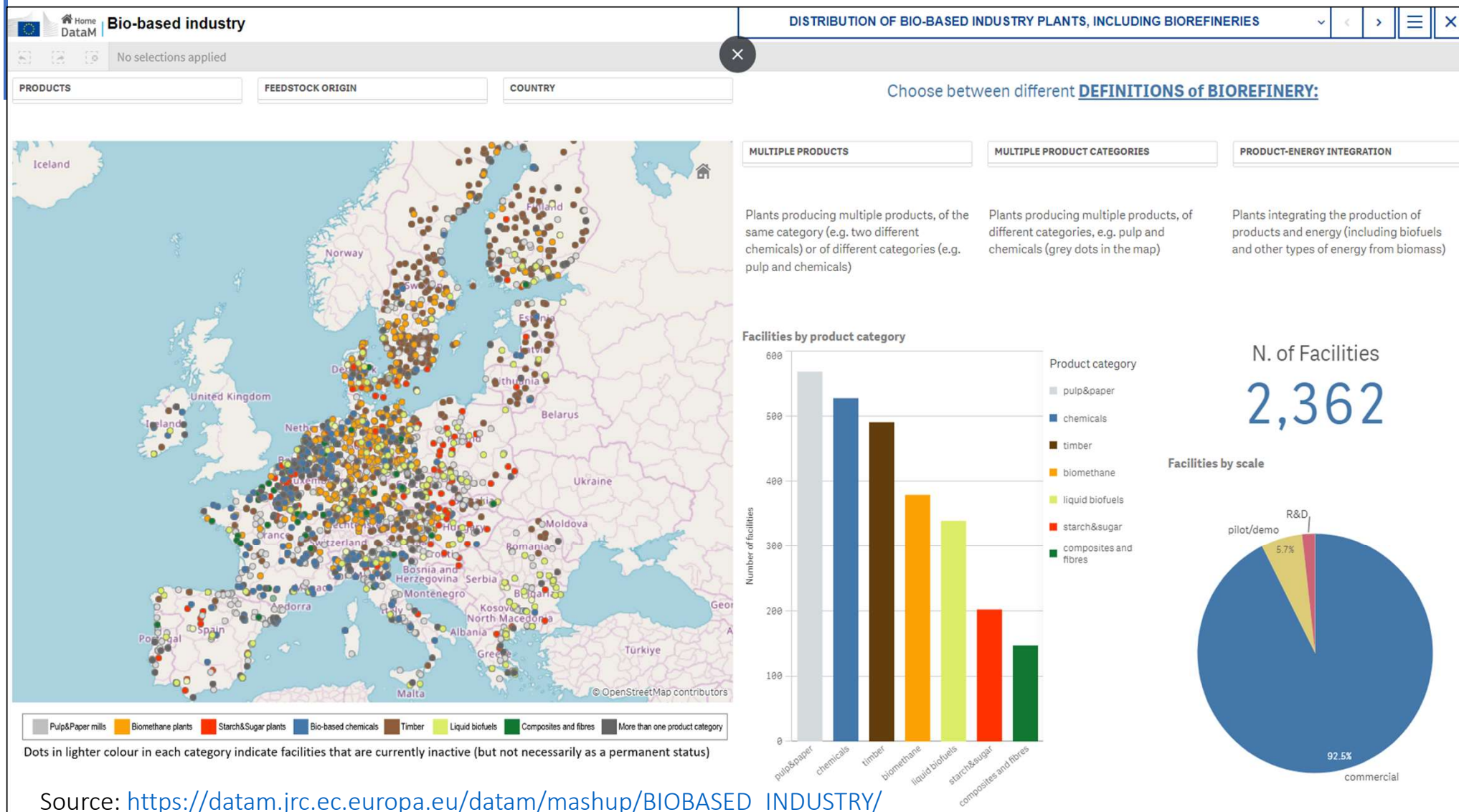
Public version

https://datam.jrc.ec.europa.eu/datam/mashup/