TOWARDS A CLIMATE-NEUTRAL EUROPE BY 2050

THE CONTRIBUTION OF THE BIO-BASED INDUSTRIES

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Bio·based Industries Consortium

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THE BIO-BASED INDUSTRIES CONSORTIUM ON CLIMATE NEUTRALITY

The Bio-Based Industries Consortium (BIC) welcomes that the European Green Deal puts the reduction of fossil emissions as a key priority and aims to achieve climate-neutrality by 2050. We support the ambitious EU target to reduce greenhouse gas emissions by 55% by 2030.

A carbon neutrality pathway will require that private sector investments and innovations are sufficiently incentivised. In that respect, contributing to achieve climate neutrality by 2050 provides strategic opportunities and challenges for our sector.

With this paper we would like to contribute to the discussion on the transition to a climate-neutral Europe. In this paper we describe how our sector already contributes to reduce GHG emission in a sustainable way. The paper then reflects on enablers for our sector to innovate and invest in the transition to climate-neutrality in 2050.

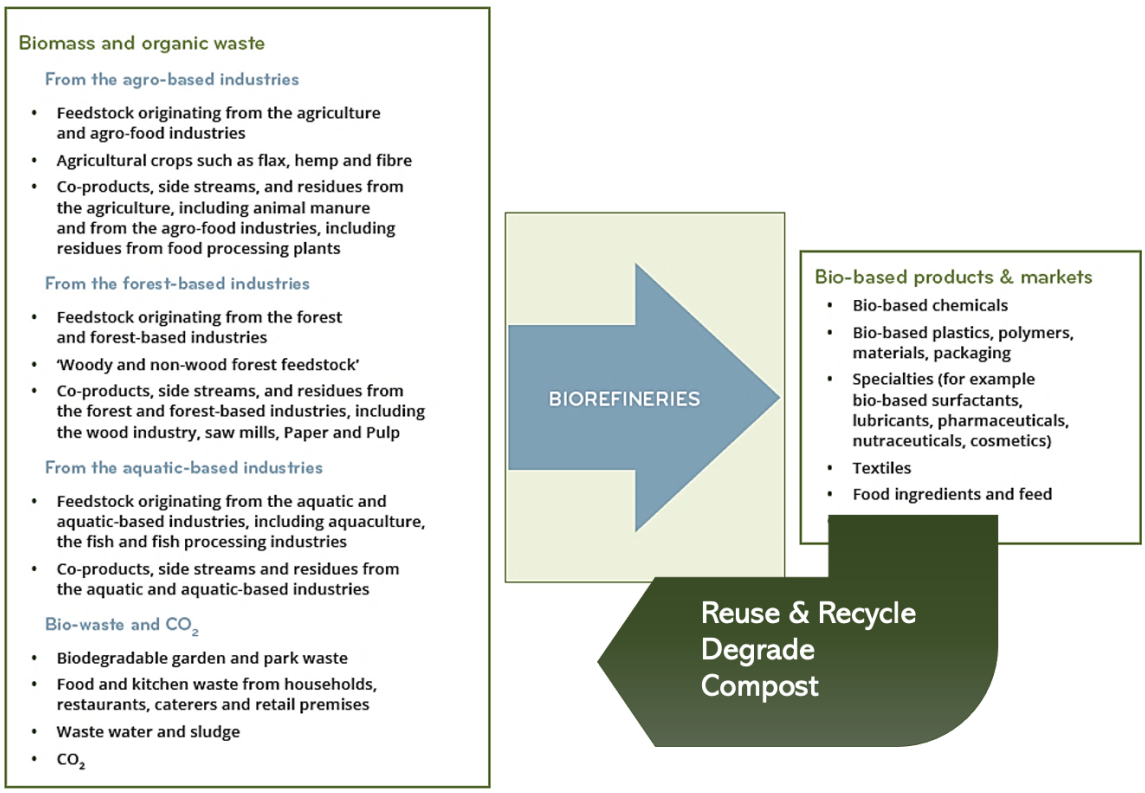
Bio-based industries: Part of the solution to achieve climate-neutrality by 2050

The EU Commission vision for a climate-neutral Europe and the partnership for a Circular Bio-based Europe Joint Undertaking (CBE JU) acknowledge the importance of the bioeconomy and bio-based sector for reaching European climate targets.

