The sustainable and circular bioeconomy in the EU

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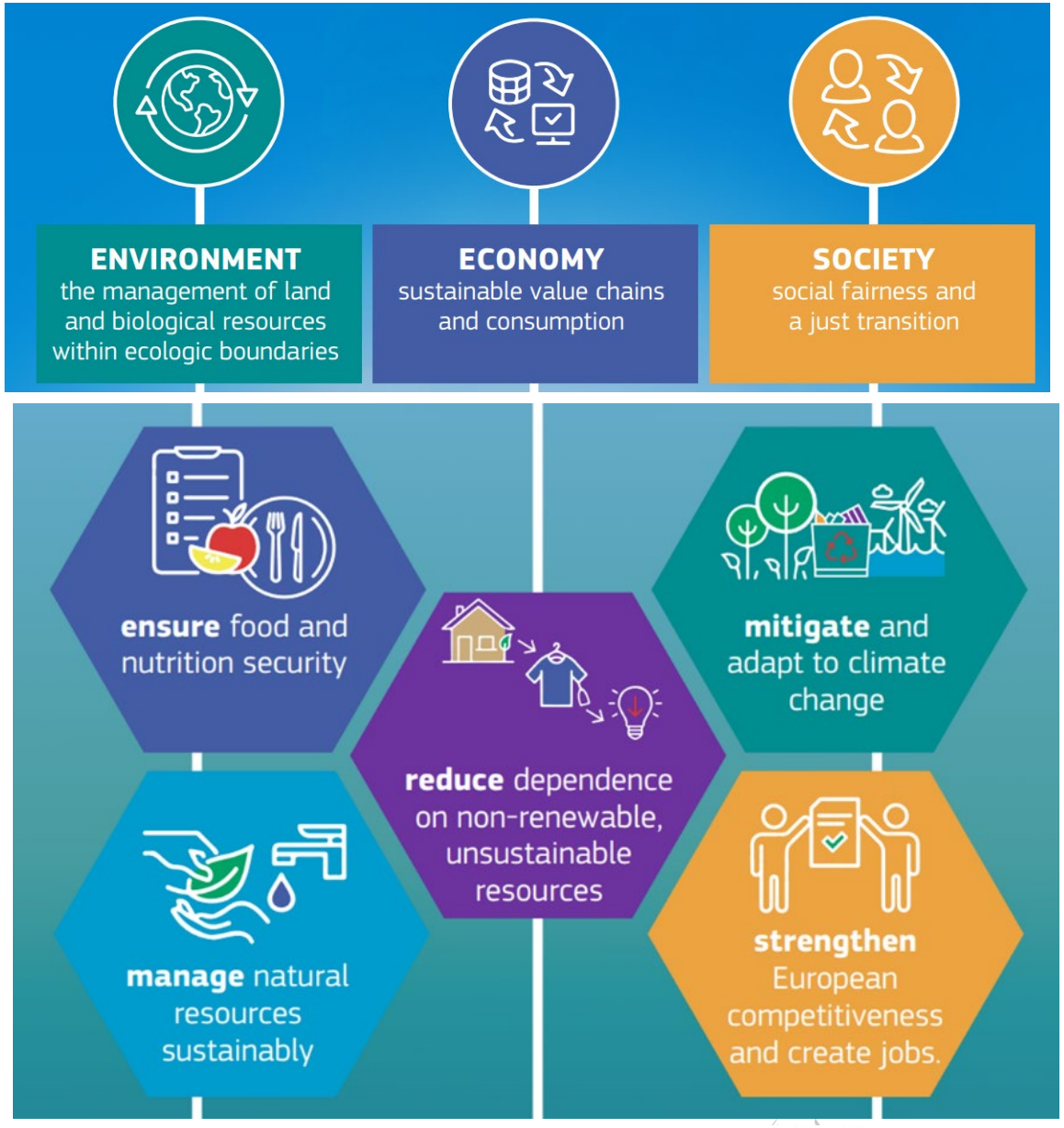
Joint OECD/UNECE Seminar on Implementation of SEEA | 18-20 March 2024

EU bioeconomy

- EU Definition: Bioeconomy encompasses all sectors and associated services and investments that produce, use, process, distribute or consume biological resources, including ecosystem services
- The bioeconomy represents 5% of the EU's GDP and employing 8.3% of its workforce
- 1.2 billion tonnes of biomass in dry matter used, of which 50% for food, feed and bedding for livestock, 22% for bioenergy and 28% for materials
- The EU Bioeconomy Strategy (2018 update) takes a holistic approach focusing on all three dimensions of sustainability, addressing five different objectives
- Strategic view on trade-offs (e.g. scarce biomass) and co-benefits (e.g. for biodiversity)



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EU Bioeconomy Strategy & recent developments

