



ROADMAP ON HOW TO SUPPORT BRAND OWNERS WHEN SWITCHING TO BIO-BASED



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ACRONYMS AND ABBREVIATIONS

ACRONYM	FULL NAME
2BSvs	Biomass Biofuels Sustainability voluntary scheme
B2B	Business-to-business
BBPs	Bio-based products
BTG	B.T.G. Biomass Technology Group BV, partner in BIOSWITCH
C2C	Cradle to Cradle Certified™
CEN	Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CLIC	CLIC Innovation Oy, partner in BIOSWITCH
Cluster partners	BIOSWITCH cluster partners are CLIC, CTA, FF and FBCD
CTA	Corporación Tecnológica de Andalucía, partner in BIOSWITCH
DIH	Digital Innovation Hub
EMAS	Eco-Management and Audit Scheme
ETSI	European Telecommunications Standards Institute
EU	European Union
FBCD	Food & Bio Cluster Denmark, partner in BIOSWITCH
FF	Flanders’ FOOD, partner in BIOSWITCH
GGL	Green Gold Label
GHG	Greenhouse gas
GPP	Green Public Procurement
IBI	International Biochar Initiative
ISCC	International Sustainability and Carbon Certification
KT	Knowledge transfer
MTU	Munster Technological University, partner in BIOSWITCH
NEN	Dutch Standards Institute



BIOSWITCH



OI	Open Innovation
RDI	Research, Development and Innovation
RED	Renewable Energy Directive
RSB	Roundtable on Sustainable Biomaterials
SDGs	UN Sustainable Development Goals
SIE	Sustainable Innovations Europe SL, partner in BIOSWITCH
SME	Small and Medium Enterprise
TSC	Technical Sectoral Committee
USDA	U.S. Department of Agriculture
VTT	VTT Technical Research Centre of Finland Ltd / Teknologian tutkimuskeskus VTT Oy, partner in BIOSWITCH.



EXECUTIVE SUMMARY

The European Union (EU) has declared the bio-based products (BBPs) sector to be a priority area with high potential for future growth, reindustrialisation, and addressing societal challenges. Within this context, the main aim of the BIOSWITCH project is to bring Europe to the forefront of the bio-based economy, encouraging and supporting brand owners to switching to bio-based approaches by following a holistic, systemic approach built on two pillars:

- A framework where brand owners are placed as the centre of the public administration-bio-based industry-consumers triangle through a set of events and communication actions that will allow shaping solutions to mitigate their perceived risks; and
- The BIOSWITCH toolbox as the ultimate instrument that will assist them in the bio-based transition journey.

Through this roadmap, that targets cluster managers, innovation agents and any kind of organisation willing to support brand owners' journey, information about how to motivate and help brand owners is provided.

Motivation for the establishment of brand owners action plans is explored, providing results from an exercise conducted in the frame of the project where brand owners' incentives, motivations, risks perceived and expectations when switching to bio-based were studied.

For those brand owners starting the journey for the fossil based to bio-based approaches transition, it could be necessary to (re)define the value chain. Hence, information about how these new value chains could look like and how to help them identify new partners and collaborators is provided. Here becomes of paramount importance the Open Innovation (OI) paradigm, which can be a total game-changer pertaining Research, Development and Innovation (RDI) progress in resource and time efficiently manner.

Moreover, the steps and first recommendations for the mobilisation of the brand owners inside clusters or regions are presented since it is important to build capacity and strengthen the regional networks of key stakeholders. Suggestions for the organisation of a Knowledge transfer event, Technical sectoral committee, Demo day, Business opportunities and cross-sectorial value chains day and a Financing and investment day are provided.

As an additional help for brand owners, main funding and financing possibilities in the bioeconomy area are reviewed, so cluster managers and innovation agents can guide brand owners when selecting the most suitable funding and/or financing approach for them.

By the end of this roadmap, other aspects that can be relevant are reviewed, e.g., certification and labelling, bio-based related standards, how to design and implement effective instruments for stakeholder and public participation, and tips about how to increase public awareness of and participation with BBPs.

Finally, in order to make the most out of BIOSWITCH activities, an overview of lessons learned is presented.



1 INTRODUCTION

1.1 The BIOSWITCH project

The main aim of the BIOSWITCH project is to bring Europe to the forefront of the bio-based economy, encouraging and supporting brand owners to switching to bio-based approaches by following a holistic, systemic approach built on two pillars:

- A framework where BOs are placed as the centre of the public administration-bio-based industry-consumers triangle through a set of events and communication actions that will allow shaping solutions to mitigate their perceived risks; and
- The BIOSWITCH toolbox as the ultimate instrument that will assist them in the bio-based transition journey.

Main novelty is a bio-based transition level self-assessment test to be done by brand owners so they can get access only to the tools that match their needs. The framework supports the mapping and analysis exercise, where information about brand owners' needs, motivations and incentives have been gathered. Perceived risks and mitigation actions have been identified and awareness and discussions with consumers have been fostered. Then, the BIOSWITCH toolbox has been developed and validated through four brand owner driven case studies (NOPA Nordic, ALPRO, Fazer and Grupo La Caña) that represent four different bio-based transition strategies from chemistry, forest, food and agro sectors and different levels of bio-based transition level. A replication plan development and toolbox roll-out will be conducted. Both regional and pan-European approaches will be considered all along the project. The main impact to be achieved will be reaching brand owners that are not familiar with bio-based approaches (at least 81 clusters that are not BIC members) and increasing brand owners' interest in bio-based strategies, as well as triggering their level of involvement and commitment to bioeconomy (it is foreseen that at least 180 brand owners from partners networks can be reached). BBPs acceptance will be also increased as at least 550 attendees are expected in all project foreseen events.

1.2 Brand owners and bioeconomy

With its cross-cutting nature, the bioeconomy can assist Europe in making the transition to a more resource efficient society that relies more strongly on renewable biological resources to satisfy consumers' needs, industry demand and tackle the climate change (European Commission, s.f.). In fact, the EU is committed to becoming climate neutral by 2050. A promising way to meet this target is to replace fossil-based resources with bio-based sources. Switching to BBPs and processes means switching to using biological resources and biological processing methods in a sustainable way. This will help to reduce Europe's dependency on oil, coal and gas and to meet its ambitious environmental, societal, industrial and climate policy targets for 2050.

Bio-based systems is an emerging sector of the bioeconomy that is expected to grow rapidly. It will help in creating new markets and jobs, especially in rural and coastal areas (European Commission, s.f.). The EU has declared the BBPs sector to be a priority area with high potential for future growth, reindustrialisation, and addressing societal challenges (European Commission, s.f.). The lead market BBPs is of high strategic and societal interest because of its potential impacts on sustainability and



the protection of the environment, human health and in supporting rural development and strengthening of industrial competitiveness (European Commission, 2011).

With 700 billion EUR turnover and 3.6 million people employed (2017), the bio-based industries offer new opportunities for Europe's green growth by reducing dependence on fossil-based resources and offer a new circular bio-based societal model. Reducing Europe's dependency on fossil-based resources, sustaining healthy ecosystems and reaching the climate neutrality goal will require better integration across sectors to create more circular and innovative bio-based solutions (Bio-based Industries Consortium, 2020).

The long-term growth potential for BBPs will depend on their capacity to substitute fossil-based products and to satisfy various end-user requirements at a competitive cost, to create product cycles that are neutral in terms of greenhouse gas (GHG) and to leave a smaller ecological footprint. Europe is well placed in the markets for innovative BBPs (European Commission, s.f.). Brand owners have an overall positive outlook towards BBPs, with 85% of brands who do not currently use bio-based ingredients or products within their branded products and 95% of brands who do not currently use bio-based packaging interested in including these in future. However, brand owners still perceive some concerns surrounding BBPs including their high cost, functional performance, and ease of integration, as well as their reliability of supply (Gaffey, et al., 2021). The introduction of BBPs and solutions in the consolidated business practice of a brand owners is indeed a complex process, which does not simply require innovative technologies from the supply side, but also regulatory and societal transformations based on a multi-actor process in which the involvement of brand owners is crucial (BioBridges, s.f.).

From BIOSWITCH project side, a holistic framework has been produced. This takes into consideration and analyses the needs, risks and motivations of brand owners switching to biobased on a European and regional level (four regions, i.e. Andalusia, Flanders, Denmark and Finland). The framework developed is based on information and data gathered through interviews and a survey. Desktop research has been performed to gain a comprehensive understanding on existing studies into brand owner perspectives on the perceived risks, barriers, and motivations for switching to biobased ingredients, products, or packaging. The literature review of publications, reports, and previous related projects has given understanding of the existing research and data that has been utilised for the interview and survey designs. Six industry-relevant best practice case studies for the BIOSWITCH key cluster sectors (agriculture, food, forestry, and chemical sectors) have been produced as good practices to support the transition to bio-based products. Also, specific studies have been made to gain an understanding of the main incentives for brand owners for switching-to-bio-based and consumer surveys to understand the main incentives for consumers to choose bio-based products.

This roadmap is aimed to build capacity among the EU bio-based clusters and innovation agents to be better adapted and to support brand owners when switching to bio-based.



2 MOTIVATION FOR THE ESTABLISHMENT OF BRAND OWNERS ACTION PLANS

What general and specific drivers and motivations help brand owners and other businesses to consider switching to BBPs differs distinctively across countries and across product groups. Each BBP (group) and application is perceived in its own way. Brand owners can take advantage of the growing trend among, and awareness of, consumers for sustainable products, offering opportunities for bio-based innovations (Bioswitch project, 2021).

BIOSWITCH project completed in 2020-2021 a broader study comprising 60 participant brands in the form of structured surveys and regional interviews. Figure 1 Main motivations for brand owners switching to BBPs. Source: illustrates the feedback obtained from brand owners when asked about the main motivations for brands switching to BBPs. Meeting company sustainability targets (69% of brands) as well as meeting customer demand (63%) were identified as the main drivers motivating brands to switch to BBPs, followed by green marketing opportunities (39%) and improved functionalities obtained from BBPs (27%) with existing and anticipated regulatory changes both at 22%. These survey findings are fully in line with the literature research findings, which identified environmental regulation, customers demanding environmental-friendly products and brands wanting to improve their public image as key drivers (Gaffey, et al., 2021).

What are the main motivations for brands switching to bio-based products?

