



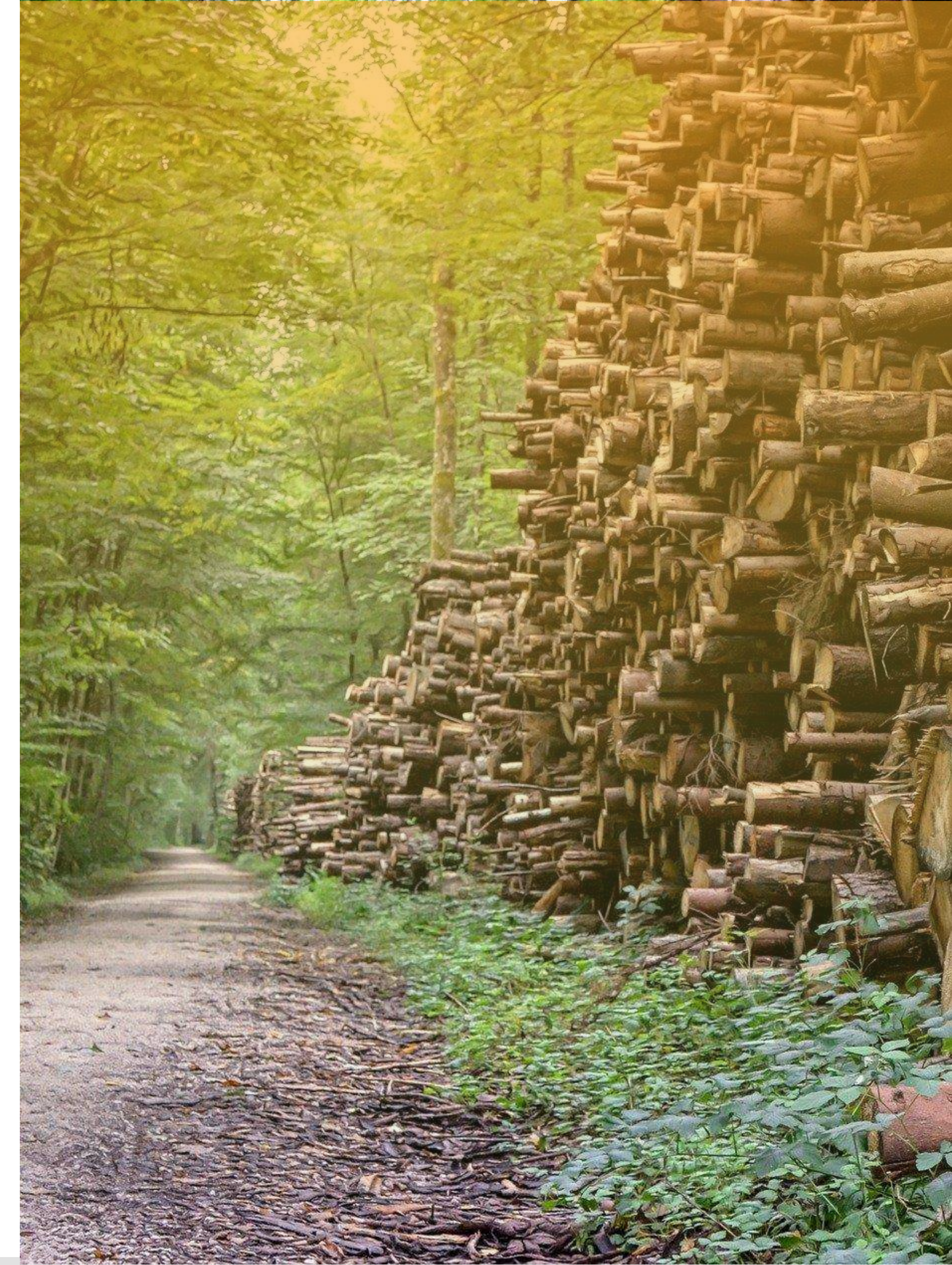
BIOSWITCH

Understanding
the main barriers
perceived by brand
owners when switching
to bio-based
approaches