Designing processes and products for circular use by involving complete value chains creates a unique opportunity to reduce greenhouse gas (GHG) emissions. The ability to take such a systematic approach is a distinct characteristic of the bio-based industry. Partners from across the sustainable circular bio-based value system collaborate from project start to end, and hence are able to design projects in a systemic way, addressing GHG impacts from sourcing (primary sector) to production and processing (technology and manufacturing sector) and to end-users (consumers, brand sector).

Biorefineries are at the heart of the bio-based industry

A key advantage for our sector is that we use recyclable and renewable feedstock[1] and we produce a variety of bio-based products and materials that are recyclable, re-usable and can be compostable or biodegradable. This is illustrated as follows:



Building blocks of the EU bioeconomy are the agriculture, forestry and aquatic sectors, where sustainably sourced biomass[2] is used to unlock the full potential of the bioeconomy model. Other biomass sources, such as food and garden waste provide new options, but are an underutilised source in Europe[3].

SCOPE 1-2-3 emissions in the bio-based value system

SCOPE 1-2-3 emissions are a common way to describe the different levels of emissions. Below is a description for a typical **bio-based value system**, and how it generates climate impact in terms of reducing or generating emissions:

Bio-refineries have a strong regional and local dimension, making the business model more resilient to global supply chain impacts. **In the biorefinery production** direct and indirect emissions stem from the production process as such (**SCOPE 1 and 2**). First-of-its-kind biorefineries aim to be zero-waste, zero-pollution and fossil-fuel free.

[1] Including bio-waste, recycled bio-based materials and CO_2

[2] For example, JRC provide biomass supply overview, see here

[3] Bio-waste generation in the EU (ZWE-BIC, 2020)

Emissions are reduced through innovative operation and manufacturing processes to optimise the use of biomass and by achieving significant water and energy use savings. **SCOPE 3** emissions (**up-stream**) in the production are related to purchases and products, transport, distribution and pre-processing of biomass, and mostly within the proximity of a biorefinery. The most significant contribution of our sector to achieve climate-neutrality can be realised **downstream.** In terms of **SCOPE 3** emissions, generating circular bio-based loops has a huge GHG savings potential:

1. Through substituting fossil emission-intensive products and the atmospheric CO_2 remaining stored in bio-based products throughout their lifespan.
2. At the end of the product life-cycle, bio-based products can be composted (to improve soil quality) and/or nutrients can be returned to the production cycle.
3. In combination with carbon capture and utilisation (CCU), negative emissions can be achieved.

2. Untap the bio-based sector's full potential towards climate-neutrality by 2050

Very often, regulatory frameworks for innovative solutions are not in place yet, and instead the regulatory framework is targeting an existing solution. Developing a forward-looking policy framework will set the right incentives for innovation and investment in the EU's bio-based sector, ensuring that bio-based solutions can enter the market and become available to consumers.

Our sector is dependent on natural capital, which is crucial for our sector's licence to operate. We believe that economic, social and environmental sustainability can be achieved in our sector at the same time, but it requires more discussion on how to achieve a clear and predictable framework in order to maintain natural capital. That includes the (climate) impact on natural capital e.g. land use, biodiversity and biomass availability.

For all industry sectors, including the bio-based industries, measuring SCOPE 3 emissions and setting science-based (climate) targets is still complex and requires further elaboration. Moreover, in the BBI JU (and the up-coming CBE JU), innovation projects have a technology readiness level of 4 to 8 i.e. emission reductions from the application phase of the product cannot be measured

For our sector, **key enablers contributing to climate neutrality** in Europe rely on a climate-smart policy design and appropriate (climate) measuring tools. Those key enablers are relevant in the context of EU policy initiatives such as the 2030 Climate Target Plan, EU 2050 climate neutrality, the Renewable Energy Directive, the EU taxonomy Regulation, the EU Bioeconomy

Strategy, the Common Agricultural Policy, the Communication on Restoring Sustainable Carbon Cycles, the EU Waste Framework Directive, etc.

