

Annual Work Programme and Budget 2023



**Circular
Bio-based
Europe**
Joint Undertaking

ANNEX to GB decision no 16 /2022

In accordance with the Council Regulation (EU) 2021/2085 and with Article 33 of the Financial Rules of the CBE JU.

The work programme is made publicly available after its adoption by the Governing Board.

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LIST OF ACRONYMS, DEFINITIONS AND ABBREVIATIONS

AAR	Annual Activity Report
AWP	Annual Work Programme
B2B	Business-to-Business
B2C	Business-to-Consumer
BBI JU	Bio-based Industries Joint Undertaking
BIC	Bio-based Industries Consortium
CA	Commitment Appropriations
CAPEX	Capital Expenditure
CAS	Common Audit Service
CBE JU	Circular Bio-based Europe Joint Undertaking
CCS	Carbon capture and storage
CCU	Carbon capture and use
CEN	European Committee for Standardization
CSA	Coordination and Support Action
CIC	Common Implementation Centre
EC	European Commission
ECA	European Court of Auditors
EFTA	European Free Trade Association (Iceland, Liechtenstein, Norway, and Switzerland)
FLAG	Flagship Action
FWC	Framework Contract
GB	Governing Board
HR	Human Resources
IA	Innovation Action
IAS	Internal Audit Service
ICF	Internal Control Framework
ICS	Internal Control Standards
IKAA	In Kind contribution to Additional Activities
IKOP	In Kind Contribution to Operational Activities
OPEX	Operational Expenditure
SRIA	Strategic Research and Innovation Agenda

FOREWORD

Dear Reader,

It is an honour for me to present to you the second Annual Work Programme for the Circular Bio-based Europe Joint Undertaking (CBE JU). In 2023, the Joint Undertaking will enter into regular annual cycles of programme implementation after kicking off the activities of the new partnership under the Horizon Europe research programme. The Annual Work Programme is the result of strong collaboration and a joint effort from the side of the European Commission, the Bio-based Industries Consortium (BIC) and the CBE JU Programme Office in drafting the new call and driving the initiative into the core of its implementation.

CBE JU will continue to support the scaling up of technologies leading to industrial deployment, thus boosting investment and jobs' creation, while aiming at achieving the goals outlined in the Strategic Research and Innovation Agenda (SRIA) 2030. In addition, the partnership will involve a wider range of stakeholders including the primary sector, regional authorities, and investors to support the deployment of bio-based solutions. To deliver on its objectives, the partnership will fund projects that respect the principles of circularity, sustainability, and planetary boundaries. Consequently, CBE JU will significantly contribute to the EU's climate targets for 2030, paving the way for climate neutrality by 2050, and advancing circular and sustainable production in line with the European Green Deal while increasing Europe's strategic autonomy.

The Annual Work Programme includes the 2023 call for proposals with an anticipated overall indicative budget of EUR 215,5 million, which will support the strategic orientations defined in the SRIA. The call will fund three types of actions, that of, Research and Innovation Actions (RIAs), Innovation Actions (IAs) which includes Flagships, as well as Coordination and Support Actions (CSAs). CBE JU calls are fully open and welcome project proposals from researchers, industries and innovators from Europe, as well as from international partners and Associated countries.

CBE JU will continue to build on the achievements of its predecessor, the Bio-based Industries Joint Undertaking (BBI JU), by ensuring the continuation of running projects. The successful conclusion of the BBI JU legacy projects is also providing for excellent examples of deployment of bio-based and circular solutions in Europe. CBE JU will reinforce its communication, involving all stakeholders, to further promote the potential of the bio-based industry to green the EU's industrial production and contribute to the recovery of the economy in a sustainable and inclusive way.

In 2023, a new Executive Director will be appointed, until then myself and the Programme Office team will ensure a smooth running of CBE JU activities along the lines of our high professional standards. '*Building a greener, safer and better Europe*': CBE JU's team of professionals share the organisation's mission and is highly committed to deliver, in close collaboration with the European Commission, the Bio-based Industries consortium (BIC) and all stakeholders, on the ambitious objectives of the Joint Undertaking.

Nicolo Giacomuzzi-Moore

CBE JU Executive Director ad interim

1. INTRODUCTION

1.1. MISSION STATEMENT OF THE CBE JU

Advancing a *competitive bioeconomy for a sustainable future* is the primary mission of the Circular Bio-based Europe Joint Undertaking (CBE JU).

In the context of the European Green Deal¹ supported by the revised EU Bioeconomy Strategy², EU Biodiversity Strategy³, A Clean Planet for All Communication, the Circular Economy Action Plan⁴ and the Farm to Fork Strategy⁵, the European bio-based sector, including SMEs, regions and primary producers, should become climate neutral, more circular and more sustainable while remaining competitive on the global market. A strong, resource efficient and competitive bio-based innovation ecosystem can decrease Europe's dependency on and accelerate the substitution of non-renewable fossil raw materials and mineral resources.

CBE JU is thereby supporting research and innovation activities in the field of sustainable bio-based solutions under the umbrella of Horizon Europe, the EU's research and innovation programme for the 2021-2027 period. By replacing non-renewable fossil resources with waste and sustainably sourced biomass to produce industrial and consumer goods, the bio-based industries will help Europe become the world's first climate-neutral continent while increasing the sustainability and circularity of production and consumption systems.

Those activities will be carried out in close collaboration between stakeholders along the entire bio-based value chain, including primary producers and processing industries, consumer brands, SMEs, research and technology centres and universities. CBE JU also aims to support the deployment of bio-based innovation at regional level with the active involvement of local actors and with a view to reviving rural, coastal and peripheral regions.

Its public-private funding scheme will boost innovation and market deployment and pave the way for future investments. To this end, the CBE JU will organise calls for proposals aimed at supporting research, demonstration and deployment activities. To deliver on its objectives, CBE JU should only fund projects that respect the principles of circularity, sustainability and planetary boundaries.

CBE JU will build on the success and achievements of its predecessor, the Bio-based Industries Joint Undertaking (BBI JU) while enlarging its scope and addressing the remaining challenges of Europe's bio-based industries.

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019DC0640&from=EN>

² <https://op.europa.eu/en/publication-detail/-/publication/edace3e3-e189-11e8-b690-01aa75ed71a1/language-en/format-PDF/source-149755478>

³ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0380&from=EN>

⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0098&from=EN>

⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0381&from=EN>

The general and specific objectives of CBE JU, as per Council Regulation (EU) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe⁶ are reported below in Figure 1.

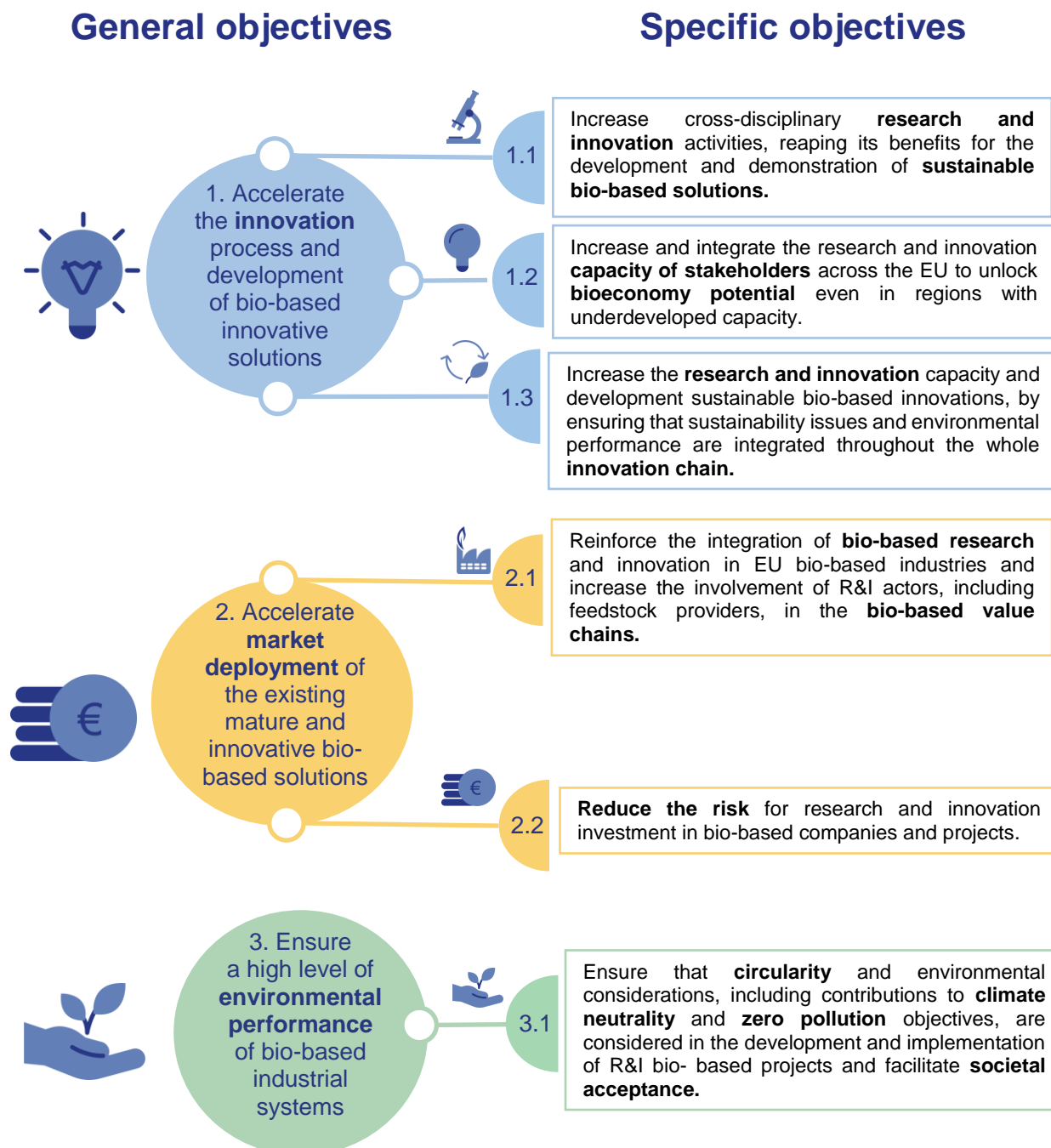


Figure 1 CBE JU general and specific objectives.

⁶ Council Regulation (EU) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe and repealing Regulations (EC) No 219/2007, (EU) No 557/2014, (EU) No 558/2014, (EU) No 559/2014, (EU) No 560/2014, (EU) No 561/2014 and (EU) No 642/2014

1.2. BACKGROUND AND LINK WITH THE SRIA

To achieve the objectives set out in the Council Regulation, the CBE Programme Office will implement Annual Work Programmes that will support:

- the acceleration of the innovation process and development of bio-based innovative solutions by funding actions (ranging from CSAs to RIAs and IAs ending TRL 6) focusing on testing and upscaling the use of novel technologies for converting bio-based feedstock into useful, innovative, environmentally sustainable and circular solutions;
- the acceleration of market deployment of existing mature and innovative bio-based solutions by promoting and supporting actions to scale up innovative bio-based processes, products, and applications starting from at least TRL 5 and ending at TRL 7-8, including Flagships, across Europe;
- the development of a high level of environmental performance of bio-based industrial systems through different types of actions, ranging from CSAs to RIAs up to targeted IAs.

The strategic priorities identified in the SRIA for each CBE general and specific objectives will be used as baseline in each topic. They are here reported in Figure 2.

FEEDSTOCK		Strategic priority 1.1.1 - Ensure the availability and quality of sustainable bio-based feedstock
		Strategic priority 1.3.1 - Protect and enhance biodiversity and ecosystem services in bio-based feedstock supply systems
		Strategic priority 2.1.1 - Demonstrate the sustainable supply of bio-based feedstock
PROCESSING		Strategic priority 1.1.2 - Develop innovative production systems in the bio-based industry
		Strategic priority 1.3.2 - Improve environmental performances of bio-based processes
		Strategic priority 2.1.2 - Deploy innovative production technologies
PRODUCTS		Strategic priority 1.1.3 - Develop innovative bio-based products
		Strategic priority 2.1.3 – Scale-up production and market uptake of innovative bio-based products
CROSS-CUTTING	Communication	Strategic priority 1.2.1 - Stimulate research activities in countries and regions with underdeveloped R&I capacity for bio-based systems
		Strategic priority 1.2.2 – Increase the awareness and capacity of national and regional research support agencies for industrial bio-based systems
		Strategic priority 1.2.3 - Facilitate the development of expertise in bio-based fields by improving higher education and skills development
		Strategic priority 2.1.4 - Build policy makers' awareness and acceptance of bio-based solutions
		Strategic priority 3.1.3 – Facilitate social acceptance of bio-based applications
	Finance	Strategic priority 2.2.1 – Improve the risk profile of bio-based projects
		Strategic priority 2.2.2 - Develop investment tools and approaches that mitigate the investment risk in bio-based systems
	Environmental sustainability framework	Strategic priority 3.1.1 - Set effective and robust environmental sustainability and circularity criteria for bio-based systems
		Strategic priority 3.1.2 - Incorporate the environmental sustainability and circularity criteria in bio-based systems

Figure 2 CBE JU SRIA Strategic priorities mapped along the value chain (Feedstock – Processing – Products) and the identified cross cutting issues.

1.3. STRATEGY FOR THE IMPLEMENTATION OF THE PROGRAMME

CBE JU programming

The CBE JU strategic and programming documents are developed jointly by both partners (EC and BIC) with the support of the Programme Office.

A structured co-creation process is foreseen for the formulation of calls included in the Annual Work Programmes, based on the SRIA and the lessons learned from previous calls, as monitored and reported by the CBE JU Programme Offices. The CBE JU Scientific Committee and States Representatives Groups will be also consulted on the draft Annual Work Programmes.

Types of actions

The CBE JU calls fund three types of actions:

- **Research and Innovation Actions (RIAs)** include activities of 'testing', 'demonstrating' and 'piloting'. These activities aim to establish new knowledge or to explore the feasibility of a new or improved technology, product, process, service, or solution. These may include basic and applied research, technology development and integration, testing, demonstration, and validation on a small-scale prototype, in a laboratory or simulated environment.
- **Innovation Actions (IAs)** include activities of 'testing', 'demonstrating' and 'piloting' and also aim at scaling up activities from prototype, in a (near to) operational environment, industrial or otherwise, to large-scale product validation and market replication.

Flagships⁷ are an important and specific type of Innovation Action which aim to support the first application/deployment in the EU market of an innovation that has already been demonstrated but not yet applied/deployed in the EU market (first-of-its-kind innovation).

- **Coordination and Support Actions (CSAs)** will address needs to i) structure stakeholder communities; ii) support dissemination and exploitation of research or innovation projects; iii) exploit synergies of scale among projects; iv) raise awareness in specific areas; v) support technological visions (e.g. road-mapping, user cases, etc.) and outreach (e.g. events, publications, etc.); vi) promote international cooperation with specific regions and/or technological areas for any of the above-mentioned activities; vii) undertake other activities similar in nature to those above (i.e., this is not an exhaustive list).

Other possible types of actions, like Pre-commercial Procurement Action (PCPs), may also be considered if relevant to attain the objectives of the CBE JU in future CBE JU AWP. In addition, financial support to third parties may be included in specific call topics and funded as part of the received grants from CBE JU via financial support to third parties. This could be the case for training and mobility of researchers, or prizes.

⁷ Flagship projects are strategically relevant, with very ambitious objectives and large-scale impacts expected, and of potential substantial size with regard to the financial volume, the number of project partners and the running time

Technological Readiness Level (TRL)

The technological readiness level scale, defined in the Horizon Europe General Annexes⁸, will be used as reference in the CBE JU call to indicate the appropriate technological context as following:

- RIAs projects are expected to be at the level of laboratory or simulated environments and expected to deliver TRL 3-5 at the end of the projects.
- IAs projects are demonstration activities in relevant and operational environments and expected to deliver TRL 6-8 at the end of the projects. In particular, Flagship projects will need to deliver TRL 8 at the end of the projects.

The end TRL will be specified in each RIAs and IAs topic.

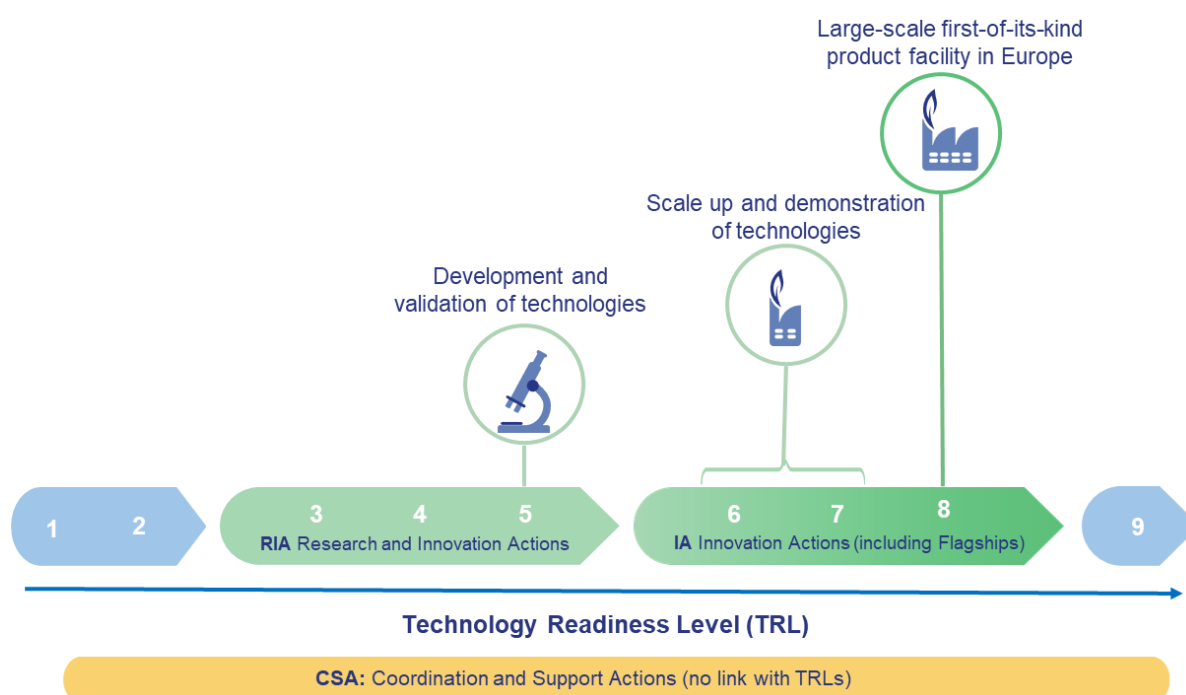


Figure 3 - CBE JU Types of Actions along the TRLs scale.

⁸ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-13-general-annexes_horizon-2021-2022_en.pdf

2. WORK PROGRAMME 2023

2.1. EXECUTIVE SUMMARY 2023

The CBE JU is a EUR 2 billion public-private partnership between the European Union, represented by the European Commission (EC), and the Bio-based Industries Consortium (BIC). It is established under Horizon Europe, the EU's research and innovation programme, for the period 2021-2031. The CBE JU is not a direct continuation of the Bio-Based Industries Joint Undertaking, but rather a programme that builds on its achievements and aims at addressing its shortcomings.

The Strategic Research and Innovation Agenda (SRIA), adopted by the CBE Governing Board (GB), identifies the strategic priorities and the essential research and innovation actions required to achieve the objectives of the Circular Bio-based Europe Joint Undertaking (CBE JU), as defined in the Council Regulation (EU) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe.