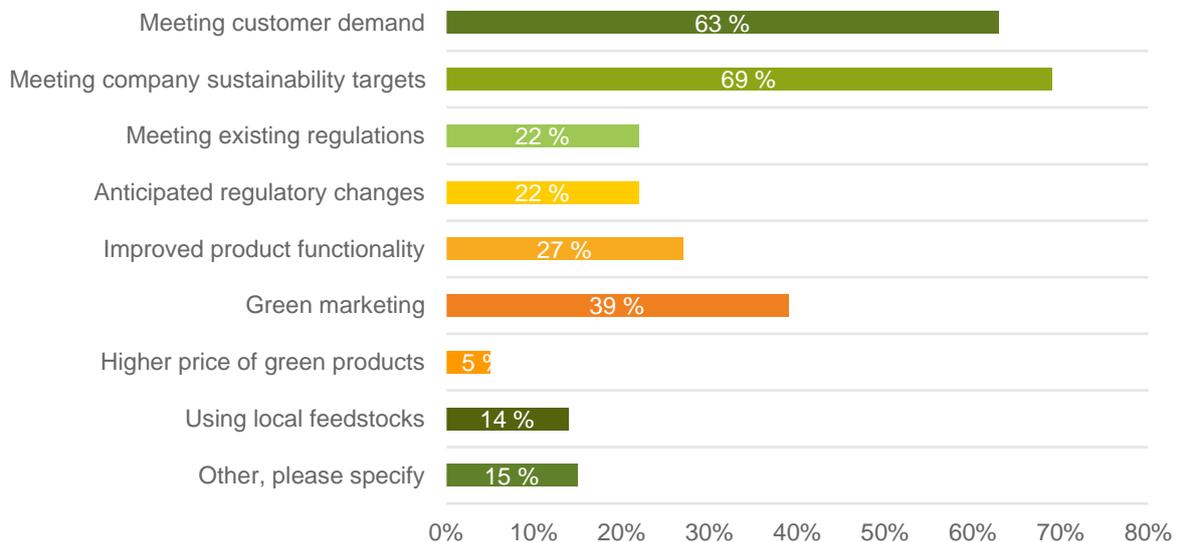


Figure 1 Main motivations for brand owners switching to BBPs. Source: (Bioswitch project, 2021)

2.1 Meeting companies' sustainability targets

BBPs can support brands to reach corporate sustainability goals and targets. Brand owners increasingly consider the importance of alignment with the UN Sustainable Development Goals (SDGs), in particular SDG 12 Sustainable Consumption and Production for promoting the circular



economy and SDG 13 Climate Action to avoid global warming. BBPs can support brands to reach corporate sustainability goals and targets (Gaffey, et al., 2021).

Globally, a thriving bioeconomy can also play a role in meeting many of the 17 Sustainable Development Goals (SDGs) set out by the United Nations. A sustainable and circular bioeconomy can also play a central role in the EU shift towards a circular economy as outlined in the EU Circular Economy Action Plan 2020, contributing to more sustainable management of plastics, packaging and nutrients, creating a more sustainable supply of local protein while also contributing to the EU Renewable Energy Directive (RED) II targets in energy, heat and transport (Gaffey, et al., 2021). Briefly, this could support meeting very ambitious climate and sustainability targets including a 55% reduction in greenhouse gas emissions by 2030.

2.2 Meeting customer demand

BBPs can play a key role in helping brand owners to become more sustainable and to create a more positive image. Increasingly sustainable products can also help brand owners to meet the demands of their consumers and it can offer a competitive and strategic advantage in the markets. According to the EU Bioeconomy Strategy update (2018), consumers and their behaviour can play a major role in supporting the profound transformation required for the successful transition to a bio-based economy. Consumers need to be aware of the benefits of BBPs (Gaffey, et al., 2021).

A carbon-neutral bio-based industry will play a central role in combatting climate change whilst moving Europe towards a carbon-neutral society. Informed and engaged European citizens will choose BBPs and services that not only underpin multi-skilled and secure jobs but enhance the well-being of society and the environment, whilst ultimately improving their own health (Bio-based Industries Consortium (BIC), 2019).

Most brands expect to see either strong or moderate growth for BBPs among their customer base within the next 5 years, driven mainly by improved customer knowledge and demand for more sustainable products (Gaffey, et al., 2021).

Brand owners can take advantage of the growing trend among, and awareness of, consumers for sustainable products, offering opportunities for bio-based innovations. Improved health can be one of the considerations for brand owners and other businesses to switch to bio-based. This aspect is relevant for various biochemicals, biomaterials and BBPs (Bioswitch project, 2021). Companies invest large amounts of money in the development of their brands. This is attributable to the value that brands create for consumers, which in turn increases the economic brand's value for the company.

From BIOSWITCH side, consumers perspective has been addressed through online discussions with Focus groups and a survey. The work carried out with focus groups aimed to define how participants recognized or recalled bio-based materials, products and brands. All evidence indicated that Finnish consumers were extremely well informed. In the early phase discussion, the participants raised important questions about ethical issues, vegan alternatives, biomass, animal-based biomass, and biological and chemical treatment. Moreover, it was concluded that consumers really preferred to buy food products and liquids packaged in bio-based materials, but also cosmetics, textiles and



clothes, and toys produced from bio-based materials. In general, they thought that bio-based packaging materials and products were environmentally friendly, less polluting and easy to recycle. However, usually they were not willing to pay more for bio-based options. Finally, results suggest that the brand (including advertising, impression, vision, and mental image) is an important factor for consumers. Information campaigns and example from social media influencers or celebrities, did not improve consumers' motivation to choose bio-based alternatives, which is a rather distressing result from the brand owner perspective. On the other hand, the consumers highlighted the role of brands: that more information and transparency from their part was needed, and that could be presented e.g. by some certification in relation to environmental aspects. About the biggest concerns, risks and negative impact related to bio-based products and materials, the participants raised: harm to the environment, intensive farming, manufacturing (cost of it, consumes more energy than non-bio-based alternatives, information about it: who, where, how is manufacturing the products), higher price and in some case, disinformation.

The survey (done in the Netherlands and Ireland) takes into account the views of different demographic groups within both countries (gender, age etc.). Overall, the results show a slightly more positive response to bio-based products among Irish consumers than among consumers in the Netherlands, evidenced by the greater share of Irish consumers who would prefer buying bio-based products as opposed to fossil-based. Irish consumers also have a slightly more positive impression that their consumer choice can be beneficial for the environment. Overall respondents in both countries are most likely to buy bio-based products in the same top selected categories which include packaging products, disposable products and cleaning, hygiene and sanitary products. But there are variances in other categories lower on the list, with bio-based construction materials more popular among Dutch consumers and bio-based cosmetics and personal care products, as well as bio-based gardening products more popular among Irish consumers. The order of motivational criteria for buying bio-based products was almost the same in both counties, with lower price of product the top option for each country.

2.3 EU policies, legislative frameworks

There are different ways in which governments can regulate, influence behaviour, and alter incentives for market actors. Across Europe, a lot of incentives that are more or less relevant for the growth of the bioeconomy and the deployment of BBPs have been in place, at all geographical (European, national, regional, and even local) levels (Bioswitch project, 2021).

EU-level common regulation and standardisation for new bioeconomy products and services can speed up bioeconomy development. This requires cooperation between the EU and Member State governments, and between business and government. Europe would benefit from a common biomarket environment, with a certain number of common rules and standardization, which could significantly reduce business risks and boost R&D.

From a demand-side perspective, well-considered and implemented regulation has the potential to be a driver for facilitating the emergence of innovations.



2.3.1 Direct regulation instruments

Direct regulation refers to legislation requiring certain behaviour of market actors. Compliance is obligatory, and actors can be punished for non-compliance. Examples of direct regulation instruments in bioeconomy are quotas, mandates, product standards, targets and qualifying criteria for incentives, green procurement rules and permitting and zoning instruments.

European and national quotes/mandates are in place for e.g., the blending of liquid biofuels used in road transportation. When ruling out uses for bioenergy production (which is not within the scope of BIOSWITCH) these seems to be little use of direct regulation of economic actors in the European bioeconomy.

Some limited relevance for the switch-to-bio-based and the general market uptake of BBPs have specific European Directives as well as bio-based procurement.

European Directives¹

Among the Directives expected to have impact on the use of bio-based and biodegradable materials are the recently issued or revised (a) Waste Framework Directive 2008/98/EC (European Parliament, 2008), (b) Packaging and Packaging Waste Directive 94/62/EC (European Parliament, 1994) and (c) Single-Use Plastics Directive 2019/904 (European Parliament, 2019).

In April 2018, the European Parliament approved the package to update the EU waste legislation, including a revision of the Waste Framework Directive and the Packaging and Packaging Waste Directive.

The revised Waste Framework Directive describes general waste management requirements, such as environmental and human health protection during waste treatment and priority for waste recycling, and also contains specific bio-waste related elements. This Directive allows biodegradable and compostable packaging to be collected together with bio-waste and recycled in industrial composting and anaerobic digestion, which has already successfully been implemented in several Member States. For other Member States, there are still come challenges. For example, when comparing Italy and Germany, Italy has widespread use of compostable plastics, primarily for the purpose of increasing food waste capture, and the plastics are accepted by composters and processed effectively. Compostable plastics in Germany, however, are not widely accepted and there are issues with these being processed effectively... This practice and the relatively short composting time is unlikely to be compatible with the conditions specified in EN 13432 that are required to ensure full biodegradation takes place before the compost is applied to land. This shows why the German composting industry is reluctant to embrace the widespread use of compostable plastics at this time when their processing time is generally incompatible and that the fresh compost output still provides the required agronomic benefits (Hann, et al., 2020).

¹ A "Directive" is a legislative act that sets out a goal that all EU countries must achieve. EU countries must adopt measures to incorporate them into national law (transpose) in order to achieve the objectives set by the Directive. Such transposition into national law must generally take place within 2 years.



By 2023, separate collection of bio-waste is set to be mandatory throughout Europe. Biodegradable plastics verifiably help to collect more bio-waste and ultimately contribute to reaching the new recycling targets.

The Packaging and Packaging Waste Directive acknowledges that bio-based plastics help to minimise the environmental impacts of plastic packaging and to reduce Europe's dependence on imported raw materials. Bio-based and recycled materials are equally viable solutions to make packaging more sustainable. While Member States are encouraged to promote the use of bio-based recyclable packaging and bio-based compostable packaging, in the opinion of industry trade association European Bioplastics the European legislators missed the chance to introduce concrete legislative measures stimulating their use and improving market conditions for such products.

The 2018 EU Plastics Strategy set out a cautious approach for the use of biodegradable plastics as it identified a number of concerning challenges associated with their uptake: *"It is important to ensure that consumers are provided with clear and correct information, and to make sure that biodegradable plastics are not put forward as a solution to littering"*. An approach that was confirmed in the Directive on single use plastics and fishing gear which makes no distinction between conventional, non-biodegradable plastics and biodegradable plastics, capturing them all in its ambition to phase out the most polluting single-use plastics. Under the Directive, the EU is banning the use of various single-use plastics (plastic cutlery, cotton buds, straws, and stirrers etc.). The ban will come into force by 2021 in all EU Member States.