Understanding the main barriers perceived by brand owners when switching to bio-based

In the context of BIOSWITCH, a European and regional analysis of the **needs, risks and motivations of brand owners switching to bio-based approaches** was carried out in three interlinked research tasks: a **desk-based literature review**, a series of **regional interviews with 20 brand owners** from four EU countries (Belgium, Denmark, Finland and Spain) and a **Pan-EU online survey with 40 brand owners** to complement the regional interviews. The research results were discussed with stakeholders in four regional workshops and one pan-European workshop.

This brochure zooms in on one aspect covered in the research: the **main barriers** perceived by brand owners, and it provides background and supporting information to help brand owners to increase their insight and to “bust some bio-based myths” and solutions to overcoming these. Research findings and the results of stakeholder discussions are detailed in BIOSWITCH deliverables *D1.1 Report on European and regional analysis of the needs, risks and motivations of brand owners switching to bio-based approaches* & *D1.4 Summary of results of regional and pan-European workshops*.



How did we arrive at these barriers and solutions ?



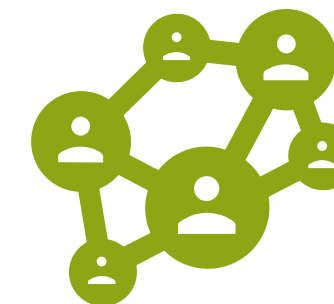
Desk research



145 participants in four regional workshops



20 regional interviews in Belgium, Denmark, Finland and Spain



64 participants in a pan-European workshop



40 responses of brand owners to online Pan-EU survey

What are bio-based products?



According to the [European Commission](#), **bio-based products** are wholly or partly derived from **biomass** and other materials of **biological origin**, excluding materials embedded in geological formations and/or fossilized.

Some bio-based products are not new, such as, pulp and paper, timber for construction, bio-based cosmetics and fibres for clothing. However, there are many new kinds of bio-based products that are emerging. These include bio-based materials and biochemicals with new functionalities and properties, new substances used for medicinal purposes, and new ingredients used for cosmetics and functional food ingredients.

According to the [European Standard EN 16575](#), if the term 'bio-based product' is used to refer to a product, which is partly bio-based, the claim should be accompanied by a quantification of the bio-based content, normally expressed as a percentage of the total mass of the product.



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.

What is the bio-based industry?



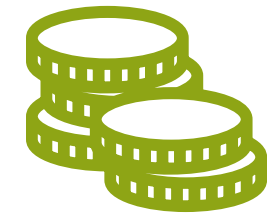
The **bio-based industry** is the part of economy formed by companies that use **biological input** (feedstock, biomass and other materials of **biological origin**) to produce material, products and services. The biological input can be the biomass extracted from natural environment and purpose grown biomass (e.g. from agriculture and forestry, fisheries and aquaculture), as well as different forms of biological waste, side streams and residues.

Main barriers perceived by brand owners and supporting information to approach them



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.

Main barriers



#1 High price



#2 Uncertainty around functional performance



#3 Insufficient consumer demand



#4 Lack of supporting policies



#5 Challenges regarding (communicating) environmental benefits

Overcoming barrier #1: High price

In general, it is true that the bio-based solutions are more expensive than fossil-based solutions. Nonetheless, an increasing number of brands are making the switch, or consider to do so. Why?

Switching to bio-based may help a company achieving its Corporate Societal Responsibility (CSR) targets, and/or give it a **“green” profile**, thus making it more interesting to work at, invest in, lend to, or buy from.

Bio-based solutions may offer **improved functionality**. Some examples are presented further below (see barrier #2).