The scope of CBE JU is underpinned by the updated EU Bioeconomy Strategy (2018) and is in line with the European Green Deal objectives – to produce major contributions to the EU climate targets by delivering innovative bio-based solutions and paving the way for Europe to become the first climate neutral continent by 2050; protecting and enhancing biodiversity; combating pollution; reducing fossil resource dependence; and deploying a just transition.

CBE JU will, in particular, aim at strengthening the European bioeconomy primary sectors of the land and sea and its industries by combining the 'public' interests, pursued by the EC, and the 'private' interests of bio-based industries, such as: increasing the competitiveness of the EU economy, job creation, balanced regional development and economic cohesion, climate and environmental performance, creating better market conditions, removal of barriers, de-risking investment, increasing resource efficiency, improving circular technologies and operations while engaging all actors in the bio-based systems.

The SRIA will be the basis for the CBE JU Annual Work Programmes that will contain the call for proposals, developed jointly by both partners under the coordination of the Programme Office, and taking into account the recommendations of the advisory bodies. Six calls for proposals are foreseen during the lifetime of the partnership for a total indicative operational budget of EUR 976.5 million.

Progress towards the achievement of the CBE JU objectives will be monitored through a set of Key Performance Indicators (KPIs). The monitoring and reporting of CBE activities, including KPIs, will be undertaken on an annual basis and reflected in the Annual Activity Report (AAR).

2.2. OPERATIONAL ACTIVITIES 2022

2.2.1.1. Objectives, indicators and risks

Scope of the activities

As presented in the SRIA 2030, the CBE JU partnership will fund projects focused on ‘the production of bio-based chemicals, materials, food and feed ingredients and soil nutrients. Biofuels, bioenergy, food and feed, pharmaceuticals and medical devices are not within the remit of the partnership’⁹.

The boundary between the industrial activities that are in or out of this scope is difficult to define in a precise way because of multiple outputs from bio-based operations or multiple use of the same bio-based material or product. For example, the production of food is excluded from the scope but processes producing food may have co-products that are within the scope and side streams that can be used as feedstock for producing bio-based products within the CBE JU scope. Another example is bioethanol, that can be used as biofuel, which is then excluded from the scope, but when used as an input to other chemicals’ production it is included within the scope. There are many other such examples.

The guiding principles for evaluating if an industrial activity falls within the scope of the partnership will be based on:

- a) assessment of what is the dominant application of the bio-based material produced and if this dominant use falls into the scope;
- b) the principle of cascading use of biological resources aiming to best valorise the sustainable use of feedstock¹⁰.

In line with above, biorefineries for sustainable processing of biomass into an array of added-value products (e.g. bioactive substances, chemicals and materials) will fall under the scope if the focus of the project is on materials; while energy production is a complementary activity that improves the overall resource efficiency of the production process and it takes place in accordance with the cascading principle.

The feedstock for bio-based operations should respect local ecological limits and protect and enhance biodiversity and ecosystems services and should come from short supply chains as much as possible. Additional requirements are included in the dedicated section.

All supported activities must also demonstrate the potential of bio-based solutions in terms of climate and environmental performance, and circularity. Activities that do not meet the agreed requirements of climate and environmental performance will not be supported. In line with the circularity objective, attention will be given to activities that enable the conversion of bio-waste, residues and side-streams into added-value circular bio-based solutions.

⁹ CBE JU SRIA <https://www.cbe.europa.eu/media/92/download?attachment>

¹⁰ A non-exhaustive list of bio-based feedstock in the scope of CBE is included in Annex V of SRIA.

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Supported industrial activities should contribute to local and regional economies, while reducing the dependency on imports of natural resources.

CBE JU objectives and Key Performance Indicators¹¹

CBE JU will contribute to the general and specific objectives set in the Council Regulation establishing the Joint Undertakings (Figure 1) and the main challenges described in the SRIA (Figure 2), via its portfolio of funded projects. To this end, the programme will be monitored against the targets set at

- Horizon Europe programme level¹²,
- Horizon Europe partnerships level¹³,
- specific CBE JU level with the KPIs defined in the SRIA.

The operational monitoring is based on indicators which are common to all Horizon Europe programme and include for example the following: 1) time to inform (TTI) all applicants of the outcome of the evaluation of their application from the final date for submission of proposals (target TTI max: 153 calendar days); 2) time to grant (TTG) measured from the call deadline to the grant signature (target TTG < 245 days). CBE JU will ensure the efficiency of all operations and the results of its operational monitoring will be included in the AAR.

The monitoring of the specific CBE JU KPIs will be based on data collected from the yearly project reporting and the progress against KPIs will be reported in the CBE JU AAR. In addition, the CBE Programme Office has the legal obligation to monitor, continually and systematically, the implementation of its programme, as well as to report and to disseminate the results of this monitoring on an annual basis.

¹¹ <https://www.cbe.europa.eu/media/122/download?attachment>

¹² [Horizon Europe programme analysis \(europa.eu\)](https://www.europa.eu)

¹³ <https://op.europa.eu/en/publication-detail/-/publication/6b63295f-d305-11eb-ac72-01aa75ed71a1/language-en/format-PDF/source-215872593>

Risk management

The CBE JU conducted a risk assessment exercise over the achievement of objectives described in this work programme for the year 2023. The assessment evaluated the root causes of each identified risk and their potential consequences, taking into account the existing controls as well as the convergences and inter-dependencies between risks. This process is documented in the internal risk register of the organisation, which incorporates a description of the responsive action plans, detailing the action owners and individual deadlines.

As a result, a total of seven risks have been identified and described in the risk register with varying degrees of importance, convergence and inter-dependency. For three additional threats, the conditions and data for assessment were not mature enough to conclude on both likelihood and impact of their potential realisation: the risk register remains an internal living document and the management of identified risks will be ensured through appropriate mitigating actions, wherever possible, and continuously monitored by CBE JU throughout the year.

The CBE JU did not identify for 2023 any critical risk that needs to be publicly disclosed with reservation by the management towards the achievement of the objectives of the year. The most significant matter of concern are the lasting impacts of COVID-19 pandemic and the emerging challenges posed by the current geopolitical and economic scenarios in Europe: the CBE JU project portfolio already experiences implementation delays due, for example, to unavailability of raw material (especially construction material) and delays in their delivery. In addition, the running costs of projects are rising also due to the significant inflation increase. CBE JU projects are highly exposed to these events being industry driven (out of 1.5k participations in CBE JU projects, 60% are private for-profit companies and notably ~40% are SMEs): private investment decisions and commitments into ongoing and future projects might suddenly be re-prioritised and the JU governance and management are fully committed to monitoring these risks and to refreshing communication and support actions towards projects' consortia.

At a lower level of magnitude, the same scenarios mentioned above pose new threats to the operational management of the organisation and additional control measures are in place and planned, notably for activities related to cybersecurity, budget planning and execution.

Overall, the risk assessment exercise confirmed the trend of previous years and some additional risks have been absorbed or reduced by an increased effectiveness of internal controls as well as experience gained in the core activities. This is notably the case for threats to the effective deployment of human resources and to the working conditions of the organisation. In these areas, the CBE Programme Office demonstrates that it is operating to high quality operational standards and efficiency ratios of operations are continuously being tested while workload patterns and the stability of services acquired outside the organisation are closely monitored.

2.2.2. Scientific priorities, challenges and expected impacts

The topics of this AWP are highly relevant to meet the commitments set out in the European Green Deal and the ‘Fit for 55’ Package’ and to achieve the ambitious EU targets of reducing net greenhouse gas emissions by at least 55% by 2030 (compared to 1990) and becoming the first climate neutral continent by 2050. They will contribute to the transition from a fossil to a sustainable bio-based economy, in line with the objectives set out in the updated EU Bioeconomy Strategy and its Action Plan¹⁴ and will support the commitments set under the UN Sustainable Development Goals¹⁵ (SDGs) and the COP 21 Paris Climate Agreement¹⁶.

The scientific priorities of this AWP are aligned with the CBE JU specific objectives and the strategic priorities, as identified in the SRIA. As shown in Table 1, the topics of this AWP will cover all priorities identified along the three main blocks (feedstock, processing and products) and focus on cross-cutting actions notably the one dedicated to the environmental sustainability framework.

		CBE JU TOPICS AWP2023																			
		2023,IA-R01	2023,IA-R02	2023,IA-R03	2023,IA-R04	2023,IA-01	2023,IA-02	2023,IA-03	2023,IA-04	2023,IA-05	2023,IA-06	2023,IA-07	2023,R01	2023,R02	2023,R03	2023,R04	2023,R05	2023,S-01	2023,S-02		
FEEDSTOCK	Strategic priority 1.1.1 - Ensure the availability and quality of sustainable bio-based feedstock					X								X	X					X	
	Strategic priority 1.3.1 - Protect and enhance biodiversity and ecosystem services in bio-based feedstock supply systems													X	X					X	
	Strategic priority 2.1.1 - Demonstrate the sustainable supply of bio-based feedstock				X	X	X		X	X	X		X								
PROCESSING	Strategic priority 1.1.2 - Develop innovative production systems in the bio-based industry					X										X	X				
	Strategic priority 1.3.2 - Improve environmental performances of bio-based processes														X						
	Strategic priority 2.1.2 - Deploy innovative production technologies	X	X	X	X	X	X	X	X	X	X	X									
PRODUCTS	Strategic priority 1.1.3 - Develop innovative bio-based products																X	X			
	Strategic priority 2.1.3 - Scale-up production and market uptake of innovative bio-based products	X	X	X	X		X			X	X	X							X		
CROSS-CUTTING	Communication	Strategic priority 1.2.1 - Stimulate research activities in countries and regions with underdeveloped R&I capacity for bio-based systems																	X	X	
		Strategic priority 1.2.2 - Increase the awareness and capacity of national and regional research support agencies for industrial bio-based systems																			X
		Strategic priority 1.2.3 - Facilitate the development of expertise in bio-based fields by improving higher education and skills development in the private sector																			
	Finance	Strategic priority 2.1.4 - Build policy makers' awareness and acceptance of bio-based solutions																			
		Strategic priority 3.1.3 - Facilitate social acceptance of bio-based applications	X	X	X	X													X		
		Strategic priority 2.2.1 - Improve the risk profile of bio-based projects																			
		Strategic priority 2.2.2 - Develop investment tools and approaches that mitigate the investment risk in bio-based systems																			X
Environmental sustainability framework	Strategic priority 3.1.1 - Set effective and robust environmental sustainability and circularity criteria for bio-based systems																				
	Strategic priority 3.1.2 - Incorporate the environmental sustainability and circularity criteria in bio-based systems	X	X	X	X					X	X	X	X	X						X	

Table 1 AWP2022 topics link to the SRIA strategic priorities

¹⁴ <https://op.europa.eu/en/publication-detail/-/publication/775a2dc7-2a8b-11e9-8d04-01aa75ed71a1>

¹⁵ <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

¹⁶ https://ec.europa.eu/clima/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_en

2.2.3. Calls for proposals

In this chapter, the topics identified for the CBE JU call 2023 are presented with their expected outcomes, their scope and their specific requirements. In addition, the ‘Specific CBE JU requirements’ are included at the beginning of this chapter together with the cross-cutting elements that must be incorporated in the proposals. Please carefully read these requirements together with the call conditions specified in section 2.2.3.1. Please also note that a Glossary, which contains the description of important terms which are marked with an * in the topics text, is included in Annex 4.2.

2.2.3.1 Specific Requirements for the CBE JU Call 2023

In addition to the requirements set at topic level, the proposals must address the CBE JU specific requirements set for the respective action(s). Rather than repeating these specific requirements in each topic, they are presented in this section per type of action and summarised in the following table highlighting the part of the proposal where they should be addressed.

Specific requirement of the CBE JU Call 2023	Type of action	Where to include it in Part B
Feedstock sourcing	RIA and IA, incl. FLAGS	Part B – Structured question (Y/N) in the introduction
Feedstock sustainability requirements (a,b,c,d)	RIA and IA, incl. FLAGS	Part B – Structured question (Y/N) in the introduction
Description of feedstock	RIA and IA, incl. FLAGS	Part B – 1.2 Methodology
Environmental performance - Ex-ante assessment <ul style="list-style-type: none"> • identification of environmental issues • estimation of environmental sustainability performance, • estimation of carbon removal 	RIA and IA, incl. FLAGS	Part B – 1.2 Methodology
Ex-post assessment of environmental sustainability and circularity <ul style="list-style-type: none"> • Dedicated task • Dedicated task or WP (LCA) • Dedicated WP (LCSA) 	RIAs IAs FLAGS	Part B – 1.2 Methodology and 3.1 Workplan and resources
Economic viability Business case Business plan	RIA IAs, incl. FLAGS FLAGS	Part B – 2.1 Project’s pathways towards impact Annex (Business plan)
Recommendations to stakeholders	IA, incl. FLAGS	Part B – 3.1 Workplan and resources
Multi-actor approach	IAs, incl. FLAGS. RIAs and CSAs, when specified	Part B – 1.2 Methodology

Table 2 CBE JU Specific Requirements for Call 2023

Feedstock sourcing (Eligibility condition)

All RIAs and IAs, including Flagships

Proposals shall confirm in Part B that:

- if the bio-based feedstock is processed in EU/EEA/EFTA countries, the bio-based feedstock comes from such countries¹⁷;
- if the feedstock is processed in an Associated Country, the bio-based feedstock comes from the same country or from neighbouring EU/EEA/EFTA countries.

Feedstock sustainability requirements

All RIAs and IAs, including Flagships

Proposals should **describe the feedstock** to be used under Part B section 1.2. Methodology, and ensure that it:

- is under the scope of the feedstocks foreseen in CBE JU SRIA (including Annex V);
- under the condition of respecting the “food first” and “cascading use” principles, surplus streams from agricultural biomass processing such as carbohydrates, or oils, can be used as feedstock for CBE JU projects.

Proposals should also demonstrate that the feedstock is produced respecting local ecological limits, and ensuring protection, enhancement and restoration of biodiversity and ecosystems services. As much as possible, the feedstock should come from short supply chains.

In addition, to ensure the environmental sustainability of feedstock, the proposal should confirm in the Part B that, if funded, it will comply with the following:

- a) Climate change mitigation:
 - i. will not impact ‘Land with high carbon stock’¹⁸
 - ii. will have low/zero ILUC risk and promote carbon sequestration, when applicable¹⁹
 - iii. will aim at reducing GHG emissions from the extraction and/or cultivation²⁰
- b) Biodiversity protection:
 - i. will implement Integrated Pest Management (IPM) for a reduced use of plant protection products and not apply those identified as “candidate for substitution”²¹

¹⁷ Bio-based feedstock may include bio-waste from imported products. A non-exhaustive list of bio-based feedstock in the scope of CBE is included in Annex V of SRIA

¹⁸ https://knowledge4policy.ec.europa.eu/glossary-item/land-high-carbon-stock_en

¹⁹ Voluntary schemes certifying low-ILUC risk biofuels, bioliquids are ruled in the “Commission Implementing Regulation 2022/996 on rules to verify sustainability and greenhouse gas emissions saving criteria and low indirect land use change-risk criteria” <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022R0996>. Although it focusses on biofuels, bioliquids, the principles of ‘additional biomass’ eligible for low-ILUC risk certification (Articles 24, 25 and 26) may apply to the biomass used within the scope of CBE. See also the ‘Annex VIII Minimum requirements on the process and method for certifying low indirect land-use change (ILUC) risk biomass’, which includes a ‘Non-exhaustive list of yield increase additionality measures’ (Table 1). Some ‘Examples of essential soil management practices to promote soil carbon sequestration (given the absence of residues) and promote soil quality’ are reported in Annex VI Table 1, as well.

²⁰ In the above-mentioned 2022/996/EU, the ‘Methodology for determining the emissions from the extraction or cultivation of raw materials’ are described in ANNEX VII.

²¹ Commission Directive (EU) 2019/782 on products containing active substances of Group 3

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- ii. will contribute to biodiversity-friendly sustainable forest management practices²², when applicable
 - iii. will not have an impact on protected species and habitats²³
 - iv. will not introduce invasive species²⁴ and/or risky plants²⁵
 - v. will not impact protected areas (terrestrial or marine) with high biodiversity value²², including highly biodiverse grasslands²⁶
- c) Zero pollution ambition (air/water/soil):
- i. will avoid open air burning of stubble/crop residues
 - ii. will contribute to the reduction of chemical pesticide and more hazardous pesticides use²⁷, when applicable
 - iii. will contribute to the reduction of nutrient losses by at least 50% and of the overall use of fertilisers^{26,28}, when applicable
- d) Water resources protection:
- i. will not deplete surface or groundwater resources beyond replenishment capacities²⁹.

Environmental performance

All RIAs and IAs, including Flagship

Proposals should include as part of the proposal in Part B under section 1.2. Methodology:

- An identification of the environmental critical issues early on and the explanation on how the projects will steer the development process in the right direction.
- An ex-ante estimation of the environmental sustainability performance (including climate neutrality and zero pollution) and circularity of the proposed processes/products, compared to benchmark(s) selected by the consortium and described in the proposal. The benchmark(s) should be based on the best performing processes/products and should be duly justified in the proposal. The proposal should demonstrate improvements of environmental performances compared to the selected benchmark(s) and if available provide relevant references and calculations.

²² According to the Biodiversity strategy for 2030 and action plan <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0380> and the Forest strategy for 2030 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0572&from=EN>

²³ According to Natura 2000 framework https://ec.europa.eu/environment/nature/natura2000/index_en.htm and to the Staff Working Document “Criteria and guidance for protected areas designations” (SWD(2022) 23)

²⁴ https://ec.europa.eu/environment/nature/invasivealien/index_en.htm: Invasive Alien Species (IAS) are animals and plants that are introduced accidentally or deliberately into a natural environment where they are not normally found, with serious negative consequences for their new environment. Regulation (EU) 1143/2014 on invasive alien species (the IAS Regulation) entered into force on 1 January 2015. A list of IAS is in: https://ec.europa.eu/environment/nature/pdf/IAS_brochure_species.pdf. The European Commission has developed an information exchange mechanism to facilitate the implementation of the EU policy on invasive alien species: the European Alien Species Information Network (EASIN). It's an online platform that aims to facilitate access to existing information on alien species from a range of sources. EASIN includes a Species Search and Mapping tool, allowing for basic and advanced search of a database including over 14 000 alien species in Europe, and showing their distribution on a map. It includes the species currently on the Union list.

²⁵ Commission implementing regulation 2018/2019 establishes a provisional list of high risk plants, plant products or other objects for which introduction into the Union territory shall be prohibited pending a risk assessment. The list is in Annex I of the regulation. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R2019&from=EN>.

²⁶ See RED II, Article 29, point 3, letter d)

²⁷ According to Farm to Fork Strategy and action plan <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0381> and the Biodiversity strategy for 2030 and action plan.

²⁸ Communication ‘Ensuring availability and affordability of fertilisers’ [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52022DC0590\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52022DC0590(01))

²⁹ See also the definition of quantitative status in the Water Framework Directive (DIRECTIVE 2000/60/EC)

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- A preliminary assessment of the carbon removal⁸⁴ (i.e., CCU* and/or CCS*) potential, if applicable.

In addition, proposals should include as part of the **project** an **ex-post assessment** of the **environmental sustainability and circularity** of all the products and processes developed and of their improvements compared with benchmark(s) and describe it under section 3.1 Work plan and resources of part B. More specifically:

RIAs: proposals should include a dedicated task to use the early-stage data to assess the potential improvements of the environmental performances of processes/products developed in the project.