The European ban follows earlier national legislation put in place by the member states with similar goals. Italy (in 2011), France (in 2015), Brussels (in 2017) and Spain (in 201) announced and since implemented decrees to prohibit the marketing and/or reduce the use of disposable plastic bags.

Green Public Procurement

Public procurement plays a vital role in Europe's economic performance. EU public spending on purchasing supplies, works and services amounts to nearly 19% of the EU's gross domestic product. This tremendous power from the European public sector can be used as a market pull mechanism to help boost the market of BBPs and their associated services.

Green procurement refers to purchasing products and services that cause minimal adverse environmental impacts. It incorporates human health and environmental concerns into the search for high quality products and services at competitive prices. Green Public Procurement (GPP) is an important tool for governments and public authorities to achieve environmental policy goals relating to climate change, resource use and sustainable consumption and production – especially given the importance of public sector spending on goods and services in Europe. In principle, GPP can be used as an instrument to support the market uptake of BBPs and their associated services.

Finally, in the frame of BIOSWITCH project, a set of incentive measures have been analysed in the deliverable D1.3 (Bioswitch project, 2021), and following the categorisation adopted in the POWER4BIO project, different types of incentive measures were identified: direct regulation, economic instruments, voluntary approaches, information and advice sharing systems, market-based signalling approaches, and other measures/instruments.



2.4 Differentiate your brand. Green marketing

Green products are sustainable products designed to minimize their environmental impact throughout their entire life-cycle. The goals of the development of green products are to decrease waste, reduce carbon emissions, and maximize resource efficiency. Moreover, green brands refer to brands that can provide sustainable benefits over other brands (Chen, et al., 2020). BBPs could be considered as a differentiating element in the same way green products do.

Due to the increasing recognition and awareness of environmentalism in the market, the positioning of green branding strategies is to build up a unique sustainable image in the targeted customers, in order to meet their green claims. Since more and more consumers are willing to give priority to greenness, by developing positive emotional responses as the basis for green brand influence, brand differentiation and generating green purchase intentions are crucial to green brand strategies (Chen, et al., 2020).

Many businesses implement green marketing, especially for reasons of opportunity, social and environmental responsibility, pressure from government and competition, and cost reduction. The brand value increases with the implementation of green marketing principles for the following reasons: The company increases the value of its products, gains a competitive advantage, improves the image of the business, gets new markets and is ready to cope with the environmental pressures of stakeholders (Moravcikova, et al., 2017).

Finally, the European Green Deal's target to make only proven/truth-based claims about products needs to be considered a well. Specifically, it states "Companies making 'green claims' should substantiate these against a standard methodology to assess their impact on the environment" (European Commission, s.f.).

2.5 Improved functionalities obtained from bio-based products

The ability of bio-based polymers to achieve improved functionalities, surpassing those of fossil-based ones, or even realising functionalities that are not achievable by fossil-based polymers offers opportunities to expand market applications for biopolymers far beyond the current state-of-play. In particular, these opportunities exist in high value market niches that require advanced functionalities.

Bio-based materials possess several complementary functionalities, e.g., unique chemical structure, bioactivity, non-toxicity, biocompatibility, biodegradability, recyclability, etc. that position them well in the modern world's materials sector.

Shifting to BBPs and packaging is commonly a means to an end, and not a goal by itself. Consumers do not explicitly ask for BBPs, but express their needs and expectations in other terms, wanting products that are of high-quality and long-lasting, produced with minimized negative impact on environment and climate; free of chemicals and contributing to healthy living; ensuring a sense of well-being and comfort or not harmful to (their personal and their children's) health. For many consumers considerations regarding health and well-being may be even more important topic than the environment (Bioswitch project, 2021). Many efforts have been directed toward commercializing novel biopolymers with improved properties and new functionalities for packaging films and coatings



as well as textile applications. In food industry, a growing concern is the use of suitable packaging material (i.e., biodegradable coatings and films) with enhanced thermal, mechanical and barrier characteristics to prevent from contamination and loss of foodstuff.

In the textile industry, the utilization of low environmental impact technologies that are based on sustainable raw materials presents a novel possible way for the development of functional textiles on a large scale. The combination of performance and sustainability converge to elevate the standards of the apparel market and help lead the transformation of the textile industry.

3 (RE)DEFINING THE VALUE CHAIN IN THE CONTEXT OF BIO-BASED TRANSITION

The development of innovative BBPs and processes is often hampered by a lack of cooperation among relevant actors. Organisation of the industry network around new products and value chains, including the identification of new business partners, is a key challenge for brand owners. New bio-based value chains will be required to meet challenging targets, and these will require new collaborations between multiple stakeholders across the chain.

3.1 Innovative value chain structure

A value chain is defined as a set of interlinked activities that deliver products/services by adding value to bulk material (feedstock). In a bio-based value chain, the feedstocks tend to be biomass drawn from an existing primary production route (e.g., agriculture, forestry, and livestock), or of a novel (e.g., microalgae) or secondary origin (e.g., sludge, industrial wastewater, and household organic waste). An example of a common bio-based value chain can be found in Figure 2 (Lokesh, et al., 2018).

The first stage of a complex bio-based value chain is biomass availability. This biomass is then turned into different valuable products, ranging from high-value chemicals to secondary-use by-products and renewable energy. The set of processes that are capable of transforming waste/secondary feedstock into an array of high value products is called integrated biorefineries. Integrated biorefineries could contain a 'pre-treatment plant' that prepares the feedstock for future transformation and refining technologies within the supply chains before packaging and distribution.

From a value chain and bioproduct perspective, most current bioeconomy strategies are dedicated to bioenergy and biofuel-based value chains, followed by food and beverage chains. The growth of biomass-cascading biorefineries is also supplemented by the keenness of European bio-based industries to valorise organic-rich biowaste (mainly agricultural residue and sludge). In addition, seizing an opportunity to synthesize value-added products from low-cost feedstock, an unhindered supply of starting material (one of the key barriers to bioproduct synthesis), is a promising start for a bio-based business model.

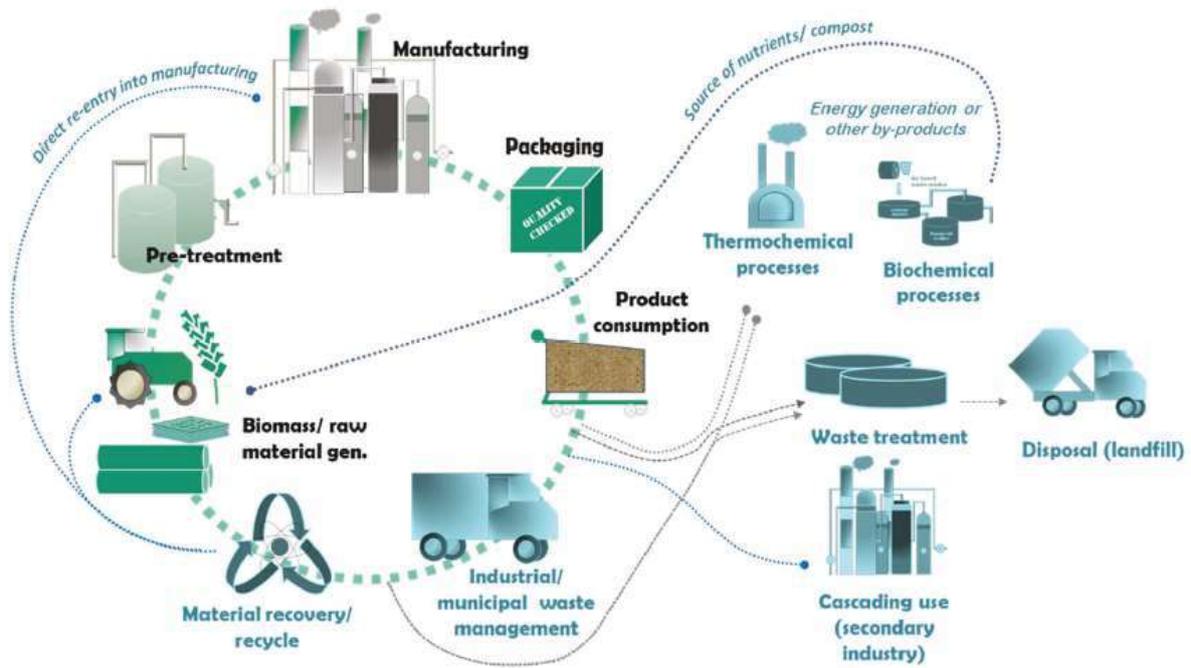


Figure 2. A generalised map of a bio-based value chain (Lokesh, et al., 2018).

3.2 Key stakeholders to be considered

Changing the economic processes requires the support and active contribution of many different actors along the value chains and their socio-political context. The innovative value chains that the bio-based transition demands include actors as strategic partners from primary sector to market, i.e., from farmers to retailers, as has been pointed out in the Bio-society vision for 2050. Some key ideas about this approach are provided below.

- These new value chains would support the creation of added value for consumer products and services that perform better than fossil-based alternatives based on life cycle sustainability assessments and performance testing results for functionalities.
- Participating primary sector actors are co-designers of value chains and their outputs, sharing the benefits thereof in rural, coastal, and urban areas.
- Stimulating additional plant-based production of food, feed, and materials would require stronger cooperation between technology providers and primary producers.
- Better connections with the rest of the actors in the innovative value chain would enable brand owners to lead the conversion to bio-based applications by informing citizens and increasing their awareness of sustainable bio-based alternatives.

Brand owners are key stakeholders for implementing and accelerating the bio-based economy and can play a key role in enabling BBPs to penetrate mass markets and to influence consumer choices in relation to BBPs. During the bio-based transition, the required new processes use materials that were not used before and produce waste that was not produced before. Therefore, companies that adopt



bioeconomic processes need to build new capabilities and find new partners. Due to the degree of specialisation needed in bioeconomic value chains, partners from old networks may be less useful, and hence new partnerships need to be sought. The stakeholders to be considered are listed below.