Various recent surveys, including the one conducted by BIOSWITCH, confirm that **a significant share of consumers shows willingness to pay a higher price, green premium¹**, for bio-based products. Certain consumers even expect to pay a higher price due to the benefits and expectations that comes with bio-based, provided that the performance of the bio-based product is at least the same or higher than that of the conventional product. Bio-based products are expected to also perform at a higher level in social aspects than conventional products.

Bio-based solutions are not more expensive per se. In some cases they may be even cheaper. Applying smart drop-in chemicals may be such case. Smart drop-in chemicals are chemically identical to existing chemicals based on fossil hydrocarbons, but their bio-based pathways provide advantages compared to the conventional pathways. When “dropped in” at a later stage of the value chain it offers the possibility of shorter synthetic pathways, enabling advantageous routes with less steps, reducing production complexity, avoiding by-products and saving energy and time-to-market².



Overcoming barrier #2: Uncertainty around functional performance

Choosing the correct bio-based ingredients or products is essential in ensuring the required functionalities are delivered, and therefore greater engagement between brand owners and the bio-based industry can help to ensure an equal or improved functional performance. **By choosing so-called “drop-in” bio-based chemicals and materials an equal functional performance can be achieved with a fossil-based product.** Bio-based drop-in chemicals are simply bio-based versions of existing petrochemicals which have already established markets. They are chemically identical to existing fossil-based chemicals³.

These include materials such as **Bio-based Ethylene/Polyethylene-PE/Polyethylene terephthalate-PEF, propylene/Polypropylene-PP.** While some difference exists between these drop-ins and their fossil counterparts (e.g. mainly in relation to price and environmental performance), there is no difference in functional performance. They are also easy to implement technically, as existing infrastructure can be used⁴.

Beyond drop-in chemicals and materials, there are also many bio-based ingredients and products which offer unique and superior properties that are unattainable with fossil-based alternatives.

Overcoming barrier #2: Uncertainty around functional performance

Examples include:

- **PolyEthylene 2,5-Furandicarboxylate** (PEF), a bio-based alternative to fossil-based PET, which offers improved CO₂, O₂, and water properties⁵.
- **Microfibrillated Cellulose** (MFC) fibres, which can provide benefits including increased strength, barrier properties, biodegradability and very high-water holding capacity. These superior properties are not found in other materials and make it attractive for a wide variety of industries and applications⁶.
- **Bio-lubricants** can offer functional benefits including high lubricity, lower volatility, and lower flammability⁷.
- **Natural fibres such as hemp and flax**, which can provide several performance benefits over synthetic fibres low density, acceptable modulus-weight ratio, high acoustic damping and biodegradability. In the automotive sector natural fibre composites can be used to decrease vehicle weight, operating cost and the life cycle environmental impact, offering a marketing advantage for manufacturers⁸.
- **Natural/renewable insulation materials such as flax, hemp, sheep and wood wool** have comparable thermal properties and costs with conventional materials such as inorganics and petrochemicals. Aside from their superior environmental performance, they have significantly lower levels of vapour resistance than conventional materials, creating a more breathable and comfortable indoor environment for building occupants⁹.

Overcoming barrier #3: Insufficient consumer demand

Consumer's interest in bio-based products is high, 87% of consumers would prefer to buy bio-based products rather than fossil-based products¹⁰. However, there is a general lack of consumer awareness; consumers are unfamiliar with the term and concept of bio-based, although the term bio-based is “most often associated with positive environmental issues”¹¹.

Bio-based is not a decisive or motivating term for consumers: biodegradable, recyclable, reusable, environmentally friendly, and sustainable as more influential term for them when choosing a product¹². Also, consumers are more familiar with the terms plant-based and biodegradable, although there are misconceptions around the terminology and their characteristics¹³.

Consumer acceptance of bio-based products are related to **personal benefits** such as ‘feel good’ and ‘naturalness’, as well as **environmental benefits**¹⁴. Consumers are willing to pay more for bio-based products, the **‘green premium’** (see barrier 1), especially for clothes, cleaning and hygiene products, cosmetics, furniture and disposable products such as plate, cups and straws.