Key enablers for a climate-smart EU policy design

- Stronger recognition of the bio-based industries carbon capture potentials e.g. product substitution, carbon captured in bio-based products, capture and utilisation of carbon from industrial processes and biorefineries.
- Guidance on how to set up and implement carbon farming in the EU.
- EU legislative incentives for bio-based materials and products to promote the use of renewable feedstock in reusable and recyclable materials.
- Fostering circular use of feedstocks through integrated value-chains and reducing regulatory barriers e.g. use industrial waste side-streams, product end-of-life criteria.
- A stronger recognition of the bioeconomy in the EU Green Deal, including a better alignment and coherence of bioeconomy-related policies.
- Technical screening criteria in the EU taxonomy delegated acts on climate mitigation that incentivises innovation, enables taxonomy alignment across bio-based value-systems and are reasonable to report on, taking into consideration that 80% of BIC members are SMEs.
- A predictable carbon price.

Key enablers for measuring climate impacts and dependencies

- Sufficient data on enabling a better natural capital maintenance e.g. biomass mapping and availability in Europe including (the collection of) bio-waste, include scenario-planning on the climate change impact in EU regions.
- Clarity on how to account for, measure and report on climate-related requirements. A lack of guidance, relevant data, and standardisation is an obstacle to providing non-financial information e.g. on climate emissions and carbon intensity.[4]
- Acknowledgement that comparing Life Cycle Assessments (LCAs) for bio-based and fossil-based feedstocks is currently like comparing “apple with oranges”, further discussion is needed to develop appropriate CO_2-footprint methodologies for the bio-based sector.
- A consideration that NACE codes currently don’t make a distinction between an economic activity that uses fossil-based and bio-based feedstock to manufacture a product. Hence, there is no distinction in an economic activity which feedstock causes and/or avoids CO_2 emissions.

[4] Guidance for assessing bio-based projects' contribution towards the SDGs (IEEP, 2020)

Annex 1 : Examples of BBI JU projects with a strong climate impact

FIRST2RUN*

The project is about extracting and converting cardoon seeds into oil that can be used to create bio-based products such as lubricants and bioplastics, turning arid and marginal lands into a sustainable bio-based business. A reduction of Global Warming Potential (GWP) and non-renewable energy resource consumption (NRER) related to the First2Run agro-industrial value chain have been estimated to be respectively around 63% and 46% compared to standard value chains for obtaining benchmark products[5].

AFTERBIOCHEM*

The project aims to turn agricultural processing co-products into multiple natural & high added-value molecules. Preliminary LCA suggests AFYREN's carboxylic acids decrease the carbon footprint by 81% compared to fossil-based acids equivalents.

PLENITUDE*

The project is about producing proteins for food applications from alternative, sustainable sources using a zero-waste biorefinery process. PLENITUDE is supposed to deliver reduced CO_2 savings equivalent to ~5 tonnes less CO_2 emissions for every tonne of mycoprotein consumed (~82% CO_2 reduction compared to meat protein).

EMBRACED*

The project is about recycling the organic content from Absorbent Hygiene Products (AHP) waste in a Circular Economy domain. "Besides providing a net economic benefit up to 208 €/ton of AHP waste, Embraced's solutions are estimated to reduce GHG emissions by 422 kg CO_2eq per ton of AHP against traditional incineration and reduces the land use required for the production of bio-based polyesters by 90 times compared to other sources"[6].

REDWine*

The REDWine project will use off-gas created during red wine fermentation (rich in CO_2) and winery liquid effluent to aid production of Chlorella biomass and extracts. The process should reduce overall $C0_2$ emissions by more than 30%, while potentially generating a new revenue stream for producers at the same.

** if you click on the project title, more information on the project will become available*

[5] See link here

[6] https://solarimpulse.com/efficient-solutions/biorefinery-for-diapers-waste#

Annex 2: Related literature and studies

- European Commission, *A Clean Planet for all* (2018) and EU Commission's Impact Assessment Report (2021).
- European Bioeconomy Alliance, *Comments on European Climate Law Roadmap* (2020), see hre.
- IEEP, *Guidance for evaluating bio-based projects' contribution to SDGs* (2020), see here.
- *Joint industry Vision for a circular-biosociety in 2050* (2019), see here.
- OECD, *Industrial Biotechnology and Climate Change* (2011), see here.

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