- **Science and academia:** Rebuilding existing and developing new value chains is dependent on the development of innovative products and processes, further LCA and social-LCA, new materials, etc. . Research institutions can generate the required expertise and provide their acquired knowledge.
- **Investors:** Even if the partners have been identified, financial support for new bio-based operations might be difficult to obtain. Banks as financiers are generally risk averse and may shy away from investing in such operations, especially since many banks might not have the in-house expertise to understand the new process and its opportunities.
- **Other private actors:** New raw material providers, new retailers that are more familiar with the bio-based market, new marketing advisors, and, in general, new partners from the private sector will be required.
- **Consumers:** New products and materials can meet resistance from consumers who are trying to avoid perceived risks or perceived performance limitations of these products and materials. Therefore, providing credible and robust information to consumers is therefore another important precondition of a successful transition to a bio-based and circular economy, so it is recommended that brand owners can interact with consumers or consumer associations to test acceptance of the new products and gather information about their main concerns and questions so that they can be properly addressed by brand owner marketing and communication campaigns.
- **Regulators and Policy Makers:** Public policy and regulation can significantly influence the development of new BBPs, both fostering and hindering it. Regulations very often focus on existing structures and processes and therefore may require alignment with the needs in new economic value chains. Brand owners need to interact and comply with different or new regulations and regulators more frequently than before.
- **Civil society organizations and the general public:** In addition to consumers, there are many other relevant societal stakeholders, such as environmental organisations and other civil society groups, or people living in the vicinity of new production facilities. Providing information and ensuring that they understand the benefits and risks of new processes and products is crucial here.

3.3 'Build me the value chain' event as a support for brand owners

Cluster managers and innovation agents can support brand owners in their search for new partners by jointly organizing a 'Build me the value chain' event. Although the organisation of this event is provided by BIOSWITCH project partners as a service (<https://bioswitch.eu/build-value-chain/>), some key ideas are provided next so other organisations can prepare this type of activity. A strong cooperation with the brand owner will be needed in order to capture its interests, needs, and motivations so as to shape an event that could be valuable and could help developing or



strengthening bio-based value chains. The key issues to be defined included event title, objectives, date and venue, agenda, required equipment / materials / logistics, attendees' profile, key messages, etc. A general approach for these aspects is provided below, so it can be customised at a later stage.

It is important to note some key points:

- Flexibility in the format of the event according to the need and will of the brand owner.
- The cluster or innovation agent would be responsible of formatting the agenda, scouting of collaborative companies, and also taking care of the registration process and satisfaction survey feedback gathering.
- The selection of B2B meeting partners will be flexible, and different approaches can be used according to the wishes of the brand owner.
- There are still some uncertainties related to COVID-19 that could affect the event organisations. Therefore, in some cases, several alternatives are presented in the following sections.

The main recommendations to be considered for the further shaping and definition of the event are provided below.

3.3.1 Objective

This workshop involves the bio-based industry so that new connections and business opportunities can be spotted to build the new value chain that the transition to bio-based approaches might demand. Therefore, the following objectives can be identified:

1. To help the brand owner in the development of the new supply/value chains that the bio-based transition demands.
2. Identify possible projects between the brand owner and other stakeholders (only private-private or private-public) in the field of innovation.
3. To disseminate and communicate the strategy and the innovation aspects of the brand owner with the purpose of gaining notoriety and positioning at local/regional/EU level and generating influence in new projects related to innovation and technological avant-garde (public and private), especially when transitioning to bio-based approaches.
4. To strengthen brand owner-group cooperation and collaboration.

The aim is to have a private (no recording for public dissemination), 'Petit Committee' style event where the brand owner can feel comfortable presenting its needs and challenges (creating a 'trustworthy' environment). Since brand owners are well-known organisations, having them at the core of the event would attract and boost the participation of attendees.

When organised face-to-face, the meeting usually starts with a welcome coffee or cocktail networking to generate a nice atmosphere before starting the session and so the brand owner speaker/s can get to know the attendees. This also prevents guests arriving late, interrupting the words of welcome and off-centring the attention of attendees.

Since some of the foreseen events could be done online due to COVID-19 the initial networking would be replaced for a small slot at the beginning of the agenda in order to allow all participants to properly join the online session. Depending on the number of attendees, a quick tour-de-table could be considered (if max 15 participants). Otherwise, a trustworthy atmosphere could be created during the



connection of attendees, e.g., by welcoming them by name and discussing with them before starting the official program.

3.3.2 Agenda

An example of a tentative agenda is provided below. This can be adapted to the needs of the brand owner and the format of the event (face-to-face or online).

- Coffee or cocktail networking // Attendee connection – 10 min
- Welcome and context – 10 min, cluster partner
- Innovation or bio-based transition activity of the brand owner - 20 min, speaker of the brand owner
- Collaborative innovation challenges and needs of the brand owner - 20-30 min, brand owner speaker
- Wrap-up – 10 min, cluster partner
- Bilateral meetings between the brand owner and attendees (upon request when registering for attendance). Time for bilateral meetings, ca. 15 min each.

Depending on the brand owner's desire, the timing between the activity description and the identification of challenges can be adjusted. Furthermore, it is desirable that if different departments of the brand owner have individual needs, all technical managers present them, splitting the “Brand owner collaborative innovation challenges and needs” slot from the agenda into two or three sets of presentations. Also, if desired, a brief presentation of the brand owner core activity can be included prior to the description of the bio-based transition activity.

3.3.3 Promoting new connections: bilateral meetings

In order to trigger real connections between the brand owner and potential suppliers, partners, etc., a set of bilateral meetings is scheduled at the end of the event. These are bilateral meetings between a representative of the brand owner and the attendee. If the brand owner desires so, the cluster partner can be present as well, but this is not mandatory since the main aim here is that the brand owner and attendee can feel comfortable regarding confidentiality issues.

These bilateral meetings would be requested by the attendees when registering for the event. In order to promote fruitful meetings, information about their motivation, value added for the brand owner, and any other information of interest will be asked. Alternatively, it could be requested for the attendee to send a brief document that includes description of their company, its activity, and the characteristics and capabilities that differentiate it in a specific thematic area.

Since the number of bilateral meetings will be decided by the brand owner according to the time available, having asked the attendees to provide information will facilitate further filtering and screening for the most promising bilateral meetings. This could be done (a) by the cluster partner; (b) as a preliminary exercise by the cluster partner with the brand owner having the final decision, or (c) by the brand owner itself. The selection of the approach and decide the bilateral meetings will depend on the desires of the brand owner and the availability of resources.



3.3.4 Registration

The registration will be done by the cluster partner using their usual platforms and procedures. All data is managed according to FAIR principles and good data management practices, being GDPR compliant. It is recommended to ask the attendees for the following information:

- Name
- e-mail
- Company
- Position
- Do you want to have a bilateral meeting with representatives from [brand owner]? Yes/No
- If so, could you please tell us why and what your value added, project idea, etc.

If done face-to-face, it is always advisable to ask the attendee if he/she will participate in the coffee or cocktail networking and if there are any allergies to consider.

3.3.5 Required equipment, material, logistics

After the event, the presentations used are to be sent to attendees by email with prior approval of the brand owner, together with a satisfaction survey.

In case the event is done face-to-face, coffee, or cocktail catering, name tags, communication material (roll-up and brochures) and participant package will be provided. As for the participant package, this will include a copy of all presentations used during the event by the cluster and the brand owner with a prior approval of the brand owner and corporate communication materials from the brand owner and/or the cluster partner as desired. The satisfaction survey is shared among participants at the end of the event as a hard copy and sent by email to those who have not responded.

3.3.6 Attendees

Number of attendees: Since the aim of the event is to support building of the supply/value chain of the brand owner, rather than focussing on a large number of attendees, the aim is to bring relevant attendees that could be interesting for the brand owner and to spot new contacts and collaboration opportunities for the brand owner. The final number of attendees will depend on the number of challenges presented by the brand owner (more challenges to be presented, more attendees to be expected) and the desires of the brand owner.

Attendees Selection Criteria: The geographical location of the attendees needs to be discussed with the brand owner since sometimes they prefer to have collaborators/suppliers from their surrounding area or region so they can work in local language and visit easily.

Regarding the attendees' profile, private sector organisations would be desirable. Bioproducts providers, auxiliary equipment, waste management companies, etc. The motivation for these organisations to attend the event is to have the opportunity to create and establish new connections and business opportunities with the relevant brand owner in the bio-based field.



It is up to the clusters to restrict the event only to their members or to widen the scope in order to bring to the event attendees with the expertise needed by the brand owner, this needs to be aligned with the previous comment about geographical scope.

3.4 Open innovation as a tool for the development of new value chains

3.4.1 What is Open Innovation? Why open innovation?

The strategic integration of innovation in organizations is considered a key aspect of success. Innovation contributes to the achievement of competitive advantages in local and global markets, to value generation, to growth, and, in addition, guarantees the necessary strategic flexibility for adapting to the challenges proposed by the dynamics and the changing preferences of the markets.

The traditional processes of innovation in organizations sometimes consume a lot of time, are expensive, inefficient, and, often, have low effectiveness when it comes to improve the competitive position of the companies. This, together with the continuous dynamism of the market, which changes much faster than the capacity of the internal R&D departments to generate innovations, and the increase in competition, means that innovation has become a necessity and not an option at the organizations level.

It is therefore necessary to look for new paradigms of innovation, models that make the innovation process more sustainable in order to obtain the following:

- Higher ratio of output-to-market and disruptive innovation (improvement in effectiveness).
- Greater optimization of available resources invested in innovation (improvement in efficiency)

Chesbrough defines Open Innovation (OI) as 'a paradigm where firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as companies look to advance their technology' (Chesbrough, 2003). OI means that companies make much greater use of external ideas and technologies in their own business, while letting their unused ideas be used by other companies. This requires each company to open up its business model to let more external ideas and technologies flow in from the outside and let more internal knowledge flow to the outside (Chesbrough & Crowther, 2006).

The OI aims to consolidate alliances with different actors within the innovation ecosystem to favour the acquisition of ideas and resources from the external context. These ideas, when integrated within the organization, result in the development of differentiated processes, products, and services. It is considered an

Open Innovation allows organizations to acquire, integrate and process external information more efficiently and effectively by interacting and collaborating with external actors (beyond suppliers, customers, universities, etc.)



effective and powerful strategy for organizations to grow and compete in the current dynamic context.

Organizations would need to rethink the strategies they have used up to now to create and generate useful benefits from technological innovation and acquire an ability to integrate, build, and reconfigure internal and external competencies as a strategy to overcome the challenges proposed by competitive and rapidly changing environments.

In this way, OI involves the transfer of resources between actors in the innovation ecosystem and the acceleration of organizational capacities for innovation and commercialization. The central idea of OI is to think of innovation as an open system in which both internal and external agents of the organization participate and cooperate together.

The main differences between innovation conducted by internal agents in the entity and OI strategy are shown below.

Table 1. Internal innovation vs. Open innovation

Internal Innovation	Open Innovation
<ul style="list-style-type: none"> • Very limited by available resources (\$ and people) • Limited by internal know how and technology availability • R&D department and the rest of the organization may collide in cultural and organizational aspects <ul style="list-style-type: none"> • In some cases, there is a lack of motivation due to the invisibility of R&D results 	<ul style="list-style-type: none"> • No limitation because of resources availability • Openness to multidisciplinary know how through start-ups • Access to disruptive technologies • Wider scope, no restrictions due to objectives, culture or internal policies • Extra motivation ("we want to change the world!")