Consumers think that their individual consumer choices can have a positive impact on the environment, and **shifting consumer habits** are a huge opportunity for businesses and industry. Improved functional performance (see barrier 2) and environmental performance of bio-based products are influential on buying decisions of consumers.



Overcoming barrier #3: Insufficient consumer demand

Awareness and communication with consumers is key to increase a positive public perception of bio-based materials and products. A lack of knowledge can generate feelings of distrust and negative association with 'green-washing' of products. Trust in the marketing of bio-based products is necessary for consumer acceptance. Consumers want to be educated and would like to receive **simple and trustworthy information on bio-based products** and the materials used to make them. An official and standardised labelling system would empower consumers to make their own informed decisions on the feedstock materials of products. The tone of communication between producers and consumers of bio-based products needs to be balanced between being scientifically comprehensible and also easy to understand for the consumer. The best way for communicating the bioeconomy and bio-based products to consumers¹⁵;

- Focus on the uses and **benefits of bio-based** products.
- **Communicate the personal and environmental benefits** of choosing products with bio-based feedstock through clear and simple labels and infographics¹⁶.
- Clear **guidance on the end-of-life disposal of bio-based products**.
- **Engage with consumers** to eliminate any doubts and advertise benefits of bio-based products, increase positive image and branding through marketing and promotional material, highlighting the benefits of bio-based materials and products over fossil-based counterparts

Overcoming barrier #4: Lack of supporting policies

It is correct that, at the industry level, no specific EU policies and legislation exist in sectors which traditionally use biomass, such as the textile, wood and wooden furniture and pulp and paper sectors. They are covered by cross-cutting EU industry initiatives and policies instead¹⁷. Nonetheless, an increasing number of support mechanisms is being put into place at EU level to specifically support the emerging bio-based industry and the market uptake of innovative bio-based products. Every year, hundreds of millions of euros are made available for research, demonstration and innovation (R+D+I) projects in the bioeconomy field. The successful public-private Bio-based Industry Joint Undertaking is set to be followed up in 2021 by the **Circular Bio-based Europe** partnership. Since 2020, the European Circular Bioeconomy Fund (ECBF) provides funding exclusively focused on investments in bioeconomy in Europe. **European legislation** such as the Waste Framework Directive and the Packaging and Packaging Waste Directive or **codes of good practice** such as 'A line in the sand' and the European Plastics Pact are expected to increase the use of bio-based recyclable packaging and bio-based compostable packaging in e.g. the plastic sector. Earlier imposed national legislation in e.g. Italy, France, Spain and Belgium¹⁸, that aimed to reduce e.g. the use of disposable plastic bags, aimed to reach the same impact.

Overcoming barrier #5: Challenges regarding (communicating) environmental benefits

Projects as RoadToBio, Star4BBI, Biobridges and LIFT concluded that specific industry **standards** and consumer (eco-) **labels** can help to certify and communicate the environmental performance of bio-based products in an effective manner.

Standards are documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines or definitions, to ensure that materials, products, processes, and services are fit for their purpose. Standards provide a basis for mutual understanding among individuals, businesses, public authorities, and other stakeholders, facilitating communication, commerce, measurement/testing and manufacturing. Beyond coverage in specific Coordination and Support Actions, including KBBPPS, Open-BIO and STAR4BBI, standardisation work is an integral component of many Horizon 2020 innovation projects [19 20](#).

At present there is no **ecolabel** developed purposely for bio-based products, however, a topic inviting initiatives to develop “Business-to-consumers labelling” may be included in the 2021-2022 work programme of Horizon Europe Cluster 6 (HORIZON-CL6-2022-GOVERNANCE-01-04: Consumer-focused labelling options for bio-based products). Currently brand owners can use multi-issue ecolabels for their bio-based products e.g. the EU Ecolabel, the Nordic Ecolabel (“Swan”), and the German Blue Angel ecolabel. Or, by lack of suitable bio-based label, some brands introduced dedicated bio-based product lines and even new brands.