2012

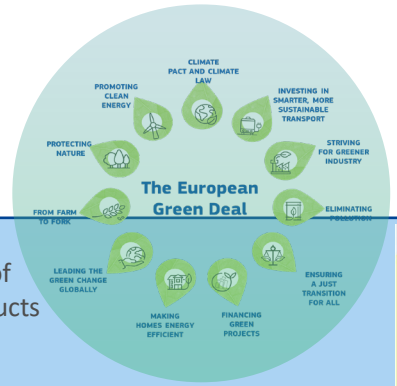
- Efficient use of renewable resources
- Focus on R&I

[First Bioeconomy Strategy]

2018

+ Substitution of harmful products
+ Regional development
+ Understanding ecological limits

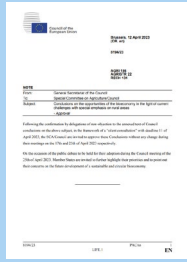
[Updated Bioeconomy Strategy]



2022

[Bioeconomy Progress Report]

2023



[European Council Conclusion]

in progress

Update of the 2018 Bioeconomy Strategy

- Bioeconomy contributes to the European Green Deal
- Mainstreaming and up-scaling of sustainable bioeconomy ever more important in view of the food and energy prices

One key priority for the EU:
"foster the transition towards a more circular economy to improve sustainability, lower input costs for EU industry and reduce dependencies regarding primary materials, including by seizing the opportunities offered by the bioeconomy"

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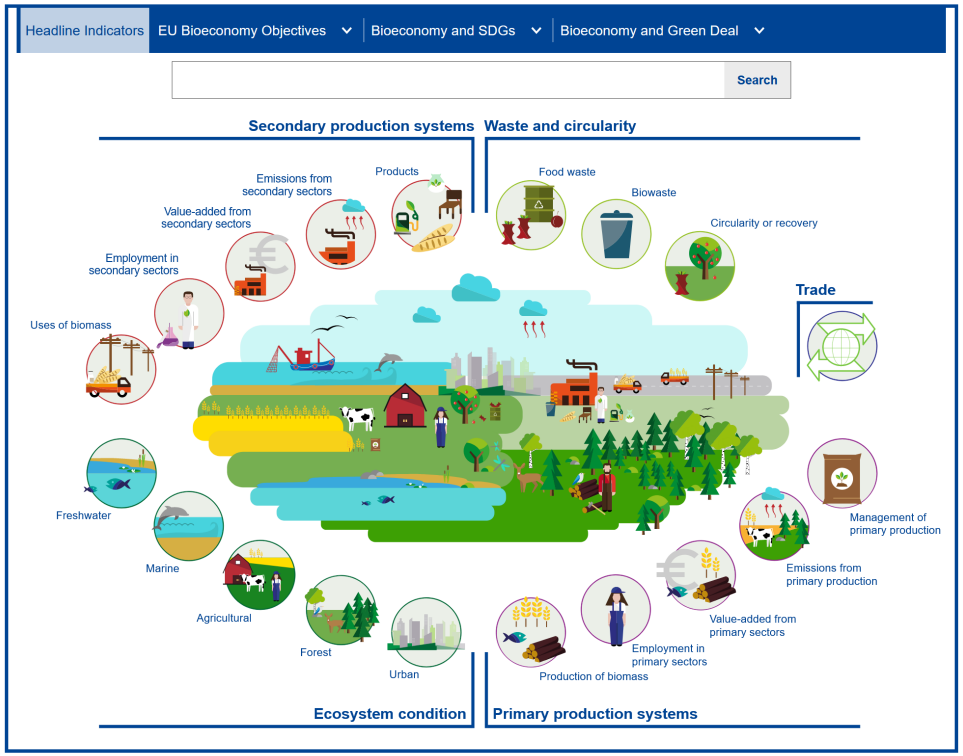
EU Bioeconomy Monitoring System I

- Launched in 2020 as part of the 2018 Bioeconomy Strategy, covering indicators for the five objectives
- Designed to assess the EU's progress towards a circular and sustainable bioeconomy
- Novel approach: not based on indicator availability but on conceptual framework (i.e. some indicators do not yet have data sources available)
- Various data sources of existing indicators: Eurostat, EEA, JRC, FAO, UNEP, etc.