In short, OI strategies aim to ensure a better use of research and development efforts in organizations, considering that being open allows them to share information, knowledge, and ideas with other actors and obtain feedback, which enriches their knowledge base and, therefore, favours its capacity for innovation. A concept that attracts attention from the organizational and academic perspective, as its application is relevant in the current competitive and dynamic context of the private sector.

In the context of the bio-based transition, new challenges might be faced by brand owners, and it could happen that their own RDI teams do not have the needed knowledge, nor the time or physical means to carry out the needed RDI activities. It is in this case that OI can become a powerful asset in order to further develop the new BBPs and/or processes. By connecting with the rest of stakeholders in the brand owner innovation ecosystem, products could be delivered to the market faster and in a more resource-efficient manner. As for the OI awareness and implementation level, wide differences regarding the starting point can be found among the brand owners, so it can be interesting for the cluster managers and innovation agents to conduct a preliminary OI audit (a guided interview to



know more about the brand owner actions in the frame of OI) in order to be able to better support the brand owner OI related actions by, e.g. raising awareness about OI if the brand owner is at a very preliminary stage, supporting the development of their own OI strategy (designing the needed actions), or going further with more sophisticated approaches such as intra-entrepreneurship programmes of incubators, accelerators or corporate venture programmes. The BIOSWITCH project has developed a free OI assessment tool (<https://bioswitch.eu/oi-assessment-2/>) that can be used by brand owners. After answering a small set of questions, they will receive an ad hoc assessment of their OI status including recommendations for some OI actions that could be of their interest together with suggestions on how to implement them.

3.4.2 Some examples of Open Innovation players in the bioeconomy field

Many brand owners have been implementing OI strategies and practices for a long time, becoming key players in their area. It is worth noting that, for example, in the biopharma industry, according to a Deloitte analysis, there is a three-fold probability of success when drugs are sourced via OI. Some examples of successful OI actions conducted by brand owners in the bioeconomy area are provided next.

Leo Pharma Open Innovation is looking for small molecules that could be relevant for business collaboration, science, and disease exploration, or provide a starting point for a collaborative project. There are no limiting business terms attached to the contract, and the external partner always retains IP rights, as well as the decision to continue the collaboration or not. *OI mechanism: Joint partnership + acquisition.*

Bayer Grants4Leads. The Animal Health program offers financial support to evaluate and promote the exploration of new compounds with an initial reward of 5000 EUR. *OI mechanism: Challenge prize.*

UNILEVER Foundry collaborates with mature start-ups to solve challenges across product, marketing, digital innovation, ecommerce, customer insight, sustainable growth, and enterprise tech. *OI mechanism: Corporate accelerator.*

Plug-and-Play-Fashion for Good: The program aimed to accelerate sustainable innovations in the textile industry, scouting innovative companies with the potential to disrupt the current apparel and textile value chain, bringing a positive environmental and/or social impact. *OI mechanism: Corporate accelerator.*

Agrostart in collaboration with the **ACE accelerator** has been named the best start-up accelerator in Brazil and Latin America. Today, it counts on two acceleration programs; ACE Start, oriented to validation phase start-up, and ACE Growth, to growth companies. *OI mechanism: Corporate incubator + accelerator.*

Food Acelerator (IT), H-FARM in partnership with Cisco have created this program dedicated to early-stage start-ups that are developing innovative solutions for disrupting the food and agriculture industry. *OI mechanism: Corporate accelerator.*



3.4.3 Implementing Open Innovation



Figure 3. Plan - Do - Check - Act approach.

Source: <https://es.123rf.com/>

When it comes to implementing OI actions, the best practice is to follow a PLAN-DO-CHECK-ACT approach. This approach allows organisations to adopt and implement new processes, it being possible to apply principles from continuing improvement. In a PLAN-DO-CHECK-ACT approach, the first step is to PLAN properly the actions to be done by defining the scope of the different activities, the resources that might be needed, inputs required, and expected outcomes. After the planning stage comes the DO step, where the shaped plan would be implemented. The CHECK steps call for monitoring and evaluation to be done after a certain period of time in order to assess if the organisation is progressing in the adoption of the foreseen plan. Once the critical spots, not-progressing actions, bottlenecks, and deviations have been identified, in the ACT step, the corresponding mitigation actions are developed and implemented, amending the initial Plan if needed.

4 STEPS AND FIRST RECOMMENDATIONS FOR THE MOBILISATION OF THE BRAND OWNERS INSIDE CLUSTERS OR REGIONS

Different events could be carried out as a way to mobilise the brand owners and engage stakeholders to motivate and support them so they can conduct the bio-based transition. These events are presented next as a suggestion of potential activities that would aim to provide information, boost networking, create awareness and trigger companies' activities in the bioeconomy field.

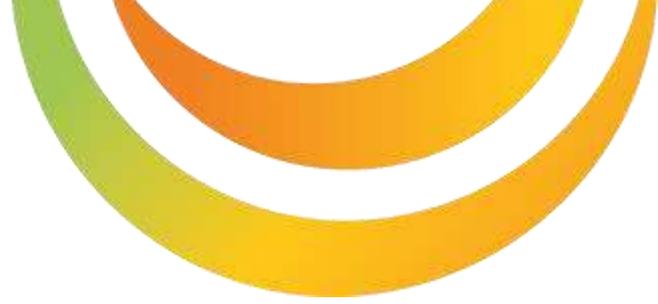
4.1 Knowledge transfer event

Objective

Main aim is to facilitate networking, B2B, knowledge transfer and innovation between researchers, primary producers, bio-based industries, other areas specialists and auxiliary industry, etc.

The Knowledge Transfer (KT) event can:

- Facilitate knowledge transfer among stakeholders (e.g., industry, researchers, primary producers, and tech providers).
- Provide an introduction to the role of technology solutions for bio-based product development.
- Foster networking so as to promote new business opportunities.



- Present success cases of brand owners that have completed their switch to bio-based journey so they can back-up the information/technologies/trends shared.

Barriers and mitigation actions

The following barriers (and corresponding mitigation actions) would need to be considered when shaping the event: accessing information on existing technologies/best practices, lack of regional focus and meeting the needs of industry/stakeholders. Moreover, the following barriers would need to be considered during the actual organisations of the event (implementing the corresponding mitigation actions when needed): low stakeholder involvement and low coordination between value chain stakeholders.

Required equipment, material, logistics

The event can be done face-to-face or online. For the face-to-face event, tea/coffee, lunch, name tags, communication material (e.g., roll-up and brochures) and participant package (including a feedback form) are recommended. If needed, it is recommended to organise lunch in a standing cocktail style as this encourages networking and discussions among participants.

Estimated attendees

Invitees will be stakeholder across sectors including primary production, tech industry, bio-based industry, auxiliary equipment, academia, and policy.

4.2 Technical sectoral committee

This event differs from the knowledge transfer event in the scope and number of attendees. While the knowledge transfer event is designed as a wider audience, wider scope event where the main aim is to create awareness and present state-of-the-art and some innovative solutions, the technical sectoral committee (TSC) has a more specific approach.

The TSC will provide a small group of brand owners (8-15) and private companies from the cluster network relevant insight on key trends and hot topics that are relevant for the bio-based transition. This could be done by the cluster staff (if they have technical knowledge) and by relevant guests that will be invited. Then, attendees could ask questions and present their problems to the experts.

Objective

Main aim is to bring specific knowledge about technological trends to brand owners and private companies to support their RDI activities and to help them move forward in the right direction. Cutting-edge technologies, new materials and innovative service models can be presented.

Barriers and mitigation actions

The following barriers would need to be considered during the actual organisations of the event (implementing the corresponding mitigation actions when needed): low stakeholder involvement and low coordination between value chain stakeholders.



Required equipment, material, logistics

This is expected to be a short session lasting 2-3 hours if done face to face or 1-2 hours if done online. For the face-to-face event, tea/coffee, lunch, name tags, communication material (e.g., roll-up and brochures) and participant package (including a feedback form) are recommended.

Estimated attendees

Brand owners and private companies. Guest speakers with specific technical knowledge might be invited.

4.3 Demo day

A demo day exhibition where there are several company site visits with demonstrations of state-of-the-art technologies currently being used in the bio-based or on-site exhibitions with BBPs can be effective means to explain the abstract concept of the bio-based transition to the general public. At the same time, they can also be used to initiate a dialogue with the visitors, e.g., by means of a survey that explores the visitors' views on the benefits and challenges related to the development of BBPs.

Alternatively, this event can be targeted to other private companies so they can conduct some peer learning as it has been proven that private companies are more motivated and inspired by other private companies and that the information is much better received from them than from other stakeholder types.

Objective

The aim is to spread awareness of BBPs and to promote their integration among consumers. Alternatively, the aim (when the attendees are other private companies) can be to foster the bio-based transition by providing real evidence of private company actions carried out in that direction.

Barriers and mitigation actions

The following barriers would need to be considered during the preparation of the event (implementing the corresponding mitigation actions): low stakeholder involvement and low coordination between value chain stakeholders.

Required equipment, material, logistics

Tea/coffee, lunch, name tags, communication material (e.g., roll-up and brochures), participant package. This would include the event agenda, site visit information (technology and company profile), host organisation leaflet and feedback form.

Estimated attendees

Invitees could cover consumers or other private organisations depending on the final aim of the event.



4.4 Business opportunities and cross-sectorial value chains day

Involving suppliers, end users and bio-based product development, the event can be shaped along specific value chains. With support of the cluster staff, innovation agent, etc., newly established business opportunities will receive technical and business support and mentoring to consolidate regional innovations, understand technical implementation, identify barriers, and develop business models following the concept of CANVAS (considering biomass resource and market, supply chain relationships, revenue streams, key activities, key partnerships, cost structure). The creation of new business opportunities on a cross-sectorial domain so as to trigger the development of new value chains will be pursued.

To allow these innovations to progress to the next level this event can be followed by a financing and investment day as explained below.

Objective

This event will boost the development of new products, solutions and/or services, aiming for a cross-sectorial approach and strengthen the cooperation among regional stakeholders. The event is to be shaped as a working session for ideas and business development.

Barriers and mitigation actions

The following barriers would need to be considered during the preparation of the event (implementing the corresponding mitigation actions): low stakeholder involvement and low coordination between value chain stakeholders and lack of regional focus.