MARKETS_BB_CHEMICALS/

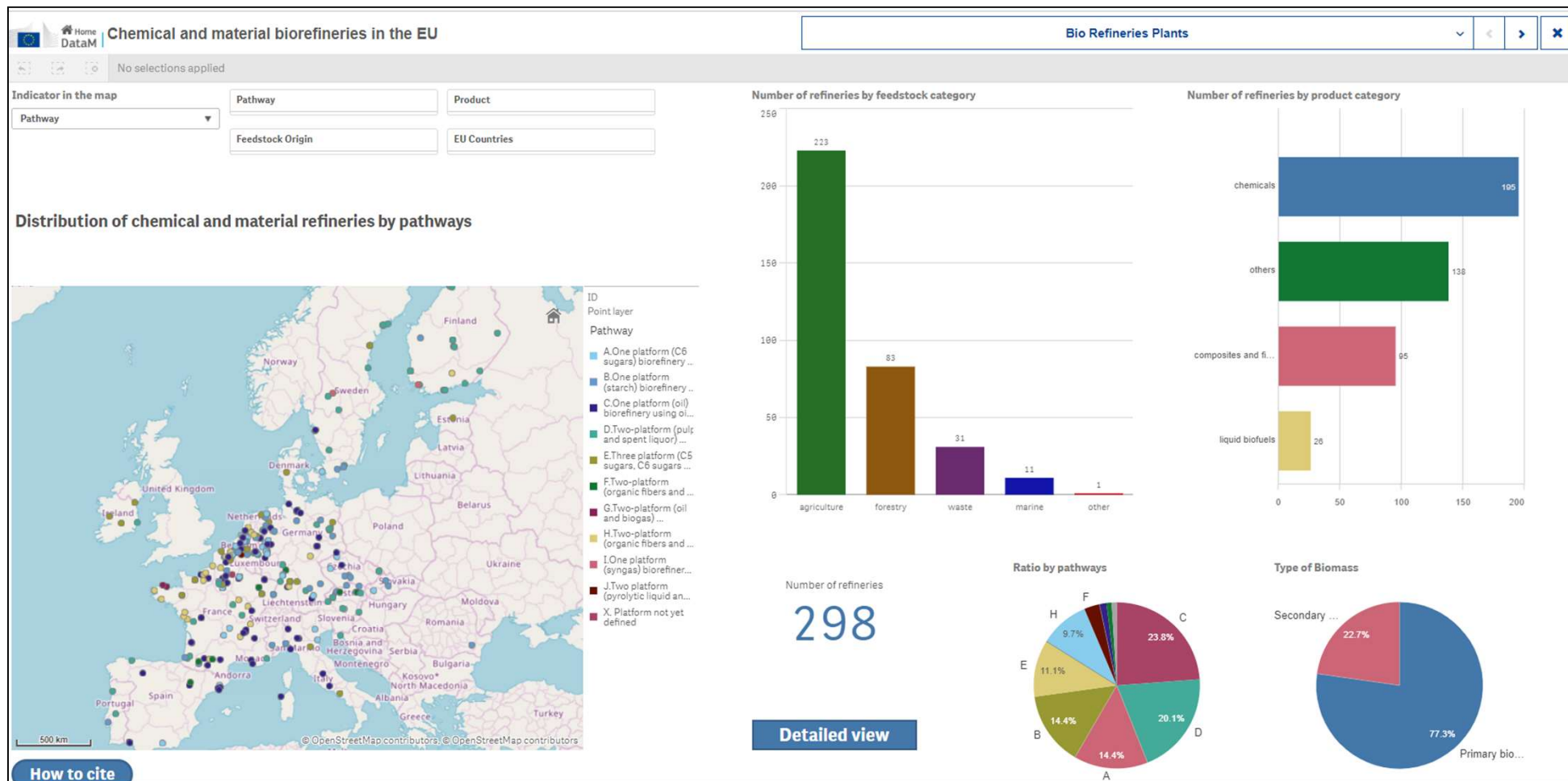
Soon also on KCB website