How to cite: *Knowledge Centre for Bioeconomy: https://knowledge4policy.ec.europa.eu /bioeconomy/monitoring_en*

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EU Bioeconomy Monitoring System II

Normative criteria	Key components	Indicator name	Unit	Short-term period	Short-term trend change (% / year)	Long-term period	Long-term trend change (% / year)	Indicator overview
Resource efficiency, waste prevention and waste-re-use along the whole bioeconomy value chain is improved	Resource efficiency (Material footprint)	Domestic Material Consumption (Biomass)	% of total Domestic Material Consumption	2017-2021	-0.96	2012-2021	-0.37	
		Material Footprint (Biomass)	kg/$ of GDP	2015-2019	1.23	2010-2019	1.69	
		Land footprint in EU of EU consumption (for non-food&feed)						
	Energy Efficiency	Energy productivity	€ per kg of oil equivalent	2016-2020	2.52	2011-2020	2.16	
		Share of renewable energy in gross final energy consumption	%	2016-2020	5.52	2011-2020	4.47	
		Share of renewable energy in gross final energy consumption of bio based industries or bioenergy industries						
	Biogenic waste prevention, re-use/ recycling, and recovery	Cascading factor of wood resources - Share of secondary woody biomass used in material industry	% of woody biomass used in material industry	2013-2017	0.11	2008-2017	-0.88	
		Circular material rate	%	2016-2020	2.75	2011-2020	1.82	
		Total energy supply from municipal waste						
		Recycling rate of municipal waste	%	2015-2019	1.39	2010-2019	3.03	
		Biowaste generated by source: Households	kg dry	2014-2018	-1.18	2009-2018	-0.56	
		Biowaste generated by source: Industrial and Agricultural	kg dry	2014-2018	-1.33	2009-2018	-0.32	
		Biowaste generated by source: Total	kg dry	2014-2018	-1.27	2009-2018	-0.42	
		Biowaste recovered by source: Households	kg dry	2014-2018	4.17	2009-2018	4.35	

Normative criteria	Key components	Indicator name	Unit	Short-term period	Short-term trend change (% / year)	Long-term period	Long-term trend change (% / year)	Indicator overview
Food security and nutrition are supported	Availability	Agricultural factor income per annual work unit (AWU)	Index (2010 = 100)	2017-2021	0.76	2012-2021	2.43	
		New food products (by sector)						
		New food value chains (by sector)						
		Total biomass supply for food purposes, including inputs	1000 t of dry matter	2014-2018	0.4	2009-2018	0.09	
		Biomass directly consumed by EU citizens as food	1000 t of dry matter	2014-2018	-0.22	2009-2018	-0.07	
	Access	Prevalence of moderate or severe food insecurity in the total population, yearly estimates	%	2015-2019	4.72	2010-2019	4.72	
		Average dietary energy supply adequacy						
		Food purchasing power	% of GDP	2016-2020	-1.32	2011-2020	0.11	
	Stability	Daily calorie supply per capita by source	kcal/cap/d	2014-2018	0.51	2009-2018	0.12	
		Indicator concerning food quality, or food safety						
		Animal welfare						
	Utilisation	Government support to agricultural research and development (by sector)	€/cap	2016-2020	4.73	2011-2020	1.90	
		EU's self-sufficiency rate on protein for feed						
		Import dependency ratio of food (import/domestic production)						
		Value of food imports over total merchandise exports						

Source: Mubareka, S., Giuntoli, J., Sanchez Lopez, J., Lasarte Lopez, J., M`barek, R., Ronzon, T., Renner, A. and Avraamides, M., Trends in the EU bioeconomy, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/835046, JRC132639

Biobased materials in the EU

- Policy framework for biobased, biodegradable and compostable plastics
  - Biobased: RED III for land use and biodiversity, for GHG emission more research needed
  - Biodegradable: Only specific applications (e.g. mulch films)
  - Compostable: Only industrially compostable plastics (e.g. plastic bags for bio-waste, tea & coffee bags)
- Packaging Regulation likely requiring to “review the state of technological development and environmental performance of bio-based plastic packaging taking into consideration the sustainability criteria laid down in Article 29 of Directive (EU) 2018/2001”
- Biobased materials used in the built environment can be considered environmentally sustainable under the EU Taxonomy for Sustainable Finance if it contains a maximum of 80/90% primary raw materials

Bio-waste in the EU

- Definition Waste Framework Directive: “biodegradable garden and park waste, food and kitchen waste from households, offices, restaurants, wholesale, canteens, caterers and retail premises and comparable waste from food processing plants”
- Bio-waste constitutes 34% of municipal waste (of which 60% is food waste) and “is the most important waste stream for which action is needed” (Early Warning Report 2023)
- Separate collection obligation of bio-waste in the EU since 31 December 2023
- Proposed food waste reduction targets of 10% in processing and manufacturing, and 30% in retail and restaurants by 2030 compared to 2020, supported by food waste prevention programmes (food waste amounts to 173 kg per person per year in the EU)

Towards a sustainable and circular bioeconomy?

- The bioeconomy has the potential to reduce the use of fossil fuels and other carbon-intensive materials (e.g. construction products), while creating growth and employment, sequestrating carbon and ensuring food and (renewable) energy security
- A recent EEA study finds a potential biomass gap of 40-70% between demand and what can be harvested in the EU sustainably by 2050.
- The sustainable and circular bioeconomy guides policy and investment decisions through its cascading use principle (highest economic and environmental value-added) and lifecycle assessments

Thank you

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