Required equipment, material, logistics

The event can be done face-to-face or online. For the face-to-face event, tea/coffee, lunch, name tags, communication material (e.g., roll-up and brochures), participant package (business model development and assessment methodology templates, feedback form) are recommended. If needed, it is recommended to organise lunch in a standing cocktail style. This encourages networking and discussions among participants.

Estimated attendees

Private companies, entrepreneurs, spin-offs, and researchers with ideas ready to be delivered to the market. In case the cluster staff lacks business or technical knowledge, external experts can be invited as well.

4.5 Financing and investment day

From a cluster, regional point of view, it can be interesting to support the bio-based transition in the area by supporting emerging business companies, entrepreneurs, spin-offs, etc. This would help building and strengthening a regional network of different actors. A way to do this is through the organisation of an Investment day. At the event, public and private funds can be presented and then



a pitch contest can be organised. If a prize is considered in the contest, it could encourage start-ups and entrepreneur's participation.

This event can be scheduled as a follow-up event for the business opportunities and value chains development in order to continue supporting emerging ideas and promising collaborations.

Objective

Main aim is to move forward from business opportunity spotting and development to real implementation, making easier going into market.

Barriers and mitigation actions

The following barriers would need to be considered during the preparation of the event (implementing the corresponding mitigation actions): low stakeholder involvement and meeting the needs of industry/stakeholders.

Required equipment, material, logistics

The event can be done face-to-face or online. For the face-to-face event tea/coffee, lunch, name tags, communication material (e.g., roll-up and brochures), participant package (funding programme fiches and feedback form) are recommended. If needed, it is recommended to organise lunch in a standing cocktail style. This encourages networking and discussions among participants.

Estimated attendees

Mostly private sector stakeholders that could benefit from funding in order to implement new business opportunities in the bio-based industry. Private investors might need to be invited so they can present their investment programmes. Some representative from the public side might be invited as speaker so public funding can be presented as well. As for the pitch contest, a jury must be designated. This can be composed by the public and private sector speakers plus additional technical experts.

5 FUNDING AND FINANCING POSSIBILITIES

Brand owners and private companies in their supply and value chains might need additional funds to carry out the needed RDI projects in order to go ahead with the bio-based transition. An analysis of European public and private opportunities has been carried out. External financing sources do not include an analysis about bank financing as this is linked to the regional context and needs to be analysed on a case-by-case basis.

5.1 Public funding

Aside from Horizon Europe (more info [here](#)) and Circular Bio-based Europe (more information [here](#)), there are other initiatives that might be interesting for private organisations.



5.1.1 EIC Accelerator

Funding entity: EASME - Executive Agency for SMEs

Description: The EIC Accelerator supports high-risk, high-potential small and medium-sized enterprises and innovators to help them develop and bring onto the market new innovative products, services and business models that could drive economic growth.

Project Budget: € 0.5 and € 2.5 million. investments (direct equity investments) of up to €15 million managed by the EIC Fund for scale up and other relevant costs.

Beneficiaries: Small and medium-sized enterprises (SMES)

Length of the Project: From 12 to 24 months

Funding Approach: Grants

Call: Open

Website: https://eic.ec.europa.eu/eic-funding-opportunities/eic-accelerator_en

5.1.2 DIGI-B-CUBE : Digital Enterprise Innovations for Bioimaging, Biosensing and Biobanking Industries

Funding entity: EU under grant agreement No 824920

Description: Travel Voucher covers travel and accommodation costs for participants of official DIGI-B-CUBE events (including travel and accommodation costs & conference fees to attend satellite events i.e., organised/co-organised by DIGI-B-CUBE consortium).

Project Budget: The maximum amount of reimbursement for each travel voucher is €2000.

Beneficiaries: Small and medium-sized enterprises (SMES)

Length of the Project: 1-5 days expected duration of participation

Funding Approach: Grants

Call: Open

Website: <https://digibcube.eu/open-calls/>

5.1.3 SmartAgriHubs – SERVICE, the SmartAgriHubs Community Network

Funding entity: EU under grant agreement No 818182

Description: Open call for projects coordinated by Digital Innovation Hubs (DIHs) that aim at services for the support of digital transformation in the agri-food domain. For this call, projects shall develop, innovate, provide, validate and/or improve services provided by Digital Innovation Hubs. Tangible innovation services shall be provided by DIHs. They shall aim at supporting the set-up and realisation of digital innovation activities realised by stakeholders of agri-food communities and related networks.



Project Budget: SmartAgriHubs considers that proposals requesting a contribution from SmartAgriHubs between €50 000 and €200 000 would allow to support proposed projects appropriately. The budget per legal entity shall be limited to a maximum of €100 000 in total within one or several sub-grants.

Beneficiaries: Small and medium-sized enterprises (SMEs) as service beneficiaries. Funding needs to be requested by the corresponding DIH.

Length of the Project: 3-12 months

Funding Approach: Grants

Call: Open

Website: <https://www.smartagrihubs.eu/portal/open-call>

5.1.4 METABUILDING: METAclustering for cross-sectoral and cross-border innovation ecosystem. BUILDING for the European Construction, Additive Manufacturing and Nature-Based Solutions industrial sectors' SMEs

Funding entity: EU under grant agreement No 873964

Description: The METABUILDING innovation ecosystem brings together stakeholders from construction and 4 emerging industrial sectors; recycling & circularity, additive manufacturing, nature-based solutions, and digital industry. The METABUILDING Platform aims to facilitate collaboration between new partners and experienced experts to further innovation.

Project Budget: Maximum €60 000 lump sum per project

Beneficiaries: Small and medium-sized enterprises (SMEs)

Length of the Project: Collaborative projects of at least 2 SMEs with a duration of 6 months

Funding Approach: Grants

Call: Open

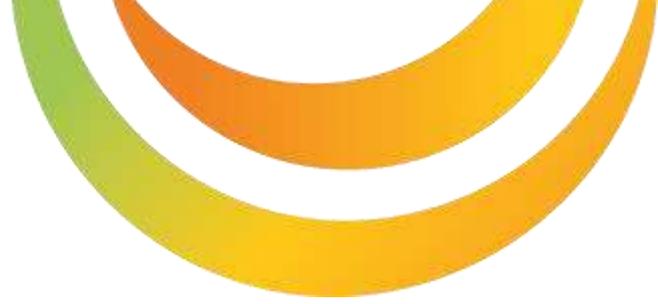
Website: <https://www.metabuilding.com/>

5.1.5 Eurostars

Funding entity: National Eureka partner

Description: Eurostars is a funding instrument that supports innovative SMEs and project partners (large companies, universities, research organisations and other types of organisations) by funding international collaborative R&D and innovation projects. By participating, organisations from 37 countries can access public funding for international collaborative R&D projects in all fields.

Project Budget: If the applicants are from a Eurostars country, funding conditions available can be found in the country-specific webpages. Also, the corresponding national or regional funding body can be contacted. Organisations from non-Eurostars countries can participate by self-funding their project costs.



Beneficiaries: Small and medium-sized enterprises (SMES)

Length of the Project: The length of these projects may be from 12 to 36 months.

Funding Approach: The amount of Eurostars funding that might be received is managed by the corresponding national funding body. Funding rules vary from country to country and national funding bodies decide:

- which organisations can receive funding,
- which project activities can be funded and
- funding rates and thresholds.

Call: Open from 21 January 2022 to 24 March 2022 (14:00 CET). Further calls will open in the future

Website: <https://www.eurekanetwork.org/open-calls/eurostars-funding-programme-2022-call-1>

5.2 Private financing

This section presents funding opportunities that involve remuneration of capital in the form of shares in the ownership of the company. Young companies with high growth potential turn to venture capitalists for funding because they cannot issue debt or raise capital in public markets.

Name: Canaan Research and Investment

Sector: Bio and Health

Type: Venture capital

Company stage: Premoney

Website: <http://canaanrd.com/>

Name: Columbus Life Science Fund II

Sector: Bio and Health

Type: Venture capital

Company stage: Seed

Ticket: 3-10M€

Website: <http://www.columbusvp.com/>

Name: EUROEQUITY



Sector: Generalist

Type: Redes

Company stage: Seed

Website: <https://www.euroquity.com/en/home>

Name: Foro capital PYMES

Sector: Generalist

Type: Networks

Company stage: Proven track record of sales

Ticket: 0,5- 5M€

Website: <https://forocapitalpymes.com/mision-vision-valores/>

Name: Inveready Venture Debt

Sector: Biotech

Type: Venture capital

Company stage: Proven track record of sales

Ticket: €300.000 -€2M

Website: <https://inveready.com/investment-vehicles/#investment-1>

Name: Kurma Partners

Sector: Bio and Health

Type: Venture capital

Company stage: Pressed

Ticket: 1-5M€

Website: <http://www.kurmapartners.com/about-kurma-partners/>



6 OTHER ASPECTS THAT CAN BE RELEVANT DURING THE BIO-BASED TRANSITION

6.1 Certification and labelling of bio-based products

Application of certification schemes and labels has positive long-term effects on the overall development of the European bio-based product market. It's therefore important that brand owners can become familiar with the different certification and labelling schemes, being possible then to assess internally which approach would suit better the company strategy, target markets, etc. It is recommended that innovation agents, cluster managers, etc. become familiar with these schemes as well, and that they connect with the relevant bodies and organisations in charge of certification/labelling so as to support properly the brand owners in their network during the bio-based transition journey.

The certification and regulation schemes that could be of interest during the bio-based transition journey, related to different sectors and markets, are presented next. These cover schemes from the biomass generation, bio-based materials and products manufacturing and the production of goods that use bio-based compounds or ingredients (i.e., cover different stages of the value chain of a biobased product, from biomass to biomaterials and final bioproducts entering the market) as identified and analysed by Bracco et al (Bracco, et al., 2019).

6.1.1 Biomass-related



Better Biomass NTA8080

For a) bioenergy not included in the Renewable Energy Directive 2009/28/EC (RED) and BBPs or b) RED biomass products (biofuels or bioliquids). It targets the EU and includes references to European (EN) standards. Concerns the complete supply chain from production, processing, transport to end use. More information [here](#).



Green Gold Label (GGL)

For biomass in the energy and bio-based sectors (woody agri-residues, waste wood biomass, and bioliquids): in particular the standards for the chain of custody (GGLS1), agricultural source criteria (GGLS2) and forest management criteria (GGLS5). Global in scope. More information [here](#).

6.1.2 Relevant labels for biobased plastics

6.1.2.1 Determination of the biobased content



DIN-Geprüft Biobased (products based on renewable raw materials)

Applies to products that are fully or partly manufactured from bio-based raw materials, and in conjunction with the basic testing standards in alignment with their properties.