Bio-based industry plants

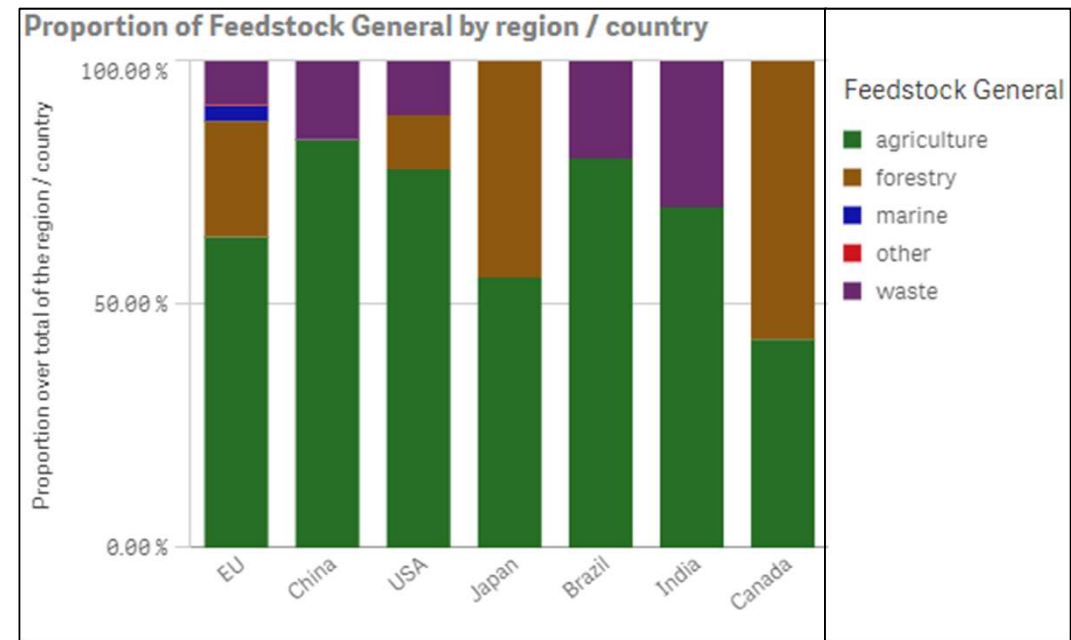
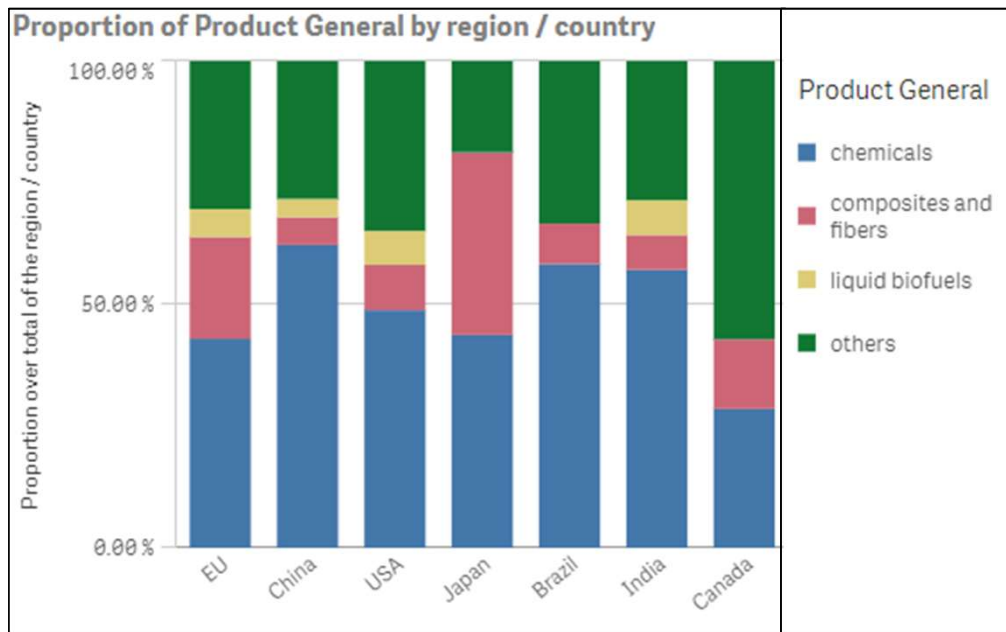