IAs: proposals should include a dedicated work package or task to assess ex-post the environmental impacts and circularity of the products or processes developed, using LCA methodologies, as part of the project.

Flagships: proposals should include a dedicated work package or task for full assessment of the environmental impacts and circularity of the developed products or processes, using life-cycle-sustainability assessment (LCSA) methodologies, as part of the project.

The **life-cycle assessment (LCA)** and **life-cycle-sustainability assessment (LCSA)** methodologies should be based on widely used standards and certifications, and they should make use of accepted and validated approaches⁸⁵. They should use Commission recommendations and the European norms, technical reports and technical specifications. In particular, LCAs should use the standards developed by CEN/TC 411 for bio-based products⁸⁶.

All IAs, including Flagship

Proposals should ensure the publication of the outputs of LCA of environmental impacts following the principles of open science (FAIR data) and using the possibilities offered by the European Open Science Cloud (EOSC) to store and give access to research data. This should be integral part of the overall Open Science strategy of the project and therefore duly described in Part B – Section 1.2 Methodology and performed e.g., through the publication of peer-review scientific papers, and/or the uploading of data of the life cycle inventory (LCI) to the EOSC database, and/or sharing the data and the outputs with the European Knowledge Centre for Bioeconomy⁴⁴.

Recommendations to stakeholders

IAs, including Flagship

Proposals should include an action in the work plan on opportunities/challenges to be addressed for targeted stakeholders, including, where possible, *national/regional stakeholders, investors and brand owners*. Applicants should include recommendations on how to improve the implementation and/or overcome hurdles and gaps of current policies in the concerned fields.

Business cases, business models and business plan (see definitions in the Glossary)

All RIAs

Proposals should include in Part B under section 2. Impacts a check of the economic viability of the products and processes to be developed (including an analysis of the value chain and potential market for the envisaged products).

All IAs

Proposals should be based on a sound business case and should present in Part B under section 2. Impacts their business case together with the specifications of an inclusive business model, covering all actors of the value chain (from feedstock providers through to the final sellers).

All Flagships

Proposals should include a detailed preliminary business plan in a separate Annex together with their business case together with an inclusive business model covering all actors of the value chain (from feedstock providers through to the final sellers and customers/consumers).

Multi-actor approach

All IAs, including Flagship and those RIAs/CSAs when explicitly mentioned in the topic text

Proposals should include the multi-actor approach and describe it in Part B under section 1.2. Methodology.

The multi-actor approach is a form of responsible R&I, it aims to make the R&I process and its outcomes more reliable, demand-driven, shared and relevant to society. It also aims to have these outcomes shared more extensively. This entails more than just widely disseminating a project's results, or listening to the views of a board of stakeholders.

A multi-actor project ensures the genuine and sufficient involvement of a targeted array of actors, which serves the objectives of the topic. These actors include: i) researchers, ii) farmers / farmers' groups and associations, iii) foresters / foresters' groups and associations, iv) aquaculture producers, v) fishers / fishers' groups and associations, vi) advisors, vii) food and bioeconomy businesses, viii) other businesses, ix) consumer associations, x) local communities, xi) citizens, xii) civil society organisations including NGOs, and xiii) government representatives. Which key actors are relevant to participate depends on the objective of the proposal. They are essentially the (end-) users of the project results who are backed up by any other useful intermediaries and actors who can contribute with further expertise and innovative ideas relevant to the topic's objectives, and support communication and dissemination. The genuine and sufficient involvement of such actors should take place all over the whole course of the project: from participation in development of the project idea, planning and experiments to implementation, communication and dissemination of results and to a possible demonstration phase.

Building blocks for the project proposal are expected to come from science as well as from practice: it is a 'co-creation' process. Practitioners and (end) users are to be involved, not as a study-object, but to use their practical and local knowledge and/or entrepreneurial skills to develop solutions and create 'co-ownership' of results for (end-) users and practitioners.

This will contribute to and speed up the acceptability and uptake of new ideas, approaches and solutions developed in the project.

Therefore, a **multi-actor project proposal must demonstrate**

- how the proposed objectives and planning are targeting the needs/problems/challenges of and opportunities for the (end-)users of the project results;
- how the description of the project concept and in particular the composition of the consortium reflects a balanced choice of relevant key actors who have complementary types of knowledge (scientific, practical, etc.), and must ensure that project results which should be ready for practice are broadly implemented;
- how the project intends to use existing practices and tacit knowledge. This should be illustrated in the proposal with a sufficient number of high-quality knowledge exchange activities outlining the precise and active roles of the different non-scientific actors in the work. The cross-fertilisation of skills, competencies and ideas between actors should generate innovative findings and solutions that are more likely to be applied on a wide scale;
- how the project will facilitate the multi-actor engagement process by making use of the most appropriate methods and expertise;
- the project's added value: how it will complement existing research and best practices;
- how the project will result in practical and ready to use knowledge, approaches, tools or products, that are easily understandable and freely accessible;
- how these outputs ready for practice will feed into the existing dissemination channels most consulted by the (end-) users of the project results in countries and regions.

In addition, to ensure EU-wide communication in all areas related to the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) and the common agricultural policy (CAP) specific objectives, in particular agriculture, forestry and rural development, this knowledge must also be summarised in an appropriate number of 'practice abstracts' in the common EIP-AGRI format.

For areas falling outside the remit of EIP-AGRI and CAP specific objectives, other similarly effective solutions ensuring dissemination at EU level should be sought. Where applicable, it is strongly recommended that interactive innovation groups, such as EIP-AGRI Operational Groups funded under Rural Development Programmes, become involved.

2.2.3.2 Cross-cutting elements

All proposals should consider the following cross-cutting elements identified below that are valuable for the accomplishment of the overall objectives of CBE JU.

Enabling Digital technologies

When relevant, applicants should consider to apply and/or adapt existing/mature or novel digital technologies provided that they are instrumental to achieving the project's outcomes and scope.

RIAs and IAs, including Flagships, should consider the applications of digital technologies among the following areas: i) chemicals, materials, catalysts and process design & modelling (including bioinformatics) ii) process monitoring and optimisation iii) tracking and tracing, and iv) data analytics and data management.

Additionally, IAs, including Flagships, should consider also i) (real-time) process monitoring and optimisation (including environmental performance) ii) predictive maintenance and plant engineering.

Targeted, communication and dissemination of outputs and learning outcomes

For all proposals applicants should pose particular attention to disseminate the outputs and learning outcomes from the project in order to increase the public awareness, and awareness of relevant industry actors, of potential benefits of bio-based solutions.

Proposals are strongly encouraged to incorporate publications on data, methodologies, including LCA assessment-related data to peer-reviewed scientific journals and conferences.

Whenever relevant, applicants should consider to contributing data and results to the European Commission's Knowledge Centre for Bioeconomy hosted by the JRC (KBC). They are also encouraged to add links with any trusted repositories for data, results and methodologies (in addition to KBC/JRC).

Cross-disciplinary aspects and involvement of Social Sciences and Humanities (SSH)

All proposals should foster cross-disciplinarity and consider the social, economic, behavioural, institutional, historical and/or cultural dimensions, as appropriate, of the proposed circular bio-based innovations. Applicants should therefore ensure that contributions from the SSH are integrated at various stages of their proposed project, and the actions required, participants and disciplines involved. Whenever relevant, applicants should consider public awareness raising, social engagement and social impact aspects with respect to circular bio-based solutions.

HORIZON-JU-CBE-2023-IAFlag-01 Optimised and integrated forest-based value chains

Type of action	Innovation Action - Flagship
Indicative budget	The total indicative budget for the topic is EUR 17 million
Expected EU contribution per project	It is estimated that a contribution of EUR 17 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 8 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>2.1 Reinforce the integration of bio-based research and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains</i></p> <p><i>3.1 Ensure that circularity and environmental considerations, including contributions to climate neutrality and zero pollution objectives, are taken into account in the development and implementation of research and innovation bio-based projects and facilitate societal acceptance.</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>2.1.2: Deploy innovative production technologies</i></p> <p><i>2.1.3: Scale up production and market uptake of innovative bio-based products</i></p> <p><i>3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i></p> <p><i>3.1.3: Facilitate social acceptance of bio-based applications</i></p>
CBE JU KPIs	<p><i>3.3 N of projects using feedstock generated with practices contributing to climate change mitigation and/or adaptation</i></p> <p><i>4.2 N of projects developing innovative & sustainable processes that improve on resource efficiency and zero-waste</i></p> <p><i>4.4 N of projects with innovative & sustainable processes with improved energy efficiency</i></p> <p><i>5.2 N of projects developing circular production practises (incl. industrial & industrial urban symbiosis)</i></p>

Expected outcomes

In line with the EU Bioeconomy Strategy, the EU Forest strategy, the EU Biodiversity strategy, the updated Industrial strategy and the Circular Economy Action Plan, successful proposals will facilitate the large-scale deployment of industrial bio-based systems based on primary woody biomass. These systems will contribute to the EU Bioeconomy Strategy implementation, demonstrating improved environmental performances, maximising resource- and energy-efficiency, and optimising cascading use of bio-based primary and secondary feedstock, aiming at 'zero waste' and 'zero-pollution' operations and outputs.

Project results should contribute to the following expected outcomes:

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- Deployment of competitive, replicable, regional/local, circular and inclusive bio-based business models in the forest-based sector and industry encompassing all segments of the value chain
- Improved circularity and resource efficiency of wood-based resources via practical applications of the circular (bio)economy concept to reduce the consumption of primary woody biomass
- Significant improvement in environmental sustainability across the value chain against specified fossil-based and/or carbon-intensive benchmarks
- Reduction in the dependency on imported feedstock and products
- Social acceptance of circular bio-based solutions and products
- Availability of broader range of competitive circular bio-based products meeting consumer and market requirements
- Industrial competitiveness, strategic autonomy and resource independence of bio-based value chains of EU member states and/or Associated countries
- New skilled job opportunities and investments in the bio-based sectors, particularly in the regions with underdeveloped capacities and in the rural and coastal areas

Scope

Forest-based value chains are often vertically integrated but could be further optimised by introducing innovative processing technologies, e.g., upcycling residual flows to higher value applications and exploiting industrial symbiosis concepts (within the same industrial sector but also with other industrial sectors when applicable) to maximise the value extracted from main and side streams of forest biomass. Moreover, there are non-forest woody resources, both primary and secondary, not yet efficiently managed and valorised.

This topic aims to considerably increase resource efficiency by promoting cooperation of companies of different scales and other actors and move towards "zero waste, zero pollution" operations. The feedstock in scope of the topic are woody biomass from sustainably managed forests and wood industry side streams and residues.

For this purpose, seamless and efficient integration of processing technologies of main and side flows of woody biomass between various companies and other actors is needed, specialising manufacturing of diverse materials and products. This may be achieved by the creation of a symbiotic ecosystem with clusters of companies of different scale and technology providers using the residual streams of large-scale industrial plants, but also exploiting the technical opportunities from emerging manufacturing systems. The cascading use of woody biomass already allows for a range of industrial purposes; the better integration would provide efficiency gains and higher value of the wood-based value chains at a regional scale. The cooperation between well-established and emerging industrial operators, forest owners, innovators and RTOs/ academia, as well as financial support from public and private investors must be increased, to ensure circular, resource efficient and zero pollution processing.

Proposals under this topic should:

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- Establish a symbiotic and flexible woody biomass processing system involving the cooperation of several actors to maximise the cascading use of feedstock and the use of residues for high value added circular products. Contribute to match interests, priorities and technological status of different participating companies and other actors as well as gaining support from public and private investors to a large-scale systemic change. One example would be clustering several enterprises/technology providers around a main woody-biomass operator³⁰ to valorise its side and residual streams.
- Identify regional opportunities to share primary materials, recycled materials, and side-streams between different industries in the wood-based sectors in a secure and economically feasible way.
- Identify and support process technologies and logistical solutions that can be integrated in a symbiotic way to create a circular economy. Develop processes to share heat, process water and chemicals between different businesses, at production site level.
- Develop cost-efficient processes to allow for efficient recycling of secondary woody biomass-products.
- Develop innovative and efficient methods to extract and produce valuable molecules and components from biomass (addressing material decomposition processes which are energy-consuming) and individuate new market sectors for such materials (e.g., pigments, new materials for additive manufacturing, bioadhesive and bio-based functional additives, food and feed ingredients etc.).
- Develop new production methods enabled by innovative, including emerging breakthrough, technologies.
- Develop material-and energy-efficient processing and recirculation of (chemicals) flows, towards the fully circular model, within the single industrial plant and within the extended production site.
- Innovate the outputs from the value chain while applying the principles of eco-design of bio-based products.
- Demonstrate the substantial improvement of environmental performance, including reduction of GHG and other harmful emissions, across the value chain against specified fossil and/or bio-based benchmarks.
- Incorporate and integrate innovative processes and solutions along the value chain into a large-scale system, including woody biomass-based products for high value applications.
- Develop and demonstrate a sound business model, based on experienced bottlenecks/gains, ensuring long-term investments and new jobs opportunities, encouraging the inclusion of all actors in the regional value chain.
- Apply certification schemes of woody biomass, including certification of environmental sustainability, and expand its use along the different types of woody biomass.
- Consider integrating activities contributing to climate change adaptation.

³⁰ For example, construction, furniture, textiles, pulp and paper industries, sawmills, etc.

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- Demonstrate the replication potential of this flagship concept in the EU and the associated countries.

Proposals are recommended to include a task to perform an assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, proposals are recommended to also include a task to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

Proposals may consider making existing/new industrial assets (e.g., labs, test rigs, etc.) or other training packages accessible to researchers, SMEs, etc., for visiting, or training and testing bio-based processes.

Proposals must implement the multi-actor approach and ensure adequate involvement of all key actors in the value chains relevant for this topic, across the sustainable circular bio-based system, e.g., the bio-based processing industry, including brand owners, but also researchers, feedstock producers and suppliers, regional actors, regional policy makers, consumers and civil society.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects³³, including from BBI JU³⁴.

³¹ See documents defining the framework and criteria on: https://ec.europa.eu/info/research-and-innovation/research-area/industrial-research-and-innovation/key-enabling-technologies/advanced-materials-and-chemicals_en.

³² More specifically, provide thresholds that can support the criteria definition and improvements for the assessment SSbD methodologies, including any specificities related with bio-based surfactants. Recommendations should also include identification of data gaps, especially safety, environmental, but also socio-economic factors, as well as priorities for data collection.

³³ For example, HORIZON-CL6-2021-ZEROPOLLUTION-01-06: Increasing the environmental performance of industrial processes in bio-based sectors: construction, woodworking, textiles, pulp and paper and bio-chemicals; the RIA on "Forest-based high value applications and improved forest management via "learning from nature" and non-invasive quality control" in the same CBE AWP.

³⁴ For example, Sweetwood, VALCHEM, INGREEN, EXILVA, VIOBOND

HORIZON-JU-CBE-2023-IAFlag-02 Expansion and/or retro-fitting of biorefineries towards higher-value bio-based chemicals and intermediates

Type of action	Innovation Action-Flagship
Indicative budget	The total indicative budget for the topic is EUR 17 million
Expected EU contribution per project	It is estimated that a contribution of EUR 17 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 8 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>2.1 Reinforce the integration of bio-based research and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains</i></p> <p><i>3.1 Ensure that circularity and environmental considerations, including contributions to climate neutrality and zero pollution objectives, are taken into account in the development and implementation of research and innovation bio-based projects and facilitate societal acceptance.</i></p>
Link to CBE JU SRIA Strategic Objectives	<p><i>2.1.2: Deploy innovative production technologies</i></p> <p><i>2.1.3: Scale up production and market uptake of innovative bio-based products</i></p> <p><i>3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i></p> <p><i>3.1.3: Facilitate social acceptance of bio-based applications</i></p>
CBE JU KPIs	<p><i>4.2 N of projects developing innovative & sustainable processes that improve on resource efficiency and zero-waste</i></p> <p><i>4.4 N of projects with innovative & sustainable processes with improved energy efficiency</i></p> <p><i>5.2 N of projects developing circular production practises (incl. industrial & industrial urban symbiosis)</i></p> <p><i>10.1 N of participants from the underrepresented EU countries and region</i></p> <p><i>10.2 N of regional hubs established and operated to process bio-based feedstocks and other cooperation aspects</i></p>

Expected outcomes

In line with the objectives of the Circular economy and the Zero pollution action plan, the successful proposal will facilitate the large-scale deployment of industrial bio-based systems. These systems will contribute to the EU Bioeconomy Strategy implementation, demonstrating improved environmental performances, maximum resource- and energy-efficiency, and optimal cascading use of bio-based feedstock. The successful proposal will also support the implementation of relevant EU policies and priorities such as the EU Industrial Strategy, Green and Digital transition, Circular Economy Action Plan, as well as contribute to the achievement of the European Green Deal (EGD) objectives.

Project results should contribute to the following expected outcomes:

- Deployment of competitive, replicable, regional/local, circular inclusive bio-based business models centred on biorefineries encompassing all segments of the value chain
- Availability of a broader range of (environmentally and economically) sustainable processes of bio-based feedstock and by-products in a biorefinery to added value bio-based materials/products
- Availability of broader range of bio-based products meeting market requirements
- Large scale implementation of (environmentally and economically) sustainable biorefinery processes
- Significant improvement in environmental sustainability across the value chain against specified fossil and/or bio-based benchmarks
- Industrial competitiveness, strategic autonomy and resource independence of bio-based value chains of EU member states and/or Associated countries
- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept
- Income and business opportunities diversification for stakeholders and actors (including primary producers) in the bio-based sectors
- New skilled job opportunities and investments in the bio-based sectors, particularly in the regions with underdeveloped capacities and in the rural and coastal areas
- Social acceptance of circular bio-based solutions and products
- Market uptake and growth of scalable circular bio-based solutions

Scope

Many biorefineries in Europe were built in the past decades with a rather narrow product scope (e.g., biofuel plants, pulp and paper mills). New technologies allow expanding their production capacity to convert bio-based feedstock to added value products, following the cascading approach, and/or to produce new and higher-value products to take full advantage of the existing assets and keep them competitive with the current market requirements. In addition to that, there is a wealth of CAPEX from dismissed or declining industrial assets that could be converted as parts of the biorefinery while exploiting the existing infrastructures, resulting in lower CAPEX, and other economic and technological benefits (e.g., shorter lead times, faster implementation, fewer production time losses and lower risks compared to fully greenfield plant construction).

Proposals under this topic should:

- Integrate innovative and sustainable conversion processes in existing biorefineries (currently producing a conventional and/or narrow range of products), addressing all elements in the value chain, also integrating, if applicable, dismissed or declined industrial assets that could be converted as parts of the biorefinery by:

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- increasing the valorisation of sustainable bio-based feedstock, from primary and secondary sources, respecting the ‘cascading use’ approach;
 - expanding the use of residual and waste streams from bio-based processes within the biorefinery into added-value products, addressing the technical challenges of converting secondary bio-based feedstock (limited process integration, energy inefficiency, water use, etc.);
 - integrating, when applicable, any other local residual biomass such as residual and waste streams from different sources (aquatic or terrestrial) to extract maximum value from the incoming feedstock and increase the economic viability;
 - developing new production methods enabled by innovative, including emerging breakthrough, technologies;
 - expanding and diversifying the production capacity and range of bio-based products, and increasing their value, including via symbiosis with other industrial actors when applicable;
 - improving the environmental sustainability profile of the plant by decreasing and controlling polluting emission and energy consumption;
 - improving the efficiency of processes to minimise process losses and reducing or eliminating the use of hazardous substances;
 - improving the flexibility to energy supply, e.g., expanding the use of renewable energy resources, increasing electrification, enabling energy storage, etc.;
 - responding to current and foreseen market requirements, e.g., expanding to markets different from the ones considered when building the plant in the first place.
- Validate the technical and economic viability of the plant conversion concept, enabling its replication including the integration of dismissed industrial assets, if applicable.
 - Demonstrate the replication potential of this flagship concept in the EU and the associated countries.
 - Demonstrate the economic and social sustainability in terms of maintaining (or increasing) jobs and skilled jobs, including at regional level towards an improved social and economic development of sectors providing bio-based feedstock, such as rural community, with no interference with the food value chains.