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.

Overcoming barrier #5: Challenges regarding (communicating) environmental benefits

To assess the bio-based content or the sustainability of bio-based products a variety of **certification schemes** exist, including²¹:

- Schemes certifying the sustainability of biomass used as raw material, such as wood ([FSC – Forest Stewardship Council](#) and [PEFC - Programme for the Endorsement of Forest Certification](#)) or agricultural biomass – e.g. [ISCC – International Sustainability & Carbon Certification](#), [RSB - Roundtable on Sustainable Biomaterials](#), [REDcert](#) or [Better Biomass](#).
- Schemes certifying the bio-based (carbon) content, such as [TÜV Rheinland / DIN CERTCO](#), [TÜV Austria](#) (founded by Vinçotte), and European [Bio-based Content](#) (founded by NEN).
- Schemes certifying end-of-life options of bio-based products, such as industrial compostability, home compostability, biodegradability in soil, biodegradability in sea water, et cetera. Relevant certification schemes are operated by TÜV Rheinland / DIN CERTCO and by TÜV Austria (founded by Vinçotte).

Overcoming barrier #5: Challenges regarding (communicating) environmental benefits

Life cycle assessment (LCA) is widely used to determine the environmental footprint of a bio-based product (compared to that of the fossil-based alternative). Generally speaking, most bio-based materials and intermediates offer (substantial) greenhouse gas reductions vis-à-vis the fossil-based options, as well as other reduced environmental impacts (e.g. low toxicity or low bioaccumulation to name but a few). A topic inviting initiatives to develop “Simplification of LCA methodology for bio-based systems” may be included in the 2021-2022 work programme of Horizon Europe Cluster 6 (HORIZON-CL6-2021-ZEROPOLLUTION-01-07: Sustainability certification schemes for bio-based systems).

Within BIOSWITCH, VTT will provide a sustainability assessment tool that allows brand owner to compare the adoption of several bio-based approaches vs. current status in order to quantify environmental, economic and social impact of the transition from fossil to bio-based.



References

1. The term 'Green Premium price' can be defined as: The additional price a market actor is willing to pay for the additional emotional performance and/or the strategic performance of the intermediate or end product the buyer expects to get when choosing the bio- based alternative compared to the price of the conventional counterpart with the same technical performance. <https://news.bio-based.eu/are-there-greenpremium-prices-for-bio-based-plastics/>
2. <https://news.bio-based.eu/which-implementation-strategy-is-right-for-bio-based-chemicals/>
3. BIO-TIC (2014): Overcoming hurdles for innovation in industrial biotechnology in Europe, Biobased Chemical Building Blocks, Summary; <http://mig.www.industrialbiotech-europe.eu/new/wpcontent/uploads/2014/08/Summary-of-the-findings-related-tochemical-building-blocks.pdf>
4. Michael Carus, Lara Dammer, Dr. Ángel Puente, Achim Raschka, Dr. Oliver Arendt (2017), Bio-based drop-in, smart drop-in and dedicated chemicals. RoadToBio paper, https://www.roadtobio.eu/uploads/news/2017_October/RoadToBio_Drop-in_paper.pdf
5. Avantium (n.y), FDCA and plantMEG™ together make a 100% plant-based plastic PEF, <https://www.avantium.com/lead-products/> Accessed April 2, 2021.
6. Fact.MR (2021), Microfibrillated Cellulose (MFC) Fibre Market Forecast, Trend Analysis & Competition Tracking - Global Market Insights 2021 to 2031, <https://www.factmr.com/report/1710/microfibrillated-cellulose-fibre-market> Accessed April 2, 2021.
7. Grandview Research (2016). Biolubricants market analysis by raw material (vegetable & animal oil), by application (automotive (automotive engine oils, gear oils, hydraulic oils, transmission fluids, greases, chainsaw oils), industrial (process oils, demolding oils, industrial gear. <https://www.grandviewresearch.com/industry-analysis/biolubricants-industry> Accessed April 2, 2021.
8. Pecas et. al, (2018) Natural Fibre Composites and Their Applications: A Review
9. Durakovic et. al, (2020) Comparative Performance Evaluation of Conventional and Renewable Thermal Insulation Materials Used in Building Envelops
10. BIOSWITCH (2021) D1.3 Report on brand owners incentives and consumer drivers and motivations analysis – Netherlands and Ireland consumer survey
11. Sijtsma et al. (2016) 'Consumer perception of bio-based products—An exploratory study in 5 European countries' NJAS - Wageningen Journal of Life Sciences 61-69
12. BIOSWITCH (2021) D1.3 Report on brand owners incentives and consumer drivers and motivations analysis
13. BIOFOREVER (2019) BIO-based products from FORestry via Economically Viable European Routes: D7.2 Market Analysis <https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5c7086741&appId=PPGMS>