Chemical and material driven biorefineries



Sources: https://datam.jrc.ec.europa.eu/datam/mashup/CHEMICAL_BIOREFINERIES_EU; Platt et al. 2021 www.e4tech.com/biorefinery-outlook.php

Chemical and material biorefineries – comparison EU and non-EU countries

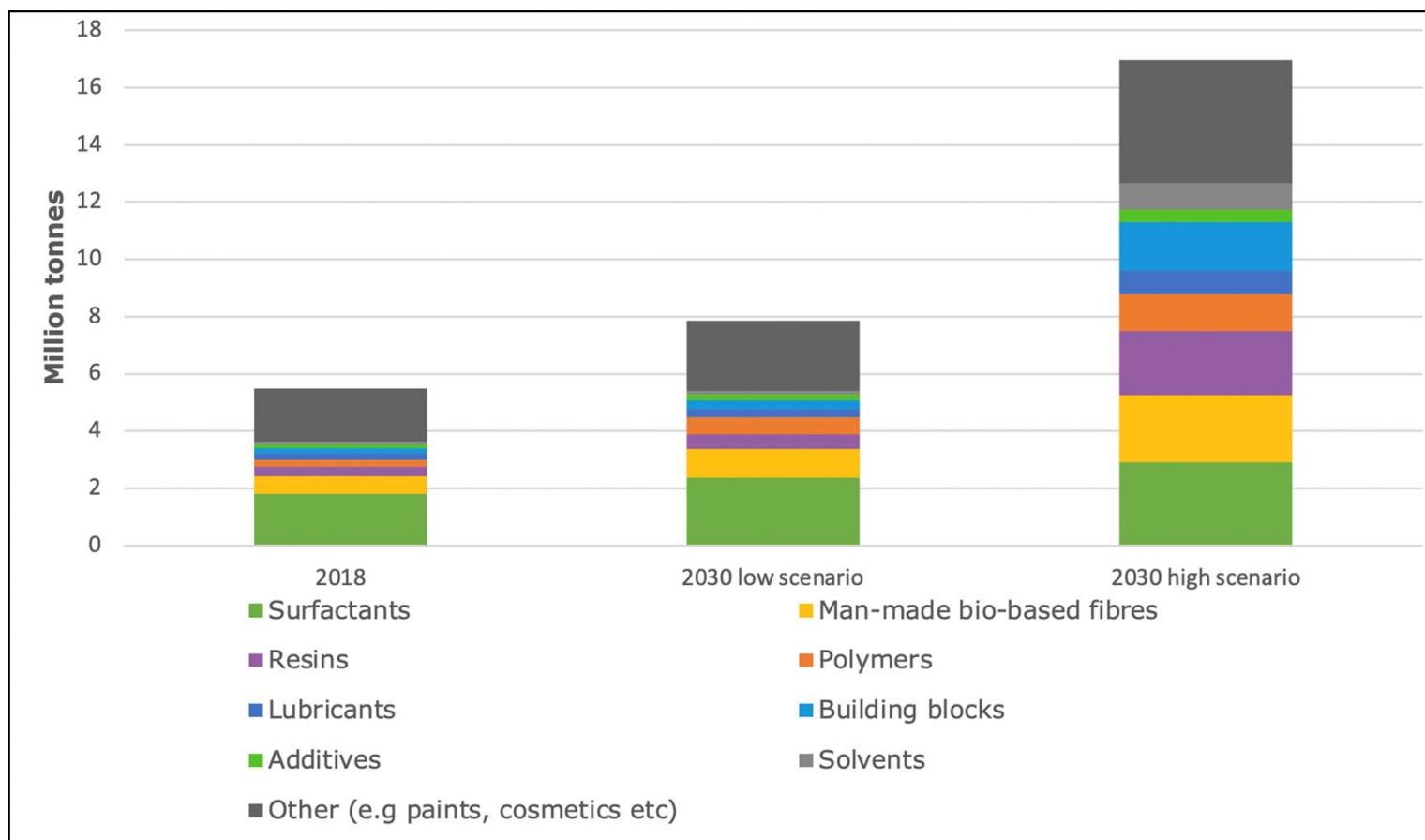


Number of biorefineries: EU 298, China 38, USA 29, Japan 11, Brazil 9, India 8, Canada 6

Source: https://datam.jrc.ec.europa.eu/datam/mashup/CHEMICAL_BIOREFINERIES_NON_EU/

Asia is global leader in fossil-based chemical production (comprising of chemicals, plastic and pharmaceuticals) with a share of 58%; Europe follows with a 21% share. In