Proposals are recommended to include a task to perform an assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, proposals are recommended to also include a task to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

Proposals may consider making existing/new industrial assets (e.g., labs, test rigs, etc.) or accessible to researchers, SMEs, etc., for visiting, or training and testing bio-based processes.

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Proposals must implement the multi-actor approach and ensure adequate involvement of all key actors in the value chains relevant for this topic, across the sustainable circular bio-based system, e.g., the bio-based processing industry, researchers, feedstock producers and suppliers, regional actors, policy makers and civil society.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects³⁵.

³⁵ For example, HORIZON-JU-CBE-2022-IAFlag-01 Maximum valorisation of sustainably sourced bio-based feedstock in multi-product, zero-waste, zero-pollution biorefinery. Also, topics under Processes4Planet partnership and Horizon Europe Cluster 4 calls should be considered.

HORIZON-JU-CBE-2023-IAFlag-03 Bio-based packaging materials with improved properties: barrier, food contact, forming, printability, safety, recyclability /circularity-by-design

Type of action	Innovation Action - Flagship
Indicative budget	The total indicative budget for the topic is EUR 17 million
Expected EU contribution per project	It is estimated that a contribution of EUR 17 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 8 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>2.1 Reinforce the integration of bio-based research and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains.</i></p> <p><i>3.1 Ensure that circularity and environmental considerations, including contributions to climate neutrality and zero pollution objectives, are taken into account in the development and implementation of research and innovation bio-based projects and facilitate societal acceptance.</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>2.1.2: Deploy innovative production technologies</i></p> <p><i>2.1.3: Scale up production and market uptake of innovative bio-based products</i></p> <p><i>3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i></p> <p><i>3.1.3: Facilitate social acceptance of bio-based applications</i></p>
CBE JU KPIs	<p><i>4.5 Number of products with improved life cycle environmental performance</i></p> <p><i>5 - Expand circularity in bio-based value chains</i></p> <p><i>7.1 Number of brand owners involved as project partners and/or engaged with other mechanisms</i></p>

Expected outcomes

In line with the objectives of the Sustainable Products Initiative as well as the EU Plastics Strategy, successful proposals will facilitate the large-scale deployment of new sustainable and high-performing packaging materials, including alternatives to plastics. Successful proposals will also contribute to the implementation of the EU Bioeconomy strategy, the Circular Economy Action Plan and the updated Industrial Strategy.

Project results should contribute to the following expected outcomes:

- Improved barrier properties (e.g., oxygen, grease and/or water, depending on application) with respect to existing fossil or bio-based benchmarks

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- Improved durability also in unfavourable environments (e.g. high humidity, high or low temperatures depending on the application) with respect to existing fossil or bio-based benchmarks
- Improved sustainability and circularity with respect to existing fossil or bio-based benchmarks
- Availability of broader range of circular bio-based packaging products meeting market requirements (depending on specific application)
- Contribution to deployment or strengthening of replicable, regional/local, circular bio-based business models
- Industrial competitiveness, strategic autonomy and resource independence of bio-based value chains of EU member states and/or Associated countries
- Significant improvement in environmental sustainability across the value chain against specified fossil and/or bio-based benchmarks
- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept to packaging solutions
- Income and business opportunities diversification for stakeholders and actors (including primary producers) in the bio-based sectors
- New skilled job opportunities and investments in the bio-based sectors, particularly in the regions with underdeveloped capacities and in the rural and coastal areas
- Social acceptance of circular bio-based solutions and products.
- Market uptake and growth of scalable bio-based solutions

Scope

The packaging business is undergoing considerable transformations due to pressing legislative changes, the issue of plastic littering and changes in customer behaviour. While consumer products make up a considerable share of packaging products, industrial packaging products also need to be considered. Future packaging products need to be bio-based, recyclable and/or biodegradable, lightweight and functional. A challenge is represented by the seemingly opposing requirements of barrier/surface properties (obtained by innovative coatings or multi-layered structures) and the need to make the product easy to recycle (easier with fully bio-based or mono-material structures).

Proposals under this topic should:

- Upscale production technologies and deploy the complete value chain to bio-based³⁶ packaging materials with improved functional properties, meeting market and sustainability/circularity/environmental performance requirements. Applications and the related requirements should be clearly identified and addressed.

³⁶ In the context of this topic, bio-based is considered as having at least 95% of organic carbon content from bio-based sources (measured using the C 14 method as defined in EN 16640:2017)

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- More specifically, focus on improvement of surface³⁷ and/or barrier properties, enabling circularity and improved environmental performance while also meeting technical performance requirements. Innovation can focus on one, more or all components (e.g. substrate/polymer, coatings, films, additives) of the bio-based packaging product, provided that technical, circularity and environmental requirements are met by the product as a whole.
- Address and demonstrate at relevant scale the sustainable end-of-life of the developed products, in particular compatibility with the existing recycling streams and/or, based on standards, their compostability or biodegradability, depending on the application sought. Reuse and remanufacturing are also in scope when compatible with the application and common practices.
- Verify the regulatory status of the new product and its safety for the intended use (especially important in food packaging) and for the environment.
- Depending on the biomass feedstock in scope, apply existing certification schemes.
- Consider end-users perception, behaviour and preferences for product design (especially important in food and consumer goods packaging, but also relevant in industrial packaging) but also in terms of disposal at end-of-life (e.g. avoiding littering, enabling easy sorting and high-target recycling with the correct stream).
- Employ low-emission and energy efficient process and ensure improved sustainability profiles for the products in scope compared to existing bio-based solutions.

Proposals are recommended to include a task to perform an assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, proposals are recommended to also include a task to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

Proposals may consider making existing/new industrial assets (e.g., labs, test rigs, etc.) accessible to researchers, SMEs, etc., for visiting, training and testing bio-based processes.

Proposals must implement the multi-actor approach and demonstrate the involvement of all concerned key actors, including the involvement of brand owners* and any relevant B2B* actors.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects³⁸.

³⁷ In the context of this topic, surface properties are those related to the interface between the packaging product and its content, on one side, and between the packaging product the outer environment, on the other. They can be conferred by a specific surface layer or treatment as well as by intrinsic properties of the bulk material.

³⁸ For example HYPERBIOCOAT, NEWPACK, SHERPACK, REFUCOAT, BIOSMART, BioBarr, MANDALA, BIONtop, CelluWiz, USABLE PACKAGING (RIA under BBI), PULPACKTION, NEWPACK, FRESH (IA-DEMO under BBI) and PEFERENCE (IA-Flagship under BBI)

HORIZON-JU-CBE-2023-IAFlag-04 Valorisation of aquatic biomass waste and residues

Type of action	Innovation Action - Flagship
Indicative budget	The total indicative budget for the topic is EUR 10 million
Expected EU contribution per project	It is estimated that a contribution of EUR 10 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 8 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>2.1 Reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains.</i></p> <p><i>3.1 Ensure that circularity and environmental considerations, including contributions to climate neutrality and zero pollution objectives, are taken into account in the development and implementation of research and innovation bio-based projects and facilitate societal acceptance.</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>2.1.1: Demonstrate the sustainable supply of bio-based feedstock</i></p> <p><i>2.1.2: Deploy innovative production technologies.</i></p> <p><i>2.1.3: Scale up production and market uptake of innovative bio-based products.</i></p> <p><i>3.1.2 - Incorporate the environmental sustainability and circularity criteria in bio-based systems.</i></p> <p><i>3.1.3 – Facilitate social acceptance of bio-based applications</i></p>
CBE JU KPIs	<p><i>1.1 N of primary producers, involved as project beneficiaries and/or engaged in value chains at project level</i></p> <p><i>2 N of innovative bio-based value chains created or enabled based on sustainably sourced biomass</i></p> <p><i>4.2 N of projects developing innovative & sustainable processes that improve on resource efficiency and zero waste</i></p> <p><i>4.3 N of projects developing innovative & sustainable processes enabling to address zero pollution</i></p> <p><i>5.2 N projects developing circular production practices (incl. industrial & industrial-urban symbiosis)</i></p> <p><i>10.1 N of participants from the underrepresented EU countries and region</i></p>

Expected outcomes

In line with the objectives of the Circular economy and the Zero pollution action plan, successful proposals will facilitate the large-scale deployment of industrial bio-based systems. These systems will contribute to new EU strategy for a Sustainable Blue Economy implementation and address the EC Communication Towards a Strong and Sustainable EU Algae Sector, demonstrating improved environmental performances, maximum resource- and energy-efficiency, and optimal cascading use of bio-based feedstock, aiming for 'zero waste'* and 'zero-pollution'* operations.

Project results should contribute to the following expected outcomes:

- Industrial competitiveness, strategic autonomy and resource independence of bio-based value chains of EU member states and/or Associated countries.
- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept, maximising the valorisation of residual biomass.
- Market uptake and growth of scalable circular bio-based solutions for high value applications.
- Availability of broader range of bio-based products meeting market requirements
- Income and business opportunities diversification for stakeholders and actors (including fisheries and aquaculture) in the bio-based sectors
- New skilled job opportunities and investments in the bio-based sectors, particularly in coastal areas
- Social acceptance of circular bio-based solutions and products.
- Significant contribution to the objectives of the R&I Mission 'Restore our Oceans and Waters by 2030' and the Sustainable Blue Economy Partnership

Scope

Residual and waste streams³⁹ from fisheries, seafood processing and aquaculture, including seaweed and invertebrates, represent potentially interesting but so far underutilised sources of active compounds, chemicals and materials. Some of them are processed into animal feed or fertilisers, but a large proportion is treated as waste (e.g. discards), despite containing interesting molecules for cosmetics and nutraceutical applications, among others. Moreover, associated disposal costs are high.

The specific challenge consists in demonstrating and deploying the efficient operation of a full value chain based on residuals and side streams from aquaculture, fisheries and aquatic processing for valorisation into new bio-based products (food/feed ingredients, chemicals and materials), increasing the value of extracted fractions, while retaining and adding functionality and increasing the range of end applications. Additional challenge consists in guaranteeing quality of the biomass for processing, including by mobile and modular units (where relevant). Microalgae and related streams are not in scope.

Proposals under this topic should:

- Demonstrate the suitability of small scale, decentralised biorefinery concepts (that may include modular and mobile units when relevant), extracting maximum value from (all components of) the sustainably sourced bio-based feedstock to produce a variety of products in the scope of CBE JU including chemicals, bioactives, soil nutrients, as well as food and feed ingredients.
- Upscale the production technologies and deploy the complete value chain to address the hurdles and bottlenecks regarding the availability, sourcing, logistics and associated infrastructure in the targeted biomass feedstock supply systems. These could include pre-

³⁹ derived from sustainably sourced aquatic biomass, applying available EU/international certifications when applicable

treatment aspects as necessary to preserve feedstock quality and minimise losses due to biodegradation.

- Demonstrate the selection, extraction or production of specific compounds from these residual streams into products for further value-added applications in the chemical industry, cosmetics and human or animal nutrition. Proposals may address more than one feedstock and production chain in an integrated concept.
- Include processing operations tailored to local circumstances. These operations will need to cope with availabilities, distances, qualities of the residuals and side streams, possible variations in these qualities, etc. The business case underlying the proposal must include a feasibility assessment (technological and financial) of: (i) the associated processes at the envisaged scale; and (ii) combinations with other relevant processes.

Proposals are recommended to include a task to perform an assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, proposals are recommended to also include a task to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

Proposals may consider making existing/new industrial assets (e.g., labs, test rigs, etc.) accessible to researchers, SMEs, etc., for visit, training and testing bio-based processes.

Proposals must apply the concept of the 'multi-actor approach' and ensure adequate involvement of primary producers and other relevant actors in rural/coastal areas

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Where relevant, proposals should consider synergies and complementarities with results of past and ongoing EU funded projects and calls, including BBI JU⁴⁰

⁴⁰ For example AQUABIOPROFIT , WASEABI, NEWPACK

HORIZON-JU-CBE-2023-IA-01 Small scale biorefining in rural areas

Type of action	Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 15 million
Expected EU contribution per project	It is estimated that a contribution of EUR 7.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 6-7 at the end of the project.
Link to CBE JU Specific Objectives	<i>2.1 Reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains.</i>
Link to CBE JU SRIA Strategic Priorities	<i>1.1.1 - Ensure the availability and quality of sustainable biobased feedstock 1.1.2 - Develop innovative production systems in the bio-based industry 2.1.1 - Demonstrate the sustainable supply of bio-based feedstock 2.1.2 - Deploy innovative production technologies</i>
CBE JU KPIs	<i>1.1 Number of primary producers, involved as project beneficiaries and/or engaged in value chains at project level 1.2 Number of (bio)waste management actors, involved as project beneficiaries and/or engaged in value chains at project level 2 Number of innovative bio-based value chains created or enabled based on sustainably-sourced biomass 4 Improve environmental sustainability of bio-based production processes and value chains 10.1 N of participants from the underrepresented EU countries and region 10.2 N of regional hubs established and operated to process bio-based feedstocks and other cooperation aspects</i>

Expected outcomes

Successful proposals will contribute to the Bioeconomy Strategy, the Long-Term Vision for Rural Areas, and the Common Agriculture Policy by promoting new economically viable and environmentally sustainable business models for a successful green transition in primary production and rural areas in line with the European Green Deal objectives.

Project results should contribute to the following expected outcomes:

- Deployment of sustainable, inclusive, and reliable biobased value chains in rural areas with a focus on fair economic returns at local (farm) level
- Industrial competitiveness, strategic autonomy and resource independence of bio-based value chains of EU member states and/or Associated countries
- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept, e.g., by maximising the valorisation of residual biomass

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- Contribution to additional, diversified incomes and generational renewal in rural areas, with the potential for a multiplier effect when replicated across the EU
- New skilled jobs opportunities and investments in the bio-based sectors in rural areas, particularly in regions with underdeveloped capacities, improved innovation capacities and product portfolio extension in primary production sectors and SME's
- Significant reduction of land use and other climate and environmental benefits
- Efficient recycling of nutrients transportation and logistics costs reduction and overall enhanced circularity of nutrients cycles
- Social acceptance of circular bio-based solutions and products

Scope

Small-scale biorefineries are attractive, especially to rural stakeholders, because they may not require a high level of initial investment in comparison to large-scale facilities and, therefore, often provide a quicker return on investment. In addition, technology providers benefit from this model because of its high replication potential across Europe. Small-scale biorefineries have the potential to offer diversification opportunities for primary producers and local rural stakeholders by:

- processing their biomass directly at source (shortening logistic chains and avoiding degradation, increasing production value) to produce new biorefinery products based on the circular use of local resources, and/or
- providing additional sources of income in rural areas and supporting the economy of scale with new biorefinery products based on the circular use of local resources.

While some small-scale and/or modular biorefinery solutions, such as the EIP-OG Biorefinery Glas⁴¹ and BBI IA-DEMO AGRI-MAX, have already been successfully demonstrated, both technical and non-technical barriers still exist that prevent the broad implementation in Europe. Downscaling in particular poses a challenge in maintaining process- and cost-efficiency competitive with large scale processes that can exploit economy of scale. Smart and integrated process designs, as well as circular processes maximising the material use, can provide innovative solutions, while maximising the environmental benefits and bringing more value to the concerned rural actors.

Proposals under this topic should:

- Demonstrate the technical suitability and economic viability of small scale decentralised biorefinery concepts, which may include modular and mobile units, in rural areas, thereby considering safety and security issues for the operators of the plant and the possible interferences with the rural landscape (e.g. in terms of biodiversity).
- Develop, demonstrate and validate resource-efficient technologies with a view to add value to locally available resources (underutilised biomass; by-products; residues; solid, liquid and gaseous waste and residual streams) at the point of origin, either as feedstock for conversion, or as process medium or growing medium for feedstock for further conversion.

⁴¹ <https://biorefineryglas.eu/>

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- Seek synergies with the existing regional food, feed, or bioenergy value chains to further strengthen their economic and environmental sustainability in line with the cascading principle of biomass use. In the context of CBE JU food, feed, and bioenergy (including biofuels) as main products are out of scope, but the related existing value chains can be involved. Food and feed ingredients and soil nutrients are in scope.⁴²
- Assess the environmental (including elimination / reduction of pollution from the processing operations) and socio-economic performance of the demonstrated value chains.
- Evaluate the replication potential of the small-scale biorefinery concept, provide a sound business plan and training material in particular for primary producers and other rural actors.
- Ensure an active involvement and profit sharing of primary producers in the value system.
- Cooperate, if applicable, with central hubs, such as local and regional hubs, distribution centres, collection and processing points for further processing steps.

Proposals must apply the concept of the 'multi-actor approach' and ensure adequate involvement of primary producers and other relevant actors in rural areas.

Proposals are encouraged to include regions with underdeveloped capacities and regions where rural bio-based pilot plants and demonstrational sites are missing or underrepresented.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Where relevant, proposals should consider synergies and complementarities with results of past and ongoing EU funded projects and calls, including BBI JU.

⁴² See CBE JU SRIA

HORIZON-JU-CBE-2023-IA-02 Production of safe, sustainable, and efficient bio-based fertilisers to improve soil health and quality

Type of action	Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 15 million
Expected EU contribution per project	It is estimated that a contribution of EUR 7.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 6-7 at the end of the project.
Link to CBE JU Specific Objectives	<i>2.1 Reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains.</i>
Link to CBE JU SRIA Strategic Priorities	<i>2.1.1 - Demonstrate the sustainable supply of bio-based feedstock 2.1.2 - Deploy innovative production technologies 2.1.3 - Scale up production and market uptake of innovative biobased products</i>
CBE JU KPIs	<i>1.2 N of (bio)waste management actors, involved as project beneficiaries and/or engaged in value chains at project level 2 Unlock sustainable and circular bio-based feedstock for the industry 3 Ensure environmental sustainability of feedstock 4.3 N of projects developing innovative & sustainable processes enabling to address zero pollution</i>

Expected outcomes

This topic contributes to the objectives of the Communication on “Ensuring availability and affordability of fertilisers”, EU Bioeconomy Strategy, Mission “A Soil Deal for Europe”, Common Agriculture Policy, and EU Fertilising Products Regulation by replacing synthetic fossil and mineral fertilisers and supporting the strategic autonomy of the EU fertiliser industry through the production of sustainable and safe bio-based alternatives to improve soil health and quality. The successful proposals will support the achievements of the Farm to Fork strategy objectives and targets as well as of the European Green Deal (EGD) objectives.

Project results should contribute to the following expected outcomes:

- Enhanced availability of affordable and sustainable fertiliser in the EU
- Safe, precise applicable and efficient bio-based fertilisers to support the transition towards a circular economy (including fertiliser industry) and agricultural production

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- Replacement of conventional fossil and mineral fertilisers with bio-based alternatives⁴³, while closing nutrient cycles and creating new value chains on a regional level
- Availability of innovative and sustainable bio-based fertiliser delivery systems (e.g., coatings) for controlled-release (if applicable)
- Significant contribution to the objectives of the R&I mission 'A Soil Deal for Europe'
- Social acceptance of circular bio-based solutions and products

Scope

Fertilisers are critical for the EU agriculture and the current market situation for fossil and mineral fertilisers, together with a general increase of input costs, could have significant impacts on EU farmers and their productivity.