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.

References

14. Pfau S, Vos J, Dammer L, and Arendt O. (2017) RoadToBio D2.2: Public perception of bio-based products. https://www.roadtobio.eu/uploads/publications/deliverables/RoadToBio_D22_Public_perception_of_bio-based_products.pdf
15. BioCannDo (2019) The BioCannDo experience: Let's talk about bio-based products - 10 Insights on communicating the bioeconomy. <http://www.allthings.bio/wp-content/uploads/2019/06/BCD-Final-publication-WEB.pdf>
16. RoadToBio (2018) Communication Guide- How to promote bio-based products, https://www.roadtobio.eu/uploads/publications/roadmap/RoadToBio_factsheet_2_communication_guide.pdf
17. for example: The communications 'A stronger European industry for growth and economic recovery', 'For a European industrial renaissance', 'Investing in a smart, innovative and sustainable industry - A renewed EU Industrial Policy Strategy', 'A new industrial strategy for Europe' and 'A new Circular Economy Action Plan For a cleaner and more competitive Europe'.
18. Ministerial Decree specifying the types of plastic bag not covered by the ban on using single-use plastic (Belgium), Decree on procedures for implementing restrictions on disposable plastic cups, glasses and plates, and Decree on the methods for implementing a limitation of disposable plastic bags (France) or the Law prohibiting the marketing of non-biodegradable shopping bags (Italy)
19. LIFT project (2020), Factsheet #4: Standardisation, LCA, Labelling and Regulatory Hurdles, https://www.bioeconomy-library.eu/wp-content/uploads/2020/03/04_LIFT_FactSheet_Standardisation_LCA_Labelling_Regulatory_Hurdles.pdf
20. For more detail see the CEN brochure "European standards supporting the market for bio-based products" or the IEA Bioenergy publication "Standards and Labels related to Bio-based Products. Developments in the 2016-2018 triennium".
21. Star4BBI (2018), D2.1 Market entry barriers report, <https://www.biobasedeconomy.eu/app/uploads/sites/2/2018/09/Please-click-here-to-access-deliverable-2.1.pdf>



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.

Contact information



John Vos, Senior Consultant, BTG Biomass Technology Group BV
vos@btgworld.com



James Gaffey, Co-Director of the Circular Bioeconomy Research Group
at the Munster Technological University
James.gaffey@staff.ittralee.ie

Emily Marsh, EU Project Manager, Munster Technological University
Emily.marsh@staff.ittralee.ie



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.

Partners



Food & Bio Cluster
Denmark



MTU

Ollscoil Teicneolaíochta na Mumhan
Munster Technological University



FLANDERS'
FOOD



Sustainable
INNOVATIONS



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.



BIOSWITCH

www.bioswitch.eu



BIOSWITCH



BIOSWITCH_



BIOSWITCH.EU



This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.