terms of bio-based chemical markets (economic values), Europe, Asia and North America have very similar shares of around 30% each (Spekreijse et al., 2021).

Demand for bio-based products 2018, and 2030 low- and high scenario: demand could triple by 2030



Source: Platt et al. 2021 www.e4tech.com/biorefinery-outlook.php

Exploratory scenarios for bio-based chemicals (1)

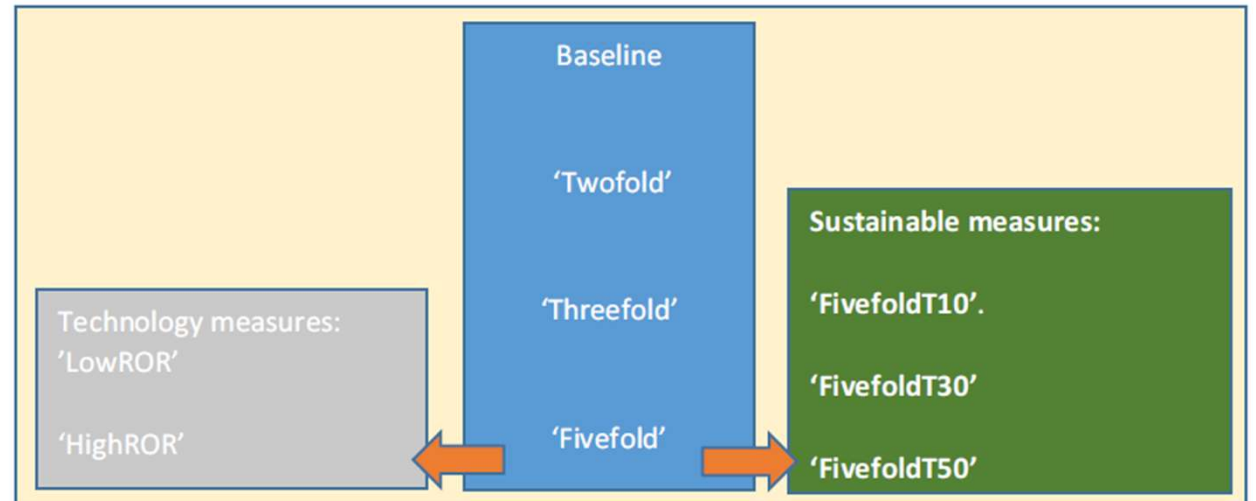


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Exploring economy-wide sustainable conditions for EU bio-chemical activities

George Philippidis^a, Robert M'Barek^b, Kirsten Urban-Boysen^c,
Willem-Jan Van Zeist^d