Bio-based fertilisers have the potential to make the food system more sustainable in line with the Farm to Fork objectives and targets but also support the availability and affordability of fertilisers by providing bio-based alternatives to farmers with similar or even improved properties. The recycling of nutrients from nutrient-rich waste and side-streams (such as agricultural by-products and waste, food waste or sewage sludge) also offer great opportunities to diversify and enhance rural incomes.

However, these alternatives need to comply with the requirements laid down in the EU Fertiliser Product Regulation, including the provisions to restrict intentionally added microplastics from 2026 onwards. Polymeric materials and plastic coatings, used to optimise the release properties of fertilisers, remain a significant problem in terms of environmental pollution and risks to human health.

Proposals under this topic should:

- Demonstrate the technical validation and implementation of bio-based fertiliser production from nutrient-rich waste and side streams (such as agricultural/forest/aquatic residues and wastes, municipal waste, food waste, sludge, etc.), thereby reducing the environmental impact linked to the dispersion of nutrients.
- Develop and validate novel bio-based fertilisers, including biodegradable fertiliser coatings or other delivery system (if applicable), ensuring their agronomic efficiency, safety and sustainability with similar or improved properties compared to synthetic and mineral fertilisers.
- Contribute to the substitution of conventional, non-renewable fertilisers, thereby reducing the dependency and risks related to depletion, market volatility as well as import dependency.
- Address the product marketability and compliance with EU Regulation 2019/100 to the largest possible extent.

⁴³ Categories according to the EU Fertilising Products Regulation are in scope

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- Optimise the costs of the value chain (including logistics) and circular approaches of waste and side streams and increase resource efficiency of the fertiliser production.
- Engage with primary producers and test the developed products on demo farms, including the machinery for application, and monitor the effects on soil health and quality. If applicable, connect and cooperate with existing living labs in the framework of the EU mission 'A soil deal for Europe'.
- Include a task to closely cooperate with projects funded under Horizon 2020, Horizon Europe (including the R&I partnership 'Accelerating farming systems transition: agroecology living labs and research infrastructures') and the Mission 'A Soil Deal for Europe'.

Proposals are recommended to include a task to perform an assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, proposals are recommended to also include a task to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

Proposals must implement the multi-actor approach and demonstrate the involvement of all concerned key actors, such as primary producers, in the bio-based systems.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Proposals should build on and avoid replication of results of previous and ongoing projects such as from BBI JU portfolio⁴⁴, and from Horizon 2020⁴⁵, and Horizon Europe portfolio⁴⁶.

⁴⁴ E.g., NewFert, SUSFERT, B-FERST, which are BBI projects.

⁴⁵ E.g., projects funded under the call CE-RUR-08-2018-2019-2020 - Closing nutrient cycles.

⁴⁶ E.g., Fert-PLAY and NOVAFERT, from the topic HORIZON-CL6-2021-ZEROPOLLUTION-01-09: Environmental impacts and trade-offs of alternative fertilising products at global/local scale. Other relevant topics in Horizon Europe are HORIZON-CL6-2021-ZEROPOLLUTION-01-01: Regional nitrogen and phosphorus load reduction approach within safe ecological boundaries; HORIZON-CL6-2021-ZEROPOLLUTION-01-02: Optimisation of nutrient budget in agriculture; HORIZON-CL6-2022-ZEROPOLLUTION-01-02: Piloting innovative governance solutions to limit nitrogen and phosphorus emissions at the interface of rural/coastal and urban/industrial environments; HORIZON-CL6-2023-GOVERNANCE: Developing EU advisory networks on the use of fertilisers; HORIZON-CL6-2023-ZEROPOLLUTION: Best available techniques for recovering or recycling fertilising products from secondary raw materials; HORIZON-CL6-2024-FARM2FORK: Increasing the availability and use of harmless inputs in organic farming

HORIZON-JU-CBE-2023-IA-03 Improve fermentation processes (including downstream purification) to final bio-based products

Type of action	Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 15 million
Expected EU contribution per project	It is estimated that a contribution of EUR 7.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 6-7 at the end of the project.
Link to CBE JU Specific Objectives	<i>2.1 Reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains. 3.1 Ensure the integration of circularity and environmental sustainability requirements, contribution to climate neutrality and zero pollution ambition in the development and implementation of bio-based research and innovation and facilitate societal acceptance</i>
Link to CBE JU SRIA Strategic Priorities	<i>2.1.2: Deploy innovative production technologies 3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i>
CBE JU KPIs	<i>4 - Improve environmental sustainability of bio-based production processes and value chains 2 - Number of projects developing circular production practices (incl. industrial & industrial urban symbiosis) 6 - Increase innovative bio-based outputs and products</i>

Expected outcomes

In line with the objectives of the Circular economy and the Zero pollution action plan, successful proposals will demonstrate processing technologies to facilitate the large-scale deployment of industrial bio-based systems. These systems will contribute to the EU Bioeconomy Strategy implementation, demonstrating improved environmental performances, maximum resource- and energy-efficiency, and optimal cascading use of bio-based feedstock, aiming for 'zero waste' and 'zero-pollution' operations.

Project results should contribute to the following expected outcomes:

- Availability of new industrial biotechnology-based production routes to bio-based products from sustainably sourced biomass;
- Improved productivity, yield, titre and selectivity of scaled up fermentation processes to bio-based products;
- Increased competitiveness of European biorefineries;
- Significant improvement of environmental performance across the value chain against specified fossil and/or bio-based benchmarks;

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- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept;
- Social acceptance of circular bio-based solutions and products;
- Availability of broader range of bio-based products meeting market requirements;
- Facilitation of market uptake of scalable bio-based solutions

Scope

Fermentation of bio-based feedstock is powerful but often still cost-intensive and resource-intensive process. This is mainly due to costly enzymes, low process yields, high by-product toxicity, poor microorganism growth, high nutrient requirements but also inefficiencies in downstream purification. Moreover, most used biocatalysts are optimised for converting conventional sugars and are less effective (or unable) to deal with second generation and non-food quality sugars, thus preventing the exploitation of additional sources of biomass feedstock. Solving all these issues may require the development of new metabolic pathways and the scale-up of related processes to industrially relevant scale. In addition, the presence of by-products often requires complex and expensive downstream purification processes, especially when the desired end products are non-volatile. This aspect adds to the complexity and cost of the process and needs to be optimised as well.

Proposals under this topic should:

- Specify and justify the choice of one or more sustainable feedstock types to be valorised via optimised, scaled up fermentation processes, and the targeted bio-based products. With regards to the targeted bio-based products, non-volatile as well as thermally and/or chemically unstable compounds, presenting higher downstream purification constraints, should be in the scope.
- Demonstrate improved process design strategies to solve previously identified bottlenecks in industrially relevant fermentation processes considering both upstream and downstream steps. The proposed strategies can consider biocatalyst(s) optimisation, reactor design, process design innovation but also process agents (e.g. solvents) innovation. Address fermentation processes productivity (yield, titre, selectivity) as well as cost-, resource- and energy-efficiency in view of further scale-up to commercial level;
- Ensure the improvement of the energy and resource efficiency of downstream purification strategies for obtaining the end products in scope, thus also enabling cost-effective production, in particular when dealing with non-volatile or chemically/thermally unstable products.
- Target end products with tangible market applications and ensure that the products meet market and regulatory requirements (e.g. in terms of consumers safety and Health, Safety and Environment (HS&E))
- Include a task to integrate assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, projects are expected to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

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- Analyse and prove techno-economic feasibility as well as commercial viability of further scaling up the process to commercial scale.

Proposals must implement the multi-actor approach and demonstrate the involvement of all concerned key actors, such as the processing industry, end users and brand owners.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects⁴⁷.

⁴⁷ For example iFermenter, CARBOSURF, US4GREENCHEM (RIA under BBI), DEMETER, REDWine, INGREEN (IA under BBI). See also HORIZON-JU-CBE-2023-IA-05 "Development of scalable safe bio-based surfactants, with an improved sustainability profile" and HORIZON-JU-CBE-2023-IA-06 "Selective, sustainable production routes towards bio-based alternatives to fossil-based chemical building blocks". Moreover, projects from Horizon Europe Cluster 4 and Processes4Planet should be considered.

HORIZON-JU-CBE-2023-IA-04 Recycling bio-based plastics increasing sorting and recycled content (upcycling).

Type of action	Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 15 million
Expected EU contribution per project	It is estimated that a contribution of EUR 7.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 6-7 at the end of the project.
Link to CBE JU Specific Objectives	<i>2.1 Reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains.</i>
Link to CBE JU SRIA Strategic Priorities	<i>2.1.1: Demonstrate the sustainable supply of bio-based feedstock 2.1.2: Deploy innovative production technologies 3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i>
CBE JU KPIs	<i>4.2 Number of projects developing innovative & sustainable processes that improve on resource efficiency and zero-waste 4.5 Number of products with improved life cycle environmental performance 5 Expand circularity in bio-based value chains</i>

Expected outcomes

In line with the objectives of the Circular Economy Action Plan, Plastics Strategy and Waste Framework Directive, successful proposals will make available effective recycling technologies for bio-based plastics. Successful proposals will also contribute to the Zero pollution action plan and the EU Bioeconomy Strategy.

Project results should contribute to the following expected outcomes:

- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept in the bio-based plastics value chain
- Increased recycled content in new products from bio-based plastics
- Effective sorting and recycling schemes for bio-based plastic materials
- Significant improvement environmental performance across the value chain against specified fossil and/or bio-based benchmarks
- Social acceptance of circular bio-based solutions and products

Scope

Bio-based plastic waste does not yet constitute a relevant amount of the total plastic waste (being only 1% in weight⁴⁸), but due to their high weight in the political agenda it is easy to foresee that bio-based plastics will gain a relevant market share in the near future. However, there is a broad range of partially or fully bio-based plastic materials and products with different molecular structures and properties. If – performance wise – this broad range of materials available offers exciting opportunities to develop highly functional products, on the side of end-of-life considerations it represents a challenge. Some bio-based plastics are chemically equivalent to fossil-based ones and can follow the same recycling routes, others are only partially compatible with existing recycling processes, further others need the development of new processes. Some of them are biodegradable, others are compostable, others are neither of the two.

Besides the technical challenges related to the recycling process itself, scale is also a challenge. For some materials, such as PLA, recycling technologies are available when they are rather homogenous industrial waste streams; their implementation in post-consumer waste treatment is however hampered by bio-based being only a small fraction of the overall highly inhomogeneous plastic stream. Another challenge lies in establishing an efficient collection and sorting process. Plastic recycling is overall a challenge in Europe, with less than 14% of plastic consumption recycled domestically. Bio-based plastic is part of this picture, although still relatively a small fraction (1%) but with forecast of high growth. Labelling is not yet there to distinguish fossil-based from bio-based plastics, and the streams are collected together. A partial exception in this picture is biodegradable plastic which is labelled after EN 13432 or similar certification schemes indicating that such plastic is compostable in industrial composting plants or in home-composting reactors⁴⁹. The expected end-of-life of compostable plastic is to be collected together with bio-waste and to be composted.

All these challenges require establishing collection and sorting strategies for bio-based plastics that are compatible with current waste management practices and recycling techniques that allow recycling bio-based plastics into new materials.

The scope of this topic focusses on the recycling of bio-based plastics which are not already recycled with the conventional (fossil-based) plastics (bio-based PET, for example, is recycled with fossil-based PET). This means that bio-based plastics made of ‘drop-ins’ polymers are excluded from the scope.

Proposals under this topic should:

- Develop sorting and separation systems for isolating dedicated bio-based plastics from the mixed bio-based and fossil-based plastics streams (when applicable, as an enabler for conversion of the bio-based polymer fraction)
- Develop, upscale and deploy innovative recycling technologies⁵⁰ or adapt, optimise and deploy existing ones for bio-based plastics

⁴⁸ ‘Reshaping Plastics’, Systemiq (2022), based on best available academic and industry data.

⁴⁹ E.g., ok compost and ok compost HOME, TUV

⁵⁰ it may include mechanical, chemical, microbial and enzymatic technologies

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- Demonstrate integration of the recycling process(es) at relevant scale inside a real waste management plant
- Target as much as possible the same grade for the recycled as the virgin product (e.g. keeping food grade), or upgrade the resulting stream into higher-value products (e.g. using them as fermentation feedstock for conversion into chemicals, materials)
- Assess the market uptake potential of recycled bio-based plastic products.
- Assess the integration of the developed sorting and recycling technologies with current waste management practices. Involvement of waste management companies/authorities should be envisaged.
- Integrate a task to perform assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, projects are expected to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

Proposals must implement the multi-actor approach and demonstrate the involvement of all concerned key actors, such as waste management companies, packaging producers and brand owners.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects⁵¹.

⁵¹ For example, HORIZON-CL6-2021-CIRCBIO-01-04: Increasing the circularity in textiles, plastics and/or electronics value chains.

HORIZON-JU-CBE-2023-IA-05 Development of scalable, safe bio-based surfactants, with an improved sustainability profile

Type of action	Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 15 million
Expected EU contribution per project	It is estimated that a contribution of EUR 7.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 6-7 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>2.1 Reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains.</i></p> <p><i>3.1 Ensuring the integration of circularity and environmental sustainability requirements, contribution to climate neutrality and zero pollution ambition in the development and implementation of bio-based research and innovation and facilitate societal acceptance.</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>2.1.1: Demonstrate the sustainable supply of bio-based feedstock.</i></p> <p><i>2.1.2: Deploy innovative production technologies.</i></p> <p><i>2.1.3: Scale up production and market uptake of innovative bio-based products.</i></p> <p><i>3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems.</i></p>
CBE JU KPIs	<p><i>1.2 N of (bio)waste management actors, involved as project beneficiaries and/or engaged in value chains at project level</i></p> <p><i>2 Unlock sustainable and circular bio-based feedstock for the industry</i></p> <p><i>3 Ensure environmental sustainability of feedstock</i></p> <p><i>4.3 N of projects developing innovative & sustainable processes enabling to address zero pollution</i></p> <p><i>4.5 N of products with improved life cycle environmental performance</i></p> <p><i>5.1 N of innovative products that are biodegradable, compostable, recyclable, reused or upcycled (circular by design)</i></p> <p><i>6 Increase innovative bio-based outputs and products</i></p> <p><i>7 Improve the market uptake of bio-based products</i></p>

Expected outcomes

Projects are expected to address the EU Bioeconomy Strategy and its action plan, the Chemicals Strategy for Sustainability (under the 'EU Zero pollution ambition'), the EU Industrial strategy, the EU Biodiversity strategy 2030, the Sustainable Products Initiative (SPI) as well as and the upcoming transition pathway for the energy-intensive industries ecosystem (including the 'chemicals transition pathway'). In line with the aforementioned policies, successful proposals will contribute to upscaling the production of commercially viable, high-performing, safe and

sustainable bio-based surfactants, with an additional focus on feedstock diversification and feedstock (sourcing) sustainability, also by advancing further Circular Bioeconomy concepts.

Project results should contribute to the following expected outcomes:

- Reduction of feedstock imports dependency, including biomass imports, to produce bio-based surfactants at EU level;
- Improvement on feedstock sustainability and reduction of direct and indirect land use impact;
- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept and by diversification of the valorised biomass feedstock;
- Significant improvement of the environmental performance across the value chain, against specified fossil and/or bio-based benchmarks;
- Scaling up of Safe and Sustainable by design (SSbD)³¹, bio-based surfactants, especially contributing to downstream sectors where sustainability and safety performance challenges are high, namely FMCG household & personal care sectors but also process and manufacturing industries as well as other relevant sectors;
- Social acceptance of circular bio-based solutions and products;
- Facilitation of market uptake of scalable bio-based surfactants & availability of broader range of bio-based products meeting market requirements.

Scope

Surfactants are often classified by: i) feedstock for synthesis, ii) biodegradability, safety and environmental effects, iii) application and iv) chemical structure (drop-in* or dedicated* chemical structures). Bio-based surfactants are produced from biomass as high value products, typically for consumer applications [household (45%), personal care (11%)]; while other sectors are characterised by a smaller share, including processing applications (e.g. food, textiles, waste treatment, etc.). Overall, there is market penetration, with an approximately 50% EU bio-based production share (4% CAGR*).⁵² Therefore, safety and sustainability performance improvements in bio-based surfactants are expected to have cascading impact in existing but also novel markets/applications.

Bio-based surfactants often face limitations for larger uptake such as high costs and niche applications. Moreover, their EU production is at present mainly based on primary biomass (vegetable oils, sugar and starch), bringing land use impacts but also often influencing the degree of feedstock imports. Currently, there is a reported impact on land use, with an index of about 0.6 ha/t of product, whereas the feedstock import dependency is at approximately 68% for the EU bio-based production.⁵³ In view of the foreseen upscale of the bio-based production capacity, feedstock diversification should be sought. Other challenges are related to wider bio-based surfactants' production/supply issues and upstream as well as downstream production process

⁵² Spekrijse, J., Lammens, T., Parisi, C., Ronzon, T. and Vis, M., Insights into the European market for bio-based chemicals, EUR 29581 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-01500-0, doi:10.2760/739561, JRC112989.and 'Road2Bio' BBI JU project.

⁵³ Idem

challenges, affecting the OPEX (and often CAPEX as well). For applications where surfactants are found in end products, substitution of conventional ones can result into complex re-formulation effects, affecting market uptake by brand-owners, together with an existing uncertainty of steady supply.

Proposals under this topic should:

- Scale up the energy and resource efficient production of anionic and/or cationic, and/or non-ionic and/or microbial bio-based surfactants. Concerning chemical structure, both dedicated* and/or drop in* structures are in scope.^{54 55}
- Address and assess feedstock-sourcing sustainability to produce bio-based surfactants. This could be done by replacing feedstock imported from outside the EU, with sustainably sourced EU feedstock,⁵⁶ or by scaling up the valorisation of circular EU feedstock sources (e.g., agricultural and agro-industrial waste and residual streams, municipal waste, industrial food waste etc).⁵⁷
- Include in the early design phase, key aspects such as biodegradability, mildness but also other desirable properties (e.g., antimicrobial), as relevant to meeting application-related, technical performance and environmental sustainability criteria. Moreover, testing against those aspects should be included, based on EU standards, as available.⁵⁸
- Assess and demonstrate safety benefits, considering both ecotoxicity and human toxicity aspects, while also taking into account the final products/formulations and/or other applications (e.g., process/manufacturing -related applications). End-products should aim to meet all relevant market and regulatory requirements (e.g., in terms of consumers safety and HS&E).
- Integrate a task to perform assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, projects are expected to contribute with and develop recommendations that can advance further the application of the SSbD framework³².
- Analyse and prove techno-economic feasibility as well as commercial viability for the proposed bio-based surfactants, also providing a comparison to fossil-based and/or bio-based benchmarks, where these exist.
- Demonstrate and optimise the 'robustness' and impact of the bio-based surfactants by testing them in: i) final products/formulations. Validate therefore the developed bio-based surfactants for formulation (re)design, whilst investigating and understanding the complex physicochemical behaviour of the new surfactant molecules in mixtures/formulations, as well as their potential implications in end-product(s) scale up, performance and (physical,

⁵⁴ Co-production of the in-focus, main production of bio-based surfactants with other bio-based chemicals is also in scope.