It contains all of the requirements for awarding the ["DIN-Geprüft biobased"](#) certification mark.



biobased

Dutch Standards Institute (NEN) bio-based content

Based on the European standard EN 16785-1 that enables independent assessment of claims on the bio-based content of products (basic materials, intermediate and finished products). More information [here](#).

6.1.2.2 Sustainability and Life Cycle Assessment (LCA)



REDcert-EU and REDcert system

It has been revised and is valid in all European Member States and selected third countries (Ukraine and Belarus). It targets biomass (agricultural raw materials) and refers to the International Sustainability and Carbon Certification (ISCC-EU) and Biomass Biofuels Sustainability voluntary scheme (2BSVs) certification schemes. More information [here](#).



International Sustainability and Carbon Certification (ISCC)

As a global certification system, covers the entire supply chain and all types of bio-based feedstocks and renewables. The BBPs certification scheme specifically targets the entire supply chain of the products derived from biomass. Here the authors cover the ISCC certification for biofuels in the context of our study. The [ISCC](#) BBPs related sections have been analysed separately for BBPs. With regards to biofuels' certification, the ISCC Document 202 "Sustainability Requirements" comprises of six sustainability principles, which have been determined in a multi-stakeholder process.



Roundtable on Sustainable Biomaterials (RSB)

The [RSB Principles & Criteria](#) for the Sustainable Production of Biomass, Biofuels and Biomaterials (RSBSTD-01-001) describes best practices in the production and processing of biomass, and in the production of biofuels and biomaterials. The standard described herein specifies requirements for the certification of sustainable operations along the entire supply chain.

6.1.3 Other relevant labels



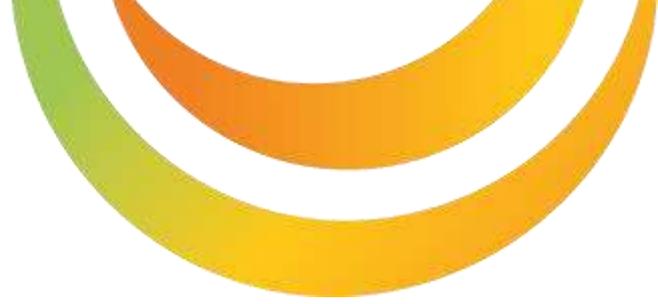
The Biomass Biofuels Sustainability voluntary scheme (2BSVs)

Founded in 2010 by a consortium of French biomass and biofuels associations (the "2BS Consortium"). The scheme was primarily set up to cover the mandatory sustainability requirements of Directive 2009/28/EC for all feedstocks and biofuel. More information [here](#).



IBI Biochar Certification Program

Voluntary, self-certifying biochar certification programme administered by the [International Biochar Initiative \(IBI\)](#). The purpose of the programme is to provide biochar manufacturers the opportunity to certify their biochar(s) by the minimum criteria established in the most recent version of the 'IBI Standardized Product Definition and Product Testing Guidelines for Biochar That Is Used in Soil', which serves as the foundation of the IBI Biochar Certification Program. Currently, the IBI Biochar Certification Program focuses only on implementation in the United States and Canada



Cradle to Cradle Certified™ (C2C)

Products Program guides designers and manufacturers through a continual improvement process (e.g., stepwise improvement or improvement in segments) that looks at a product through five quality categories – material health, material reutilization, renewable energy and carbon management, water stewardship, and social fairness. More information [here](#).



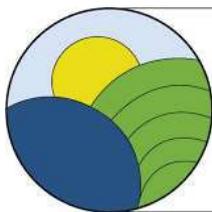
EU Eco-Label

Covers a wide range of product groups, from major areas of manufacturing to tourist accommodation services to assess whether they are environmentally friendly, as claimed. The specifications depend on the product type and are mostly based on the best available techniques. The [EU Eco-Label](#) is a voluntary scheme, which means that producers, importers and retailers can choose to apply for the label for their products. In the context of this study, the product labelling schemes of the sectors, which could be relevant to bioeconomy (i.e., pulp and paper, chemicals, textiles, and construction materials and furniture) are analysed.



Blue Angel

Guarantees that a product or service meets high standards in terms of environmental, health and performance characteristics. In the process, these products and services are evaluated across their entire life cycle. Criteria are developed for each product group that must be fulfilled by those products and services awarded with the [Blue Angel](#). In order to reflect technological advances, the Federal Environmental Agency of Germany reviews these criteria every three to four years. In the context of this study, the product labelling schemes of the sectors, which could be relevant to bioeconomy (i.e., pulp and paper, chemicals, textiles, and construction materials and furniture) are analysed.



**USDA
CERTIFIED
BIOBASED
PRODUCT**
PRODUCT 83%
PACKAGING 93%

USDA Biobased Product Certification

Managed by the U.S. Department of Agriculture (USDA) under the USDA Voluntary Labelling Initiative, to help consumers in identify BBPs and packages in the general marketplace. Around 2,700 of the 14,200 products of the USDA BioPreferred Programme display an [USDA Certified Bio-based Product label](#).

It applies to all BBPs and certifies on the basis of percent bio-based carbon, and percent biomass content of the final product. The certification also includes the reporting of the grain and oilseed inputs used in bio-based product manufacturing

6.1.4 Natural cosmetics

Several private organizations have developed certifications to back up the claims and assign a seal that the manufacturer can put on its label to let the consumer know that there is a third-party certification. The best known in Europe are [ECOCERT](#), [BDIH](#), [ICEA](#) and the [SOIL association](#). They can apply a common standard called COSMOS. NATURE is another European certifier that applies its own standard. They offer two labels: organic cosmetics or natural cosmetics, depending on the content of ingredients of organic origin (EurobioLab-Organic certificates, s.f.).



Figure 4. Natural cosmetics certifications

Specific certifications for chemicals

The [A.I.S.E.](#) Charter for Sustainable Cleaning is a voluntary initiative of the European detergents and maintenance products industry. The aim is to encourage the whole industry to undertake continual improvement in terms of sustainability and also to encourage consumers to adopt more sustainable ways of doing their washing, cleaning, and household maintenance.



Figure 5. Sustainable cleaning certification

6.1.5 Environmental certification



Figure 6. EMAS certification

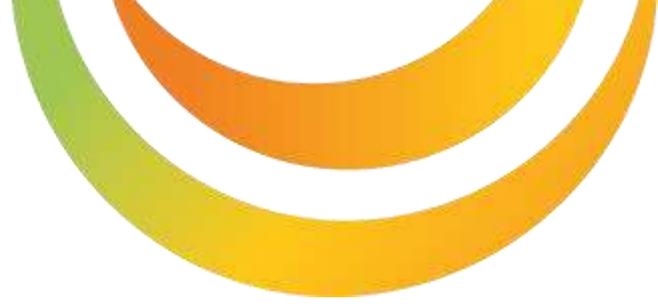
EMAS certification

The EU Eco-Management and Audit Scheme ([EMAS](#)) is a premium management instrument developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance. EMAS is open to every type of organisation eager to improve its environmental performance. It spans all economic and service sectors and is applicable worldwide.

The environmental management model in this Regulation is based on ISO Standard 14001 and proposes an efficient system for helping organisations to manage and constantly improve their environmental performance. However, EMAS contains its own requirements, which turn it into a model of excellence for environmental management.

ISO 14001 certification

The implementation of an Environmental Management System in accordance with the standard [ISO 14001](#) allows for easy standardisation of the environmental factors arising from each activity that takes place in organisation. It also promotes environmental protection and prevents pollution while maintaining a balance with socio-economic factors.



6.2 Bio-based related standards

Following the same approach for certification and labelling schemes, it is recommended that brand owners become familiar with current standards during their bio-based transition. Products and services used in everyday lives have to meet certain standards of safety and quality. In Europe, these standards are developed and agreed by the three officially recognized European Standardization Organizations: the European Committee for Standardization (CEN), the European Committee for Electrotechnical Standardization (CENELEC) and the European Telecommunications Standards Institute (ETSI). Together, CEN and CENELEC provide a platform for the development of European Standards and other technical specifications across a wide range of sectors.

Concerning the bio-based transition, it is interesting to explore standards available for the bioeconomy area. Also, depending on the brand owner sector and products market area, it would be interesting to assess the respective standards group. Results from a European standards screening exercise are provided next.

6.2.1 Bio-based product related standards

There is only one related Committee, the [CEN/TC 411 - Bio-based products](#). Its scope is (i) Development of standards for BBPs covering horizontal aspects. This includes consistent terminology, sampling, certification tools, bio-based content, application of and correlation towards life cycle analysis, sustainability criteria for biomass used and for final products, and aspects where further harmonization is needed on horizontal level; (ii) Development of standards for bio-solvents, covering product functionality, biodegradability and, if necessary, product specific aspects not covered under i.

There are four subcommittees and working groups: [CEN/TC 411/WG 1](#) – Terminology, [CEN/TC 411/WG 3](#) - Bio-based content, [CEN/TC 411/WG 4](#) - Sustainability criteria, life cycle analysis and related issues and [CEN/TC 411/WG 5](#) - Certification and declaration tools. There is an infographic created by Dutch Standards Institute (NEN) that summarises the Standards for BBPs (NEN, s.f.) and depicted in Annex I.

So far, there are 15 standards related to this committee. The infographic from ANNEXI gathers the most relevant info such as why standards for bio-based products are needed, which standards are available for bio-based content determination, for sustainability, for terminology, communication and bio-based solvents. More detailed information can be found in Table 2 Committee CEN/TC 411 – Bio-based product standards provides information.

Reference, Title	Status
CEN/TR 16721:2014 Bio-based products - Overview of methods to determine the bio-based content	Published
EN 16785-1:2015 Bio-based products - Bio-based content - Part 1: Determination of the bio-based content using the radiocarbon analysis and elemental analysis	-
EN 16640:2017 & EN 16640:2017/AC:2017 Bio-based products - Bio-based carbon content - Determination of the bio-based carbon content using the radiocarbon method	Published



EN 16785-2:2018 Bio-based products - Bio-based content - Part 2: Determination of the bio-based content using the material balance method	Published
EN 16935:2017 Bio-based products - Requirements for Business-to-Consumer communication and claims	Published
EN 17351:2020 Bio-based products - Determination of the oxygen content using an elemental analyser	Published
FprCEN/TR 17674 Bio-based products- Use of stable isotope ratios of Carbon, Hydrogen, Oxygen and Nitrogen as tools for verification of the origin of bio-based feedstock and characteristics of production processes - overview of relevant existing applications	Under Approval
CEN/TR 16957:2016 Bio-based products - Guidelines for Life Cycle Inventory (LCI) for the End-of-life phase	Published
CEN/TR 17341:2019 Bio-based products - Examples of reporting on sustainability criteria	Published
EN 16751:2016 Bio-based products - Sustainability criteria	Published
EN 16760:2015 Bio-based products - Life Cycle Assessment	-
EN 16575:2014 Bio-based products - Vocabulary	Published
EN 16766:2017 Bio-based solvents - Requirements and test methods	Published
EN 16848:2016 Bio-based products - Requirements for Business-to-Business communication of characteristics using a Data Sheet	Published

Table 2 Committee CEN/TC 411 – Bio-based product standards

6.2.2 Other standards that could be relevant

Finally, there are other standards related to the bio-based transition and daily RDI operation. Table 3 Other standards that can be relevant during the bio-based transition gathers information about the different committees and identified standards.