- Simulation model MAGNET
- Time horizon 2050



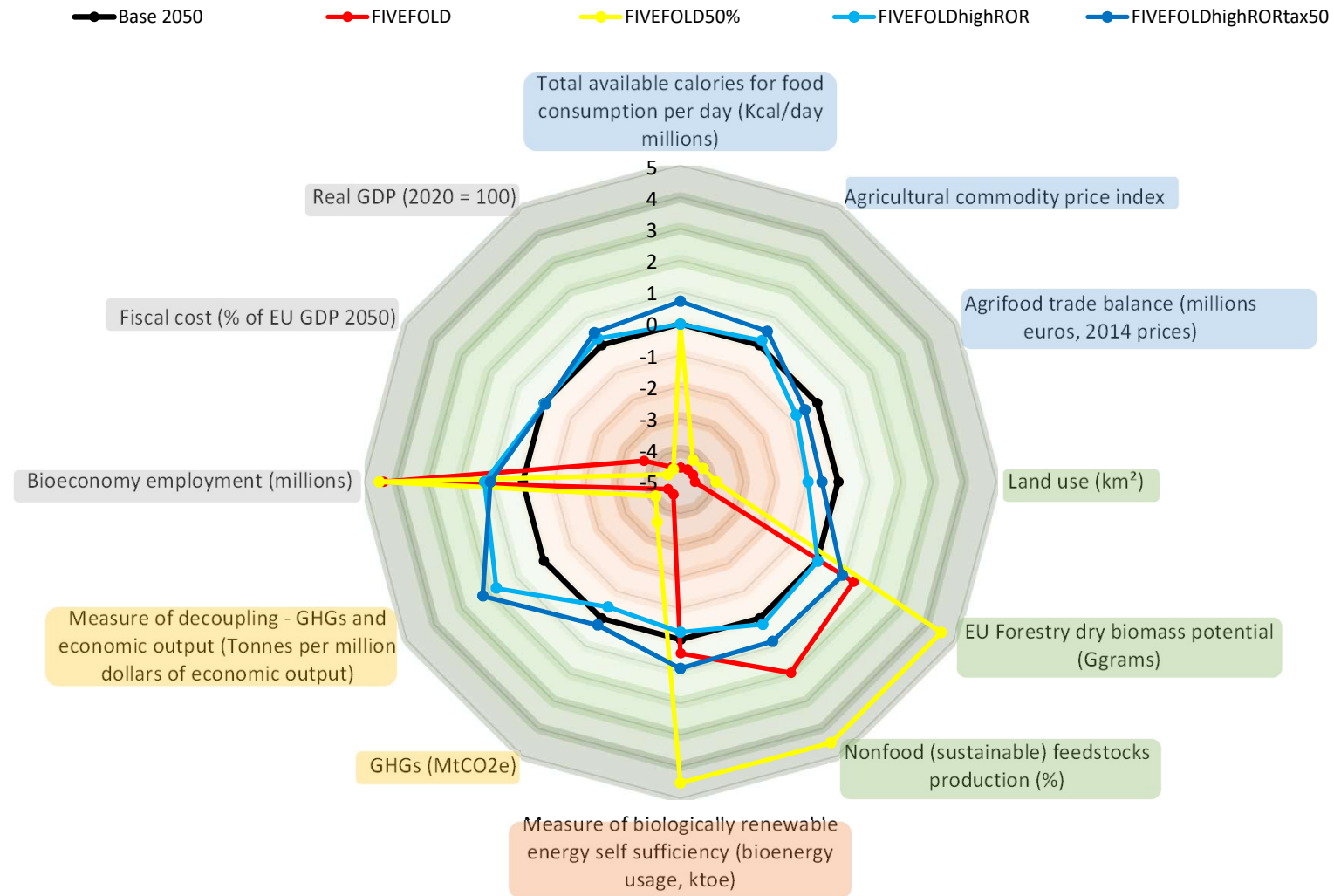
Investments translated into productivity improvements (rate of return from McKinsey (2014)).

Bio-based chemical input subsidies, met by rising taxes on all EU end users of chemicals.

Tax on food-based feedstock, revenues to fund bio-based chemical production subsidies.

Source: Philippidis et al. 2023, <https://www.sciencedirect.com/science/article/pii/S0921800923001209>

Exploratory scenarios for bio-based chemicals (2)



Source: Philippidis et al. 2023, <https://www.sciencedirect.com/science/article/pii/S0921800923001209>

Thank you

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