⁵⁵ As per 'scope's introductory part and 'expected outcomes' sections, surfactants applicable to end products/formulations and/or processing applications are in scope.

⁵⁶ For feedstock origin, refer to section 2.2.3.2 of the AWP.

⁵⁷ Feedstock chosen should ensure that there is no competition with food/feed, as well as adhere to environmental sustainability requirements (including biodiversity, etc.) - see also 'specific requirements' of the AWP.

⁵⁸ Please advise further European standard EN 17035 'Surface active agents - Bio-based surfactants - Requirements and test methods', with this also including recommended criteria and methodologies for determining the degradability of the bio-based surfactants, among other surfactants' related aspects.

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chemical) stability, and/or ii) final production/manufacturing processes, while meeting technical and holistic environmental performance criteria.

Proposals must implement the multi-actor approach and demonstrate the involvement of all concerned key actors, including the involvement of feedstock suppliers, brand owners* and any relevant B2B* actors.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Proposals should consider synergies with past and ongoing projects.⁵⁹

⁵⁹ Proposals should consider ongoing and past projects, especially under BBI JU as well as H2020 but also HEU (especially Cluster 6). E.g. BBI JU projects CARBOSURF (RIA), PERCAL (RIA), IRRODI (RIA) and WASTE2FUNC (IA-DEMO). See also HEU-CBE JU-IA-03 'Improve fermentation processes (including downstream purification) to final products'

HORIZON-JU-CBE-2023-IA-06 Selective, sustainable production routes towards bio-based alternatives to fossil-based chemical building blocks

Type of action	Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 15 million
Expected EU contribution per project	It is estimated that a contribution of EUR 7.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 6-7 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>2.1 Reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems and increase the involvement of R&I actors.</i></p> <p><i>3.1 Ensuring the integration of circularity and environmental sustainability requirements, contribution to climate neutrality and zero pollution ambition in the development and implementation of bio-based research and innovation and facilitate societal acceptance.</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>2.1.1: Demonstrate the sustainable supply of bio-based feedstock</i></p> <p><i>2.1.2: Deploy innovative production technologies.</i></p> <p><i>2.1.3: Scale up production and market uptake of innovative bio-based products.</i></p> <p><i>3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i></p>
CBE JU KPIs	<p><i>2 Unlock sustainable and circular bio-based feedstock for the industry</i></p> <p><i>3 Ensure environmental sustainability of feedstock</i></p> <p><i>4 (all vectors): Improve environmental sustainability of bio-based production processes and value chains</i></p> <p><i>6 Increase innovative bio-based outputs and products</i></p>

Expected outcomes

Successful projects will contribute to scaling up the sustainable production of bio-based chemicals with a large market potential and as alternatives for fossil-based platform chemicals, thus going beyond niche and specialty applications, while considering both technical and sustainability performance.

Projects are overall expected to address the EU Bioeconomy Strategy and its action plan, the Chemicals Strategy for Sustainability (under the EU Zero pollution ambition), the EU Industrial strategy, the EU Biodiversity strategy 2030, as well as and the upcoming transition pathway for the energy-intensive industries ecosystem ('chemicals transition pathway').

Project results should contribute to the following expected outcomes:

- Reduced biomass feedstock imports dependency and land use impact with positive effects of the feedstock sustainability along the value chain;

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- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept, encompassing the resource- and energy-efficient, cascading use of sustainably sourced biomass;
- Significantly improved sustainability, strategic autonomy, resilience and competitiveness of the European chemical industry while reducing the fossil feedstock dependence in other downstream sectors;
- Significant improvement of environmental performance across the value chain against specified fossil and/or bio-based benchmarks;
- Reduction of direct and indirect emissions against available fossil-based and/or bio-based benchmarks of the chemical industry, with a clear technical pathway to carbon neutrality;
- Social acceptance of circular bio-based solutions and products;
- Availability of broader range of bio-based chemicals meeting market requirements & facilitation of market uptake of scalable bio-based solutions (therefore, improving on the present market penetration and impact of the bio-based chemicals).

Scope

The production of a wider portfolio of bio-based platform chemicals is presently at low maturity, and CAPEX (and OPEX) investments are still needed to scale up production. The EU bio-based production share still amounts to 0.3 %.⁶⁰ The main current feedstock platforms deployed for bio-based chemicals are the sugar/starch, vegetable oils and glycerine platforms. Concerning the current land use impact of bio-based platform chemicals, an index of 0.5 ha/t of product has been reported, with a medium level imported feedstock dependency of 34%.⁶¹

The bio-based platform chemicals portfolio remains relatively limited, with an approximate of 90% of the global bio-based production capacity accounted by a limited amount of platform chemicals⁶². Yet, the list of bio-based platform chemicals is growing and with a projected 10% CAGR.⁶³ It is essential to progress further with the market penetration of bio-based chemicals, with a holistic consideration of sustainability across the value chain.

Proposals under this topic should:

- Demonstrate novel or improved production routes that are resource and energy efficient towards bio-based platform chemicals which have a large market potential. Such novel improved production routes can encompass different enabling technologies.^{64 65}

⁶⁰ Spekrijse, J., Lammens, T., Parisi, C., Ronzon, T. and Vis, M., Insights into the European market for bio-based chemicals, EUR 29581 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-01500-0, doi:10.2760/739561, JRC112989

⁶¹ idem

⁶² Extrapolation at EU level

⁶³ Idem

⁶⁴ Enabling technologies include (without the list being exhaustive): catalysis, biocatalysis, metabolic engineering, systems biology, enabling digital technologies (e.g. for chemicals design, high-throughput testing, chemical process design, control and optimisation).

⁶⁵ Both C2-C4 small molecules and larger chain length platform chemicals are in scope, but not aromatics as BTX, phenols and others due to expected to receive R&I coverage in medium and long-term of the CBE JU programming.

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- Address and assess feedstock sustainability and imports dependency to produce bio-based platform chemicals from EU-sourced feedstock,⁶⁶ including the valorisation of circular biomass sources (e.g., agricultural and agro-industrial waste and residual streams, municipal waste, etc).⁶⁷
- Propose and deduce reaction mechanisms and pathways to produce the studied bio-based platform chemicals; enabling reaction kinetics elucidation and mechanistic understanding. This should be provided also in the context of further advancing process scale-up;
- Include a task to integrate assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, projects are expected to contribute with and develop recommendations that can advance further the application of the SSbD framework³².
- Demonstrate the applicability and added-value of the bio-based chemical building blocks compared to the fossil-based ones, while considering the target end uses in bio-based products.
- Develop and propose a strategic roadmap for closing the competitiveness between well-established fossil-based routes and the proposed novel or improved bio-based routes.

Proposals must implement the multi-actor approach and demonstrate the involvement of all concerned key actors in the bio-based systems, such as feedstock suppliers, researchers and technology providers bio-based processing industries, end-users and consumers (in case of B2C* value chains).

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Proposals should consider synergies with past and ongoing projects.⁶⁸

⁶⁶ For feedstock origin, refer to section 2.2.3.2 of the AWP.

⁶⁷ Feedstock chosen should ensure that there is no competition with food/feed, as well as adhere to environmental sustainability requirements (including biodiversity, etc.) - see also 'specific requirements' of the AWP.

⁶⁸ Proposals should consider ongoing and past projects, especially under BBI JU/CBE JU as well as H2020 but also HEU (Clusters 4 and 6).

E.g. topic HORIZON-JU-CBE-2022-IA-03 "Cost-effective production routes towards bio-based alternatives to fossil-based chemical building blocks", projects URBIOFIN (IA-DEMO), PULP2VALUE (IA-DEMO), PERCAL (RIA), FRACTION (RIA), EMBRACED (IA-DEMO), CAPIFLA (RIA), BIOFOREVER (IA-DEMO), AFTERBIOCHEM (FLAGSHIP). See also HORIZON-JU-CBE-2023-IA-03 "Improve fermentation processes (including downstream purification) to final bio-based products" and HORIZON-JU-CBE-2023-IA-05 "Development of scalable safe bio-based surfactants, with an improved sustainability profile"

HORIZON-JU-CBE-2023-IA-07 High performance, circular-by design, bio-based composites

Type of action	Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 15 million
Expected EU contribution per project	It is estimated that a contribution of EUR 7.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 6-7 at the end of the project.
Link to CBE JU Specific Objectives	<i>2.1 reinforcing the integration of bio-based research and innovation throughout industrial bio-based systems</i> <i>3.1 Ensuring the integration of circularity and environmental sustainability requirements, contribution to climate neutrality and zero pollution ambition in the development and implementation of bio-based research and innovation and facilitate societal acceptance</i>
Link to CBE JU SRIA Strategic Priorities	<i>2.1.2: Deploy innovative production technologies</i> <i>2.1.3: Scale up production and market uptake of innovative bio-based products.</i> <i>3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i>
CBE JU KPIs	<i>3 Ensure environmental sustainability of feedstock</i> <i>4.5 N of products with improved life cycle environmental performance</i> <i>5.1 N of innovative products that are biodegradable, compostable, recyclable, reused or upcycled (circular by design)</i> <i>6 Increase innovative bio-based outputs and products</i> <i>7 Improve the market uptake of bio-based products</i>

Expected outcomes

Successful proposals will contribute to the implementation of the EU Bioeconomy strategy, the Circular Economy Action Plan, the Sustainable Products Initiative (SPI), as well as the New European Bauhaus initiative and the EU Industrial Strategy.

Project results should contribute to the following expected outcomes:

- Availability of sustainable and circular bio-based composites meeting high technical performance requirements;
- Improved circularity and overall sustainability of downstream sectors taking into account both the production and use phase, as well as end of life considerations of composites;
- Significant improvement of environmental performance across the value chain against specified fossil and/or bio-based benchmarks;
- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept;

- Facilitation of market uptake of scalable bio-based solutions.

Scope

Many sectors applying composites in their products have set a target of shifting from fossil-based towards bio-based and/or materials with a high recycled content. Current commercial bio-based polymers and natural fibre-based materials are however suited to respond only to a part of the projected increased demand. Limitations include not being fully compatible with current industrial processing, not being able to fully meet target application requirements, and/or their higher cost vs existing solutions.

Like conventional polymer matrices for composites, bio-based matrix materials can be divided into two different polymer groups of: i) thermoplastics and ii) thermosets. Thermoplastic polymers are characterised by reversible chemical bonds while thermosets have strong covalent bonds and crosslinking (aspects that may impact their recyclability). Regarding bio-based composites, demonstration activities have mainly focused on the integration of (natural or synthetic bio-based) fibres in fossil-based polymer matrices up to now, rather than fully bio-based composites (i.e. including both bio-based matrix and fibres).

Processability during manufacturing (including aspects of thermal stability), technical performance of the end product along its life cycle, and durability are some of the key challenges to address for bio-based composites. It is also important to address the end of life and circularity challenges of composites, including recycling, re-using or upcycling.

Proposals under this topic should:

- Demonstrate, at a relevant scale, the production of bio-based⁶⁹ composite materials and products made from bio-based natural (e.g. plant) fibres and/or bio-based synthetic fibres (e.g. lignin carbon fibres), in bio-based thermoset and/or thermoplastic matrices. Proposals can address one or more classes of fibres and matrices depending on the application(s) and products in scope.
- In addition to the demonstration of the innovative composite end product, proposals may also include demonstration of the production of innovative fibres, matrix or both, as well as full formulation with relevant innovative bio-based additives where applicable.
- Meet end-product technical performance requirements dictated by the final application (e.g. mechanical and thermal stability properties, fire resistance, corrosion resistance, durability...).
- Design for sustainability and with a focus on enabling circularity to address major challenges of end of life in end use sectors. Circularity aspects can include also considerations in increasing the recyclable content, biodegradability and/or compostability (under specified conditions). The choice of the end of life option must be compatible with application and technical performance requirements. In case of recycling, the recycling routes for the composite materials in scope should be tested and a strategy should be proposed on the basis of existing practices and infrastructures.

⁶⁹ In the context of this topic, bio-based is considered as having at least 95% of organic carbon content from bio-based sources (measured using the C 14 method as defined in EN 16640:2017)

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- Address composites manufacturing issues, minimising CAPEX impacts, employing energy- and resource-efficient processes and minimising the amount of hazardous substances used in production.
- Include a task to integrate assessment based on the safe-and-sustainable-by-design (SSbD) framework, developed by the European Commission, for assessing the safety and sustainability of chemicals and materials³¹. Under this context, projects are expected to contribute with and develop recommendations that can advance further the application of the SSbD framework³².

Proposals must implement the multi-actor approach and demonstrate the involvement of all concerned key actors in the bio-based systems, such as researchers and technology providers bio-based processing industries, end-users and consumers (in case of B2C* value chains).

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Proposals should consider synergies with past and ongoing projects.⁷⁰

⁷⁰ Proposals should consider ongoing and past projects, especially under BBI JU/CBE JU as well as H2020 but also HEU (Cluster 4 and 6). E.g. topic HORIZON-JU-CBE-2022-RIA-03 "Circular-by-design bio-based materials to improve the circularity of complex structure", HORIZON-CL6-2023-CircBio-01-8: Eco-friendly consumer products – low-toxicity/zero pollution construction bio-based materials, BBI projects BIZENTE, VIBES, SSUCHY, ECOXY

HORIZON-JU-CBE-2023-R-01 Phyto-management; curing soil with industrial crops, utilising contaminated and saline land for industrial crop production

Type of action	Research and Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 10 million
Expected EU contribution per project	It is estimated that a contribution of EUR 5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 5 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>1.1: Increase the intensity of cross-disciplinary research and innovation activities</i></p> <p><i>1.3 Increase and integrate the research and innovation capacity for addressing environmental challenges and development of more sustainable bio-based innovations</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>1.1.1 - Ensure the availability and quality of sustainable biobased feedstock</i></p> <p><i>1.3.1 - Protect and enhance biodiversity and ecosystem services in bio-based feedstock supply systems</i></p> <p><i>2.1.1 - Demonstrate the sustainable supply of bio-based feedstock</i></p>
CBE JU KPIs	<p><i>1.1. N of primary producers, involved as project beneficiaries and/or engaged in value chains at project level</i></p> <p><i>2. N of innovative bio-based value chains created or enabled based on sustainably-sourced biomass</i></p> <p><i>3.2 N of projects using feedstock generated with practices aiming at zero-pollution (soil, water, air) and/or at reducing water consumption</i></p> <p><i>10.3. N of projects with synergies with other funding programmes at EU, national or regional level</i></p>

Expected outcomes

Successful proposals will contribute to the EU Mission “A Soil Deal for Europe”, EU Bioeconomy Strategy, EU Long-Term Vision for Rural Areas, Circular Economy Action Plan and Common Agriculture Policy by testing new zero-pollution approaches and business models for a successful green transition in rural areas in line with the European Green Deal objectives.

Project results should contribute to the following expected outcomes:

- Increased availability of domestic raw materials for use in non-food high-value applications in the bio-based industries.

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- Enhanced knowledge on sustainable options to extract, recover, added value compounds as well as on the processing of the biomass into high value products.
- Development of guidelines, recommendations, thresholds, and restrictions related to the utilised biomass in form of specific case studies.
- Better knowledge on characteristics and quality of biomass grown on contaminated and salt-affected soils.
- Improved environmental condition of post-industrial and other relevant areas affected by soil contamination or salinity, in view of their future reconversion to other uses (agriculture, recreation etc).
- Significant contribution to the objectives of the R&I mission 'A Soil Deal for Europe'.

Scope

Phytoremediation, the use of plants to remove contaminants from the environment and in particular soils, has become an important approach in ecological engineering. However, contaminated lands are normally left fallow for a long period of time as there is a risk of bioaccumulation in food crops.

A relatively new area of phytoremediation is phytomanagement in which non-food high biomass yielding crops are used to reduce and control risks arising from soil pollution, while making a profitable and sustainable use of resources possible by extracting contaminants and valorising marketable biomass.

Considering the increasing demand of biomass and resulting potential land-use conflicts, the cultivation of industrial crops in contaminated soils offers great environmental benefits and new social and economic opportunities for primary producers, broader society and the entire bio-based value system.

Furthermore, this topic addresses phytoremediation techniques for salt-affected soils to better understand the potential of selected high-yielding industrial crops to restore soil fertility and ecosystem services, including in view of the reconversion to future uses (agriculture, recreation etc).

The high biomass yield (productivity) is an important aspect of the topic.

Proposals under this topic should:

- Test and optimise, validate and monitor the cultivation and production of high-yielding and resilient industrial crops to restore contaminated lands (by heavy metals or organic/inorganic pollutants) or remediate salt-affected soils in support of the biodiversity and climate objectives.
- Assess resource-efficient pathways in specific case studies for the valorisation and conversion of biomass and recovered compounds for high-value applications, linking with relevant bio-based industry actors, while taking into account the levels of pollution and/or salinisation and suitability of the crop for site phyto-management⁷¹.

⁷¹ Taking into account the local soil microbiomes and their contribution for crop phyto-management potentials.

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- Identify and validate economic-viable value chains, end products and applications of bio-based products in which farmers play an active role and generate additional income.
- Ensure the minimisation of environmental impacts in the context of good agricultural practices and possible sanitary and other safety related implications through guidelines and Life Cycle Environmental Assessments.
- Include a task to closely cooperate with activities and projects funded under the Mission 'A Soil Deal for Europe', and other parallel projects funded e.g., under Horizon Europe., as well as with civil society (e.g. NGOs) to benefit from social innovation, creativity and engagement⁷².

Proposals must apply the concept of the 'multi-actor approach' and ensure adequate involvement of primary producers and other relevant actors in rural/post-industrial areas.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects⁷³.

⁷² Especially as related to biodiversity enhancement, recreation and other eco-system services' potentials.

⁷³ Proposals should consider ongoing and past projects, especially under BBI JU/CBE JU as well as H2020, LIFE but also HEU.

HORIZON-JU-CBE-2023-R-02 Optimised forest-based value chains for high value applications and improved forest management

Type of action	Research and Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 10 million
Expected EU contribution per project	It is estimated that a contribution of EUR 5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 5 at the end of the project.
Link to CBE JU Specific Objectives	<p><i>1.1 Increase the intensity of cross-disciplinary research and innovation activities</i></p> <p><i>1.3 Increase and integrate the research and innovation capacity for addressing environmental challenges and development of more sustainable bio-based innovations</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>1.1.1 - Ensure the availability and quality of sustainable biobased feedstock</i></p> <p><i>1.3.1 - Protect and enhance biodiversity and ecosystem services in bio-based feedstock supply systems</i></p>
CBE JU KPIs	<p><i>1.1.N of primary producers, involved as project beneficiaries and/or engaged in value chains at project level</i></p> <p><i>2. N of innovative bio-based value chains created or enabled based on sustainably sourced biomass</i></p> <p><i>3.1 N of projects using feedstock generated with practices that contribute to enhance biodiversity</i></p> <p><i>3.2 N of projects using feedstock generated with practices aiming at zero pollution (soil, water, air) and/or at reducing water consumption</i></p> <p><i>3.3 N of projects using feedstock generated with practices contributing to climate change mitigation and/or adaptation</i></p> <p><i>5.2 N projects developing circular production practices (incl. industrial & industrial-urban symbiosis)</i></p>

Expected outcomes

Successful proposals will contribute to the Bioeconomy Strategy, the Long-Term Vision for Rural Areas, Biodiversity Strategy and Forest Strategy by promoting new business models for a successful green transition in primary production and rural areas in line with the European Green Deal objectives. Project results should contribute to the following expected outcomes:

- Improved overall environmental impact of the forest management practice, due to higher understanding and appreciation of natural forest biodiversity, knowledge on climate change impacts, and improved non-invasive quality control.
- Optimized application of the cascading use of biomass in regional industrial ecosystems, based on the principles of circularity, residue up- and re-cycling and industrial symbiosis.