Reference, Title	Link to bio-based transition
CEN/WS 093 - Industrial Symbiosis, including one standard CWA 17354:2018 Industrial Symbiosis: Core Elements and Implementation Approaches	Relevant to assess the relationship between biofuels production, cosmetics, food supplements and specialty chemicals manufacturing industries
CEN/SS S26 - Environmental management, especially those standards related to Life Cycle Assessment and the ISO 14040:2006 EN ISO 14040:2006 , EN ISO 14040:2006/A1:2020 , EN ISO 14044:2006 , EN ISO 14044:2006/A1:2018 , EN ISO 14044:2006/A2:2020	Relevant for LCA calculations
CEN/SS F20 – Quality assurance. From this committee, the relevant standards are EN ISO 9000:2015 Quality management systems - Fundamentals and vocabulary (ISO 9000:2015), EN ISO 9001:2015 Quality management systems - Requirements (ISO 9001:2015), EN ISO 9004:2018 Quality management - Quality of an organization - Guidance to achieve sustained success (ISO 9004:2018)	Relevant for smooth bio-based transition implementation



<p>CEN/TC 389 - Innovation Management, with the following standards: CEN ISO/TR 56004:2020 Innovation Management Assessment - Guidance (ISO/TR 56004:2019), CEN/TS 16555-2:2014 Innovation management - Part 2: Strategic intelligence management, CEN/TS 16555-3:2014 Innovation management - Part 3: Innovation thinking, CEN/TS 16555-4:2014 Innovation management - Part 4: Intellectual property management, CEN/TS 16555-6:2014 Innovation management - Part 6: Creativity management, EN ISO 56000:2021 Innovation management - Fundamentals and vocabulary (ISO 56000:2020), EN ISO 56002:2021 Innovation management - Innovation management system - Guidance (ISO 56002:2019), EN ISO 56003:2021 Innovation management - Tools and methods for innovation partnership - Guidance (ISO 56003:2019)</p>	<p>Standardization of tools that allow companies and organizations to improve their innovation management, including all kinds of innovation and all the related aspects, as well as the relations with R&D activities</p>
<p>CEN/TC 383 - Sustainably produced biomass for energy applications. Specifically, EN 16214-1:2012+A1:2019 Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 1: Terminology, CEN/TS 16214-2:2020 Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 2: Conformity assessment including chain of custody and mass balance, EN 16214-3:2012+A1:2017 Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 3: Biodiversity and environmental aspects related to nature protection purposes, EN 16214-4:2013+A1:2019 Sustainability criteria for the production of biofuels and bioliquids for energy applications - Principles, criteria, indicators and verifiers - Part 4: Calculation methods of the greenhouse gas emission balance using a life cycle analysis approach</p>	<p>Relevant for bioenergy sector</p>

Table 3 Other standards that can be relevant during the bio-based transition

It's worth mentioning some information sources that cover both the information presented in section 6.1 for certifications and labelling and also in 6.2 concerning standards. The projects [Star4BBI](#) and [STAR-ProBio](#) have produced relevant information (reviews, analysis, policy suggestions) that could be useful in case the cluster managers, innovation agents, etc. want to delve into these topics. Among all the results produced, the following deliverables are the most relevant ones:

- STAR-ProBio D8.1 Recommendations concerning current sustainability standards associated with BBPs and amendments to current standards of BBPs, [here](#)
- STAR-ProBio D9.2 Recommendations for Standards and criteria for eco-labels for BBPs, [here](#)

6.3 Design and implement effective instruments for stakeholder and public participation

Motivations and objectives for switching to BBPs vary as previously depicted. Engagement with civil society can aim to increase people's awareness of BBPs, gain public acceptance for a transition to a



bio-based economy, or gather the views and concerns of different groups to inform the decision-making of brand owners.

Since sometimes engaging with stakeholders (consumers, policy makers, academia, etc.) can be time-consuming and/or fall out of their daily agenda of brand owners, cluster managers and innovation agents can support them by acting as liaison with the rest of the stakeholders and promoting the bio-based transition and products in their region by cooperating with policy makers.

It could be interesting for cluster managers and innovation agents to try to connect with the rest of the quadruple helix stakeholders. The figure of 'living labs' can become very interesting since this could be very relevant for brand owners to support open innovation actions that could facilitate the efficient time and resource development of new bio-based approaches. These 'living labs' provide an opportunity for interactive communication between entrepreneurs, scientists, policy makers, and citizens to find concerted solutions to common needs in terms of the development of BBPs. In the same way, a 'design thinking' approach could serve as a tool for the direct participation of relevant actors, including citizens, in the process of the development of BBPs.

6.4 Increase public awareness of and participation with bio-based products

An important obstacle in the development of new economic processes and networks is that there are sometimes very different assumptions and perceptions about the risk and benefits of the new processes.

Increasing consumer awareness of bio-based industrial products could lead to widespread acceptance of BBPs. In addition, trustworthiness is an important precondition for acceptance of the bio-based product. In order to address this issue, brand owners can provide information about their new bio-based product through their own communication channels, targeting consumers and showing the benefits of the new products. Cluster managers and innovation agents can support brand owners in this task by providing information, materials, and sharing strategies such as those produced in the frame of several BBI JU funded projects such as the BIOWAYS project, <https://www.bioways.eu/>. Additionally, cluster managers and innovation agents can connect brand owners with regional consumer associations in order to develop a common understanding of benefits (and how to share them) and risks (and how to mitigate them) of BBPs.

Another action that could be carried out by regional innovation agents and/or cluster managers is to organise bio-based transition achievement awards to brand owners that contribute to the development of technological innovations related to the bio-based transition or that manage to successfully complete a bio-based transition process. This could promote new products and enhance the public image of brand owners that commit to bio-based approaches.



7 LESSONS LEARNED

During the whole process of motivating and supporting brand owners in their transition to bio-based approaches several lessons have been learned.

It is very important to customize stakeholder messages in order to properly catch their attention. Since nowadays there are a lot of initiatives, events, workshops, associations, etc. it is a key aspect to highlight the added value of switching to bio-based approaches. Relevant insights about brand owners' drivers, motivations, perceived risks, and expectations have been gathered and are presented in section 2. The tools "Why switching to bio-based?" and "understanding the main barriers", the latter devoted to busting myths could be useful here.

Moreover, thanks to the Bio-based readiness level assessment test provided in the frame of the project, brand owner profile categorization will ease the tailoring and further communication actions. Thanks to this cluster managers and innovation agents could become aware of the starting point of the brand owner, enabling to better customise the actions, messages, and tools to be provided.

Another key aspect that triggers reaction from the private companies is to learn from other private companies. In this case, the "Switching to bio-based hall of fame" could be interesting as it presents success cases from several brand owners, presenting how their bio-based transition journey has been.

Once brand owners are aware of why transitioning to bio-based could be relevant for them, sometimes they could feel a little bit lost when it comes to who could support them and how to find new partners for RDI developments and also value chains shaping. In this case, the tools "How do I switch to bio-based?", "Who can help me?", the "Build me the value chain" service and the "Open Innovation enabler" can be useful.

For those brand owners that have carried out their first steps, it could be interesting to measure, assess and compare the different scenarios (fossil-based vs. bio-based). In this case, the Sustainability assessment tool can be of help. In addition, brand owners might need to get their own staff committed and on-board so they can face all the internal changes that switching to bio-based requires. In this case, the tool "we are all bio-based" could be used in order to create awareness among brand owners' staff.

Finally, a key aspect in brand owners' business strategies is the way they interact and reach consumers. Switching to bio-based does not only have an impact in environmental and sustainability terms for the society, but it also has an impact in the way that the consumers perceive the new products. Therefore, brand owners could use the tools "Consumers and bio-based products, a love story" to know better about the consumers' point of view. Also, in order to better communicate about the new bio-based approach adopted by the brand owner, the tool "#I am bio-based" can be used as some hints on how to best communicate this novelty to society are provided.



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ANNEX I - INFOGRAPHIC ABOUT BIO-BASED PRODUCTS STANDARDS



Standards for Biobased Products

Raw materials for biomass

Why standards for biobased products?
 Bio-based products are products that are partly or wholly made of biobased components. Compared to fossil based products (having ingredients such as oil), innovative bio-based products are still a 'niche' sector. They make up a relatively small share of the market, while their potential contribution to solving climate problems (e.g. reduce carbon emissions, renewable sources) is substantial. Therefore, bio-based products need to be given greater visibility and have their potential benefits explained. All of this, in a uniform way (e.g. labeling, certification, standards).



The European Commission focuses on bio-based products, describing methods for biobased content determination, requirements for sustainability assessment and how to communicate about them in the value chain. By using these standards, producers can present and promote their biobased products in the same understandable way.

Biobased end products



Biobased intermediates



These biobased standards were developed at the request of the European Commission.



Bio-based content determination

- EN 16785-1: Bio-based products - Bio-based content - Part 1: Determination of the bio-based content using the radiocarbon analysis and elemental analysis
- EN 16785-2: Bio-based product - Bio-based content - Part 2: Determination of the bio-based content using the material balance method
- EN 16640: Bio-based products - Determination of the bio-based carbon content of products using the radiocarbon method
- CEN/TR 16721: Bio-based products - Overview of methods to determine the bio-based content
- EN 17351:2020: Bio-based products - Determination of the oxygen content using an elemental analyser



Sustainability

- EN 16760: Bio-based products Life Cycle Assessment
- EN 16751: Bio-based products Sustainability criteria
- CEN/TR 16957: Bio-based products Guidelines for Life Cycle Inventory (LCI) for the End-of-life phase
- CEN/TR 17341: Bio-based products Examples of reporting on sustainability criteria



Terminology

- EN 16575: 'Bio-based products - Vocabulary'

Communication

- EN 16948: 'Bio-based products - Template for B2B reporting and communication of characteristics - Data sheet'
- EN 16935: 'Bio-based products - Business-to-Consumer communication and claims'

Bio-based solvents

- EN 16766: 'Bio-based products - Bio-based solvents - Requirements test methods'



Measure the same way, communicate the same way