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- Increased engagement and innovation capacity of regional and local actors, including bio-based industry, and in particular SMEs, as well as social impact in rural areas.
- Increased consideration of the sustainability objectives, for the multifunctional forestry value chains, contributing to speeding up deployment and maximising the opportunities in new rural industrial ecosystems.
- Strengthened application of the hierarchy of materials use, trade-offs, synergies, business models, participatory approaches, with positive environmental, social and economic impacts in regional and rural development.

Scope

European forests are important providers of multiple feedstocks and services including biomass used for a wide variety of uses, where the assurance of sustainability plays a key role. Moreover, they host a wealth of biodiversity and act as highly effective carbon sinks, in addition to other multiple functions in bioeconomy (e.g. recreation, 'reconnection with nature'), and ecosystem services (e.g. water retention, soil quality/prevention of erosion etc). However, they are presently facing increasing pressure from climate change and other environmental pressures. Extreme weather conditions and fluctuations, changing pathogen niches, water stress and infestations from insects, rot and fungi, resulting from or worsened by climate change, are having an increasingly stronger negative impact on trees and forest ecosystems. Availability and quality of data and information about the growing forest is a key for success together with digital tools of handling the data in specific purposes of interest. The speed of development in both data handling, machine learning and data collection bring new opportunities to this research field. Forest operators need to adapt to these fast-changing conditions to ensure the continued role of forests in providing biomass, enhancing biodiversity and absorbing atmospheric carbon. Sensing, data acquisition and predictive technologies can prove a key enabler for data-driven decision making in forest-based operations. These range from maintaining forest health through monitoring and corrective actions, to quality control of wood and non-wood biomass, to support decision making on the best application of each biomass (wood and non-wood, when applicable) component.

Proposals under this topic should:

- Develop or upgrade non-invasive solutions for forest health monitoring and wood quality control (including remote and automated operations), taking into account the European and regional variety of forests. The developed solutions should support sustainable forest management via better understanding of forest ecosystem characteristics (including multi-species' interactions in forest ecosystems⁷⁴), and of the relation between growth conditions of the trees/forest ecosystems (presence of parasites or pests, biodiversity, climate change stress) and the resulting woody biomass quality.
- Apply data gathering and monitoring across the whole value chain from forest operations to transport, storage and processing of wood. Use this knowledge for decision support and prediction throughout forest-based operations to optimise the value chain in scope. Decision support is needed for instance to identify the best moment for harvesting/conservation/treatment options. Data gathering and monitoring

⁷⁴ such as the symbiotic/parasitic eco-system relations (important for e.g. growth support, defence mechanisms etc) including any climate-change-related aspect, e.g. between trees, fungi, lichens, mosses, insects etc.

of tree growth will assist in anticipating and projecting resulting wood quality and forest ecosystem health.

- Identify early intervention actions to restore and enhance forest health, (e.g. new or better adapted varieties with higher resistance to pathogens, pests, water scarcity adaptation etc) in particular to mitigate and adapt to effects of climate change and to enhance the natural biodiversity potential and forest resilience ('learning from nature' approaches). A feedback loop should be created with the forest management and the ecosystem research sectors to reach this goal.
- Identify the most suitable application(s) for different grades of woody feedstock (which may include wood rot, insect damaged and storm damaged wood, but also local varieties and wood whose characteristics are affected by climate change stress) and apply innovative solutions for their valorisation. When applicable, the activity can include additional sources of primary biomass such as bark, stumps, leaves, nuts etc. aiming at full valorisation of forest biomass. Higher quality of wood means it is increasingly used for high value and durable applications (e.g. construction sector), increasing its carbon storage potential.
- Optionally, proposals can include downstream processing of the selected feedstock for the identified applications, to assess the impact of the innovations introduced by the project in relation to the benchmark.
- In a dedicated task on Life Cycle Environmental Assessment conducted to understand the environmental impact of the proposed solutions, consider in particular the biodiversity enhancement and resource efficiency potentials. Conduct the social impact assessment to understand the impact on rural actors. Identify the economically viable opportunities and new business cases, for the forest economy stakeholders, developing the recommendations and suggestions, in particular for any uptake or deployment actions ⁷⁵.

Proposals should build on past or ongoing research projects⁷⁶ and collaborate with relevant initiatives, including the Forest Information System for Europe (FISE).

Proposals must implement the multi-actor approach and ensure adequate involvement of all key actors in the rural value chains relevant for this topic including researchers, feedstock producers and suppliers (including forest managers), regional actors, and civil society.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

⁷⁵ such as under the parallel topic HORIZON-CBE-2023.F2. Optimised and integrated forest-based value chains

⁷⁶ e.g. under topic HORIZON-CL6-2023-CircBio-01-14: Monitoring the multi-functionality of European forests or topic HORIZON-CL6-2023-CircBio-01-12: Optimising the sustainable production of wood and non-wood products in small forest properties and development of new forest-based value chains. Links to the activities under the Soil Mission and LIFE programme could be foreseen.

HORIZON-JU-CBE-2023-R-03 Robust and optimised industrial biotech and chemical/industrial biotech processes

Type of action	Research and Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 10 million
Expected EU contribution per project	It is estimated that a contribution of EUR 5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 5 at the end of the project.
Link to CBE JU Specific Objectives	<i>1.1 Increase the intensity of cross-disciplinary research and innovation activities</i> <i>1.3 Increase and integrate the research and innovation capacity for addressing environmental challenges and development of more sustainable bio-based innovations</i>
Link to CBE JU SRIA Strategic Priorities	<i>1.1.2: Develop innovative production systems in the bio-based industry</i> <i>1.3.2: Improve environmental performances of bio-based processes</i>
CBE JU KPIs	<i>4 Improve environmental sustainability of bio-based production processes and value chains</i> <i>5.2 Number of projects developing circular production practices (incl. industrial & industrial urban symbiosis)</i> <i>6 Increase innovative bio-based outputs and products</i>

Expected outcomes

Successful proposals will contribute to the Industrial Strategy, Green and Digital transition and Circular Economy Action Plan, as well as to the achievement of European Green Deal objectives. Proposals will also contribute to the EU Bioeconomy Strategy implementation, developing processes with improved environmental performances, maximum resource- and energy-efficiency, and optimal cascading use of bio-based feedstock, aiming for 'zero waste' and 'zero-pollution' operations.

Project results should contribute to the following expected outcomes:

- (Industrial) biotech or chemical/(industrial) biotech processing routes with improved efficiency compared to established routes, or completely new processing routes that are currently unavailable;
- Cost-competitive bio-based products;
- Improvement of the environmental performance of bio-based processes through resource-efficient valorisation of sustainable biomass feedstock, while addressing (i.e. reduction/elimination) pollution issues in production processes;
- Significant improvement environmental performance across the value chain against specified fossil and/or bio-based benchmarks;

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- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept;
- Availability of broader range of bio-based products meeting market requirements.

Scope

Industrial biotech processes often have limitations of scaling up and continuous processing. There is an additional complexity of reduced biocatalyst robustness and poor process metrics, especially when applied in sequence with chemical pre-processing. Industrial biotech processes can be used to replace chemical conversion steps which may pose safety or resource efficiency issues (e.g. necessitating complex reactions with protective groups, hazardous solvents etc.), or may be high in energy demand (heat, pressure) etc. Vice versa, some biotechnological conversion steps can be difficult to scale up because of e.g. substrate inhibition, difficult product removal, co-factor regeneration: in this case, chemical conversion steps can provide improvements.

Proposals under this topic should:

- Identify existing, industrially relevant, bio-based process(es) (upstream and conversion steps) and identify the areas of intervention and bottlenecks to improve process flexibility, robustness, techno-economic feasibility and environmental performance. The proposal should consider the case of developing combined processes using biotech and chemical⁷⁷ approaches synergistically in order to optimise process and/or (bio)catalyst design for obtaining bio-based products.
- Incorporate reactor design (e.g. membrane reactors, small-scale reactors, microfluidics), process design, process control and optimisation as well as catalysis optimisation aspects that are relevant to also enable tandem chemical/biotech processes, and where applicable for optimisation of continuous production approaches (batch2continuous).
- Identify, optimize/engineer and test more active and robust microbial hosts and their enzymes, or other (bio)catalysts, against relevant process conditions (including physical and chemical stressors). The projects should also consider integrating the biofoundry and synthetic biology advances⁷⁸;
- Ensure and assess productivity, yield, robustness, flexibility of the process.

Overall, modifications and optimisation of the (physico)chemical steps to further optimize chemical/biotech tandem processes are also in scope and could be considered.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects⁷⁹.

⁷⁷ Chemical processes include electrochemical processes

⁷⁸ Biofoundry concept (integrated molecular biology facility that includes robotic liquid-handling equipment, high-throughput analytical equipment, and the software, personnel and data management systems required to run the equipment and broader biofoundry capabilities).

⁷⁹ Proposals should consider ongoing and past projects, especially under BBI JU/CBE JU as well as H2020 but also HEU (Clusters 4 and 6). See also HEU-CBE-JU-IA-03 "Improve fermentation processes (including downstream purification) to final bio-based products".

HORIZON-JU-CBE-2023-R-04 Development of novel, high-performance bio-based polymers and co-polymers

Type of action	Research and Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 10 million
Expected EU contribution per project	It is estimated that a contribution of EUR 5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 4-5 at the end of the project.
Link to CBE JU Specific Objectives	<i>1.1: Increase the intensity of cross-disciplinary research and innovation activities</i>
Link to CBE JU SRIA Strategic Priorities	<i>1.1.2: Develop innovative production systems in the bio-based industry</i> <i>1.1.3: Develop innovative bio-based products</i>
CBE JU KPIs	<i>4.5 Number of products with improved life cycle environmental performance</i> <i>5.1 Number of innovative products that are biodegradable, compostable, recyclable, reused or upcycled (circular-by-design)</i> <i>5.2 Number of projects developing circular production practices (incl. industrial & industrial urban symbiosis)</i> <i>6 Increase innovative bio-based outputs and products</i>

Expected outcomes

In line with the objectives of the EU Bioeconomy Strategy, Plastics Strategy and Industrial strategy, successful proposals will contribute to development of new, high performance materials for the European industry. Successful proposals may also contribute to achieving the objectives of the Sustainable Products Initiative (SPI) and the Sustainable Textiles strategy.

Project results should contribute to the following expected outcomes:

- Availability of broader range of bio-based products meeting market requirements;
- Unlocking new applications presently not covered by bio-based polymers;
- Improved sustainability, safety and circularity when compared to fossil-based (or bio-based) state of art;
- Evidence of promising product and process performance for reference applications in view of subsequent upscaling;
- Significant improvements in environmental performance across the value chain, against specified fossil and/or bio-based benchmarks;
- Improved circularity and resource efficiency via practical application of the circular (bio)economy concept.

Scope

Many bio-based monomers and polymers are (relatively) new: while some are well characterised and already produced at industrial scale, there are hundreds of molecular structures with limited application outside the lab, which may be worth exploring in view of future upscaling and market uptake. Often, bio-based polymers have a limited application space in comparison with established fossil-based counterparts also due to some undesired properties (e.g. brittleness, low glass transition temperature). Co-polymerisation or blending with other materials could also be one way to provide a solution to overcome at least some of these issues, but research in the field is scarce due to their (relative) novelty and unavailability of materials in sufficient quantity (at least pilot scale) to perform testing and characterisation.

Proposals under this topic should:

- Develop polymers with improved or unprecedented properties by:
 - Polymerisation of bio-based monomers with no fossil-based counterpart to produce new polymers with unprecedented properties, **and/or**
 - Co-polymerisation of (new or known) bio-based monomers to improve the properties of the copolymer with respect to the original polymer(s), **and/or**
 - Blending of (new or known) bio-based polymers to obtain materials with novel, advanced properties
- Design the polymers so that they are able to match application requirements without using potentially hazardous additives and substances of concern in the end product formulations. Proposals need to specify the end applications sought and involve potential end users to provide specific application requirements.
- Develop pilot scale production and test the products against application requirements, demonstrating high performance and market suitability. Process design choices should take into account energy and resource efficiency showing the potential for future scale up.
- Perform a preliminary assessment of the safety, circularity and overall sustainability of the developed polymers in view of the subsequent scale-up phase. Circularity aspects should be considered from the early stages of material design, based on existing or novel end of life (EoL) options. In the absence of suitable EoL options, projects should highlight R&I gaps that may be taken up by future projects.
- Perform a preliminary techno-economic feasibility analysis of the subsequent scale-up phase, including market considerations (demand; target price; competing products; estimated lead time)

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects.⁸⁰

⁸⁰ Proposals should consider ongoing and past projects, especially under BBI JU/CBE JU (for example those funded under the call HORIZON-JU-CBE- 2022-R-01) as well as H2020 but also HEU (Clusters 4 and 6)

HORIZON-JU-CBE-2023-R-05 Pre-normative research to develop standards for biodegradability of bio-based products in controlled and in open environments

Type of action	Research and Innovation Action
Indicative budget	The total indicative budget for the topic is EUR 5 million
Expected EU contribution per project	It is estimated that a contribution of EUR 5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	TRL 5 at the end of the project.
Link to CBE JU Specific Objectives	<i>1.1: Increase the intensity of cross-disciplinary research and innovation activities</i> <i>3.1: Ensure the integration of circularity and environmental sustainability requirements, contribution to climate neutrality and zero pollution ambition in the development and implementation of bio-based research and innovation and facilitate societal acceptance</i>
Link to CBE JU SRIA Strategic Priorities	<i>1.1.3: Develop innovative bio-based products</i> <i>3.1.3: Facilitate social acceptance of bio-based applications</i>
CBE JU KPIs	<i>5.1 N of innovative products that are biodegradable, compostable, recyclable, reused or upcycled (circular by design)</i> <i>5.2 N of projects developing circular production practises (incl. industrial & industrial urban symbiosis)</i>

Expected outcomes

The successful proposal will enable the bio-based industries in the Union to contribute to the enhancement of European bio-based industrial sustainability and to the development of innovative and sustainable value-chains in the bio-based sectors. Project results will contribute to deliver bio-based solutions which are biodegradable either in controlled or in open environments, with reduced environmental impacts on soil, water and air quality, biodiversity and climate, in line with the EGD objectives, the EU circular economy and the EU zero pollution action plans.

Project results should contribute to the following expected outcomes:

- Development and validation of the methodology to test the safe biodegradation of bio-based materials and products both in controlled and in open environments
- Support to the development of standard(s) for biodegradability in controlled/open environments and clear labelling for end consumers and customers
- Societal acceptance of bio-based circular bio-based solutions and products
- More responsible and informed choices in consumption
- Significant improvement in environmental sustainability and safety across the bio-based value chains

- Significant contribution to the objectives of the R&I missions 'A soil deal for Europe' and 'Restore our oceans and waters'

Scope

The amount of waste littered in the open environment and causing pollution from harmful substances released from such waste streams, e.g., from plastic littering, has reached the level of a global emergency, especially affecting soil and water quality and biodiversity in land and marine environments. The overall low level of recycling of many waste streams, including collected plastic waste, is also part of such global pollution challenge. Biodegradability of materials and products for targeted applications may offer viable end-of-life solutions in case of safe and sustainable biodegradation either under controlled conditions, i.e., in composting plants and anaerobic digestors, or in open environments. However, there is still a need for clarity on how to label biodegradable products and a lack of standards covering the range of conditions under which a (claimed) biodegradable material actually biodegrade to the desired extent and in the desired time frame to ensure a safe end-of-life.

Proposals under this topic should:

- Select applications for biodegradable bio-based materials and products. Such applications should include materials and products which show environmental benefits from being biodegradable in one (or more) of the following cases: i) controlled environments (if separately collected after their use), such as industrial composting plants, anaerobic digestors and home-composting, for example in cases where products and materials are contaminated from food or from other organic substances during their use⁸¹; ii) open environments, for example in those cases of uncontrolled waste littering⁸², or in those cases where the products are used already in the open environment and their biodegradation 'in situ' is the expected end-of-life⁸³.
- Identify gaps and needs of existing methods and standards to test the biodegradability of materials and certification schemes applicable to the bio-based material and products selected.
- Select a set of combinations of bio-based products and end-of-life environments. The set of combinations should cover all of the following end-of-life pathways in: industrial composting plants, anaerobic digestors and home-composting, as controlled environments, and soil and water, as open environments. The choice of products and applications should be based on the review of existing standards and gaps and on the indications from the current legislative framework⁸⁴, as well on current market volume, projected market volume (to capture emerging materials) and, in the case of end-of-life in open environments, the likelihood of the product being released (fully or partially) to the environment during its use of afterwards.
- Design new/improve existing tests of biodegradability in the specific environments for the selected set of combinations, under representative ranges of physical/chemical conditions.

⁸¹ E.g., coffee/tea bags, food carrier bags, food packaging, etc.

⁸² E.g., micro particles/fibrils leaking from textiles during their use/washing, microplastics coming from fragmentation of macro-plastic used in open environments, etc.

⁸³ e.g., agricultural mulching films, fishing gears, etc.

⁸⁴ For example, Regulation on alternative fertilising products, REACH regulation, Strategy for Sustainable and Circular Textiles , Directive on single-use plastics

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The tests should include the monitoring of all relevant environmental impacts, including, but not limited to, emissions, eco-toxicity and any impacts on natural ecosystems, from biodegraded materials, including from micro-plastics, and from their additives during the biodegradation process. The tests should include, as a parameter of biodegradation process, the time-frame of partial up to full biodegradation. A risk assessment should be planned as well, based on the monitored parameters.

- Validate the tests of biodegradability of the selected set of combinations and develop protocols for their replication. The trials of biodegradation of bio-based materials in different environments should be performed and monitored under representative ranges of physical/chemical conditions.
- Develop a proposal for the development and/or the update of standards for tests of biodegradability for the selected applications.
- Perform a survey among the concerned consumers and end-of-life stakeholders to get insights on the information necessary on the correct use and end-of-life disposal options of the selected bio-based products. This includes information about the specific conditions/environments for use and end-of-life (e.g., recycling, composting, anaerobic digestion, home-composting, 'in situ' biodegradation, etc.) and recommendations on the integration of such information in the existing labelling systems.
- Design measures to deliver transparent communication, aiming at improved societal acceptance of bio-based innovation and at supporting consumers, public procurers and the business-to-business market in making responsible and informed choices. It should include the information about the environmental impacts, including on ecosystems, of uncontrolled disposal and of uncontrolled littering into the open environments and of the consequent risks.

In order to achieve the expected outcomes, the consortium should include a standardisation body, to monitor and be consulted on the development of the tests, to the development of the standards proposal, to participate in the consultations on the labelling systems. Suggested members of the consortium are researchers in the bio-based technologies, bio-based industries, trade bodies, consumers' associations and any relevant stakeholder along the value chain of industrial bio-based systems, as well as waste management companies and facilities.

An advisory board shall be established by the project. The Bio-Based Industries Consortium and a representative from the European Commission should be part of this advisory board to provide expertise in the implementation and follow up of the different tasks.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Where relevant, proposals should seek links with and capitalise on the results of past and ongoing EU funded projects^{85,86}.

⁸⁵ Especially the FP7 Open-BIO project <https://www.biobasedeconomy.eu/projects/open-bio/>

⁸⁶ For example HORIZON-CL6-2022-CIRCBIO-02-03-two-stage: Sustainable biodegradable novel bio-based plastics: innovation for sustainability and end-of-life options of plastic; HORIZON-CL6-2024-CircBio-01-5: Programmed biodegradation capability of bio-based materials and products, validated in specific environments. Also, topics from the Processes 4 Planet partnership and other European partnerships of Horizon Europe, the Horizon Europe Missions, especially 'A soil deal for Europe' and 'Restore our Ocean and Waters' and their work programmes should be considered.

HORIZON-JU-CBE-2023-S-01 EU-wide network of pilot plants and testing facilities, improving SMEs and start-ups' access to scale-up

Type of action	Coordination and Support Action
Indicative budget	The total indicative budget for the topic is EUR 1.5 million
Expected EU contribution per project	It is estimated that a contribution of EUR 1.5 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
Financial support to third parties	It is estimated up to EUR 300 000
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Beneficiaries may provide financial support to third parties. The total amount estimate for this support is EUR 300 000. The support to third parties can only be provided in the form of grants. The maximum amount to be granted to each third party is EUR 50 000
TRL	n/a
Link to CBE JU Specific Objectives	<p><i>1.2: Increase and integrate the research and innovation capacity of stakeholders across the Union</i></p> <p><i>2.1: Reinforce the integration of bio-based research and innovation throughout industrial bio-based systems and increase the involvement of R&I actors including feedstock providers in the bio-based value chains</i></p> <p><i>2.2: Reduce the risk for research and innovation investments in bio-based companies and projects</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>1.2.1: Stimulate research activities in countries and regions with underdeveloped R&I capacity for bio-based systems</i></p> <p><i>2.1.3: Scale up production and market uptake of innovative bio-based products</i></p> <p><i>2.2.2: Develop investment tools and approaches that mitigate the investment risk in bio-based systems</i></p>
CBE JU KPIs	<p><i>7.1 Number of brand owners involved as project partners and/or engaged with other mechanisms</i></p> <p><i>9.1 Number of projects contributing to develop the skills and capacity needed by the EU bio-based sector</i></p> <p><i>10.1 Number of participants from the underrepresented EU countries and regions</i></p> <p><i>10.3 N of projects with synergies with other funding programmes at EU, national or regional level</i></p>

Expected outcomes

In line with the objectives of the EU Bioeconomy Strategy, Industrial strategy and SME strategy, the successful proposal will facilitate the access of innovative bio-based SMEs and start-ups to scale-up and growth.

Project results should contribute to the following expected outcomes:

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- Integration of pilot plants and test rigs, labs for testing and upscaling bio-based processes in an open and long lasting community with an EU-wide scope, bringing them together with users such as SMEs and start-ups
- Capacity building for researchers including enabling access to research, testing and upscaling infrastructures and services
- Access to scale-up and testing facilities for SMEs and start-ups, as well as academia actors searching for facilities and support to scale up their lab-scale processes with an outlook towards future commercialisation.

Scope

Availability and accessibility of testing and pilot infrastructures is a key element to increase and integrate the research and innovation capacity of stakeholders across the Union, especially SMEs and start-ups that often lack the ability of performing scale-up research in-house. While the number of open access facilities is growing across Europe, there are considerable discrepancies in geographic distribution and scale, which means that many SMEs and start-ups have difficulties in getting access to scale-up facilities beyond pilot scale. As a consequence, local bioeconomy potential is not fully exploited, particularly in under-represented countries and regions. Past and ongoing projects at national, macro-regional and European level have produced maps and databases of existing open access facilities and organisations across Europe, but their efforts are often scattered and there's a need for a centralised and all-encompassing approach. Besides making available and updating a EU-wide database of such facilities, there is also a need of turning it into a community, bringing together demand and offer and providing matchmaking and networking occasions for pilot facilities, open access labs and test rigs on one side and SMEs, start-ups, research groups and large companies on the other.

Proposals under this topic should:

- Map existing infrastructures for pilot, testing and upscaling bio-based processes⁸⁷ in Europe, building on and going beyond existing databases, with a geographic distribution encompassing all EU countries. Create an open database of such infrastructures.
- Create and manage a community bringing together facilities, SMEs/startups and researchers, encouraging the access of the latter to the scale up ecosystem. The community should also involve large companies and market actors, investors and finance actors to provide networking and matchmaking opportunities for the SMEs and startups.
- Establish assistance, training and support services for SMEs and startups (e.g. related to process design, access to finance) in view of scaling up their process technology. Create opportunities for knowledge exchange and commercial development of the scaled-up innovations by connecting innovators and market/finance actors.
- Work in synergy with the European Strategy Forum on Research Infrastructures (ESFRI) and other R&I infrastructure-related initiatives to develop an integrated and efficient ecosystem of research infrastructures (RIs) in Europe which includes pilot plants and test⁸⁸

⁸⁷ In scope of the CBE JU

⁸⁸ See further info on Technology Infrastructures: <https://op.europa.eu/en/publication-detail/-/publication/0df85f8b-7b72-11e9-9f05-01aa75ed71a1/language-en> See further info on Open Innovation Test Beds:

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rigs, labs for testing and upscaling bio-based processes, including regions where access to such facilities is currently lacking.

- Deploy actions to create or improve awareness of the opportunities related to the network of open access facilities, with a specific focus on under-represented countries and regions.
- Develop a viable business model with a credible revenue generation stream to make the database and community self-sustainable beyond the project duration. Test the exit strategy and revenue generation model already during the project duration to prove the business model and establish the foundations of future self-sustaining operations.
- Proposals may involve financial support to third parties to provide direct support (e.g. in the form of cascading grants) to (SMEs, SMEs cluster, local hubs, start-ups and spin-offs from universities and research organisations). A maximum of € 50 000 per third party might be granted. Conditions for third parties support are set out in Part B of the General Annexes. Consortia need to define the selection process of organisations, for which financial support will be granted. Maximum EUR 300 000 of the EU funding can be allocated to this purpose. The financial support to third parties can only be provided in the form of grants.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

Proposals should seek links with and capitalise on the results of past and ongoing EU funded projects⁸⁹

https://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-suppl-info-innotestbeds-18-20_en.pdf <https://cordis.europa.eu/article/id/436434-open-innovation-test-beds-to-accelerate-european-innovation>

⁸⁹ e.g. PILOTS4U: <https://biopilots4u.eu>, BioeconomyVentures: <https://www.bioeconomyventures.eu>; MPowerBio <http://mpowerbio.eu>

HORIZON-JU-CBE-2023-S-02 Extending regional assessment of environmental sustainability screening for the bio-based sectors

Type of action	Coordination and Support Action
Indicative budget	The total indicative budget for the topic is EUR 3 million
Expected EU contribution per project	It is estimated that a contribution of EUR 3 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts
TRL	n/a
Link to CBE JU Specific Objectives	<p><i>1.3 Increase and integrate the research and innovation capacity for addressing environmental challenges and development of more sustainable bio-based innovations</i></p> <p><i>2 Increase and integrate the research and innovation capacity of stakeholders across the Union</i></p> <p><i>3.1 Ensure the integration of circularity and environmental sustainability requirements, contribution to climate neutrality and zero pollution ambition in the development and implementation of bio-based research and innovation and facilitate societal acceptance</i></p>
Link to CBE JU SRIA Strategic Priorities	<p><i>1.1.1:- Ensure the availability and quality of sustainable biobased feedstock</i></p> <p><i>1.3.1: Protect and enhance biodiversity and ecosystem services in bio-based feedstock supply systems</i></p> <p><i>1.2.1: Stimulate research activities in countries and regions with underdeveloped R&I capacity for bio-based systems</i></p> <p><i>1.2.2: Increase awareness and capacity of national and regional research support agencies for industrial bio-based systems</i></p> <p><i>3.1.2: Incorporate the environmental sustainability and circularity criteria in bio-based systems</i></p>
CBE JU KPIs	<p><i>9. N of projects contributing to develop the skills and capacity needed by the EU bio-based sector</i></p> <p><i>10.1. N of participants from the underrepresented EU countries and regions</i></p> <p><i>10.3. N of projects with synergies with other funding programmes at EU, national or regional level</i></p>

Expected outcomes

The successful proposal will enable the bio-based industries in the Union to contribute to the fair and just green transition, enhancement of European bio-based industrial sustainability and socio-economic viability at regional level, and to boost inclusive innovation of sustainable value-chains in the bio-based sectors. Project results will contribute to increasing engagement, understanding and participation of regional stakeholders, including policymakers, to develop policy on bio-based solutions, in line with the EGD objectives, updated EU Bioeconomy Strategy, Biodiversity Strategy, the EU circular economy and the EU zero pollution action plans.

Project results should contribute to the following expected outcomes:

- Increased deployment of circular bio-based solutions in the regional settings, especially of the actors currently lagging behind⁹⁰, based on correct understanding of sustainability challenges and opportunities/benefits, while ensuring inclusive engagement of market operators and civil society, thus contributing to regional revitalization and fair and just green transition.
- Implement (i.e. integrate into regional/local policies) monitoring systems and assessment of the environmental impacts and circularity of bio-based systems for the EU single market and for international trade.⁹¹
- Improved understanding and awareness by the regional and local stakeholders including at the authorities' level, of the sustainability and circularity screening methodologies (for resources such as water, biodiversity, land use including 'marginal land' potentials/limitations, biological primary and secondary feedstock, which are all critical for the development of bio-based sectors and applications), supporting higher innovation capacity and inclusion of such methodologies into the regional bioeconomy strategies and action plans based on local resources, as well as social engagement.
- Improved resource efficiency of local resources and lowered environmental impact of the circular bio-based industrial activities in the regional and local scales (maximizing biodiversity enhancement and restoration through bio-based solutions, and the climate adaptation and resilience of bio-based systems).

Scope

While the bioeconomy carries great potential for achieving various policy aims related to sustainability, sustainability is not an intrinsic characteristic of the bioeconomy, but a potential it could achieve. For this reason, and to achieve the expected benefits, improving our capacity to assess the environmental impacts of bioeconomy (including any bio-based activity) development is of great importance. Regions⁹² can be considered the most appropriate territorial level at which to implement bioeconomy strategies, including for the innovative bio-based sectors. The aim of this action is to support decision-makers to incorporate considerations of ecological limits into their regional bioeconomy strategies and roadmaps, when it comes to circular bio-based activities.

Proposals under this topic should:

- Consider the existing datasets related to environmental sustainability assessment and its methodology options⁹³ and in particular Life Cycle Assessment (LCA) data developed under the past BBI JU projects, as a baseline to develop/expand guidelines, digital tools⁹⁴ and other policy recommendations for the regional-level authorities and other bio-based sector' stakeholders. Within the scoping of methodologies for safe and sustainability assessment, the safe and sustainable by design assessment framework³¹ should be considered.

⁹⁰ e.g. without regional bioeconomy/bio-based system roadmap or strategy, or in a need to regional revitalisation.

⁹¹ in synergy and building on the project supported under HORIZON-JU-CBE-2022-S-01 Developing and validating monitoring systems of environmental sustainability and circularity: collection of best practices and benchmarks

⁹² at the EU NUTS2/3 level, as more appropriate for the level of data availability and reflecting the regional level of the guidance developed.

⁹³ such as those developed under the topic HORIZON-JU-CBE-2022-S-01 Developing and validating monitoring systems of environmental sustainability and circularity: collection of best practices and benchmarks

⁹⁴ for environmental, sustainability and circularity monitoring such as those of advanced GIS, mobile web, robotics, cloud innovations, etc.

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- Include into study the following considerations: i) projections on bio-based chemicals and materials market growth, their value chains including biorefining options (small, including mobile, and large scale) and applications at EU/national and regional level, based on available sources⁹⁵, ii) tools to assess/model biomass (including secondary) availability requirements for chemicals, polymers and materials. iii) cover scenarios of growth while estimating impacts on food security Land Use, Land Use Change and Forestry (LULUCF), biodiversity and ecosystems integrity (including potentials/limitations of biomass provision from marginal land).
- Perform a policy analysis (e.g. conflicting policies/trade-offs)/SWOT) and provide recommendations to policy makers at local/regional/EU level, taking into account the geographical distribution of the feedstock, and considering the regional ecological and socio-economic boundaries, as well as the related social impacts
- Collect and analyze the (range of) best available industrial bio-based systems in the scope of CBE JU within the EU in terms of environmental and circular performances,
- Develop practical forums for case studies' collection and exchange of best practice at regional level, to build a preliminary set of benchmarks or references of best performing industrial systems, across a diversity of European regions, providing an inclusive platform for all stakeholders, including expert voices, market actors (especially SMEs), civil society (especially NGOs) and policy makers.
- Deploy actions to create or improve awareness of the policy makers related to opportunities in bio-based sectors, with a specific focus on under-represented regions.
- Ensure synergies and complementarities with parallel activities, including those of Circular Cities and Regions Initiative (CCRI)⁹⁶ and the projects funded under the Horizon Europe programme on bioeconomy governance, in particular when related to circular bio-based innovation systems⁹⁷.

Proposals must apply the concept of the 'multi-actor approach' and ensure adequate involvement of civil society, public authorities and other relevant actors at regional scales, in particular in policy-making capacity. This will contribute towards the aim to support 'fair and just green transition', and aiming at not leaving anyone behind in this process.

Proposals should also describe their contribution to the Specific CBE JU requirements, presented in section 2.2.3.1, and the Cross-cutting elements, highlighted in section 2.2.3.2.

An Advisory Board shall be established by the project. The Bio-Based Industries Consortium should be part of this Advisory Board to provide expertise in the implementation and follow up of the different tasks and provide support to the organisation of meetings and workshops.

⁹⁵ e.g. JRC Bioeconomy Knowledge Centre, biorefinery outlook assessments, BBI JU/CBE JU flagship mapping etc.

⁹⁶ <https://circular-cities-and-regions.ec.europa.eu/> In this regard, the proposals should share their knowledge, solutions and recommendations with the CCRI Coordination and Support Office and the CCRI-related projects. They are also encouraged to contribute to the CCRI activities and/or organize joint actions.

⁹⁷ such as the parallel topics HORIZON-CL6-2023-GOVERNANCE-01-5: Revitalisation of European local (rural / peri-urban) communities with innovative bio-based business models and social innovation, HORIZON-CL6-2023-GOVERNANCE-01-6: Co-creation and trust-building measures for biotechnology and bio-based innovation systems, HORIZON-CL6-2023-GOVERNANCE-01-7: Integrated assessment of land use and biomass demands to contribute to a sustainable healthy and fair bioeconomy,

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Cooperation with macro-regional initiatives such as BIOEAST Initiative⁹⁸ is encouraged. Explore the possibility to collaborate with and/or provide inputs to the European Commission Knowledge Centre on Bioeconomy.

International cooperation is encouraged, in order to collect best practices (indicators, methodologies, tools and data) outside EU and to expand the outreach of projects outputs, as a win-win solution, while taking care of the European industrial competitiveness.

⁹⁸ www.bioeast.eu; considering cooperation with the project BIOEAST-SUP and under parallel topic HORIZON-CL6-2023-GOVERNANCE-01-8: Mobilising BIOEAST networks for the development of national bioeconomy action programmes in support of the European Green Deal

Indicative budgets per topics

Topic	Million EUR
Innovation actions – flagship	
HORIZON-JU-CBE-20203-IAFlag-01 Optimised and integrated woody-based value chains	17
HORIZON-JU-CBE-20203-IAFlag-02 Expansion and/or retro-fitting of biorefineries towards higher-value bio-based chemicals and intermediates	17
HORIZON-JU-CBE-20203-IAFlag-03 Bio-based packaging materials with improved properties: barrier, food contact, forming, printability, safety, recyclability /circularity-by-design	17
HORIZON-JU-CBE-20203-IAFlag-04 Valorisation of aquatic biomass waste and residues	10
Innovation actions	
HORIZON-JU-CBE-20203-IA-01 Small scale biorefining in rural areas	15
HORIZON-JU-CBE-20203-IA-02 Production of safe, sustainable, and efficient bio-based fertilisers to improve soil health and quality	15
HORIZON-JU-CBE-20203-IA-03 Improve fermentation processes (including downstream purification) to final bio-based products	15
HORIZON-JU-CBE-20203-IA-04 Recycling bio-based plastics increasing sorting and recycled content (upcycling).	15
HORIZON-JU-CBE-20203-IA-05 Development of scalable, safe bio-based surfactants, with an improved sustainability profile	15
HORIZON-JU-CBE-20203-IA-06 Selective, sustainable production routes towards bio-based alternatives to fossil-based chemical building blocks	15
HORIZON-JU-CBE-20203-IA-07 High performance, circular-by design, bio-based composites	15
Research and innovation actions	
HORIZON-JU-CBE-20203-R-01 2.1 Phyto-management; curing soil with industrial crops, utilising contaminated and saline land for industrial crop production	10
HORIZON-JU-CBE-20203-R-02 Optimised forest-based value chains for high value applications and improved forest management	10
HORIZON-JU-CBE-20203-R-03 Robust and optimised industrial biotech and chemical/industrial biotech processes	10
HORIZON-JU-CBE-20203-R-04 Development of novel, high-performance bio-based polymers and co-polymers	10
HORIZON-JU-CBE-20203-R-05 Pre-normative research to develop standards for biodegradability of bio-based products in controlled and in open environments	5
Coordination and support actions	
HORIZON-JU-CBE-20203-S-01 EU-wide network of pilot plants and testing facilities, improving SMEs and start-ups' access to scale-up	1.5
HORIZON-JU-CBE-20203-S-02 Supporting the capacity of regions in environmental sustainability assessment for the bio-based sectors	3
Total	215.5

2.2.3.1. Conditions of the calls and calls management rules

This section sets the general conditions applicable to calls and topics for grants under this Annual Work Programme. It also describes the evaluation and award procedures and other criteria.

Call management and general conditions

Call identifier:	HORIZON-JU-CBE-2023
Call opening:	20 April 2023 ⁹⁹
Call deadline:	20 September 2023 17:00:00 (Brussels local time) - (single stage call)
Indicative budget:	EUR 215,5 million

The call included in this AWP, including evaluation and award procedures, will follow the General Annexes to the Horizon Europe Work Programme 2023-2024 which shall apply mutatis mutandis (with the exceptions introduced in the specific topic and the additional conditions reflected in the section below). There is no derogation from the Horizon Europe Rules for Participation.

Admissibility conditions	The conditions are described in HE General Annex A.
Eligibility conditions	The conditions are described in HE General Annex B.
Financial and operational capacity and exclusion	The criteria are described in HE General Annex C.
Award criteria	The criteria are described in HE General Annex D.
Documents	The documents are described in HE General Annex E.
Evaluation Procedure	The procedure is described in HE General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in HE General Annex G.

⁹⁹ The Executive Director may decide to open the call up to one month prior to or after the envisaged date of publication

Additional conditions

Admissibility

The conditions are described in Annex A of the General Annexes to the Horizon Europe Work Programme 2023–2024 which shall apply mutatis mutandis to the actions covered in this AWP, taking into consideration the following:

Page limits

- **Innovation Actions, including Flagships:** the page limit of the application is 70 pages (Part B).
- **Research and Innovation Actions:** the page limit of the application is 50 pages (Part B).

Dissemination and Exploitation plan

- **All types of Actions:** A first version of the 'plan for the dissemination and exploitation including communication activities' of the project's results should be included in the Part B of the proposal in line the standard HE application forms. This plan is an admissibility condition, unless the work programme topic explicitly states otherwise.

Eligibility

The conditions, including countries eligible for funding, type of actions and definition of TRL are described in Annex B of the General Annexes to the Horizon Europe Work Programme 2023–2024 which shall apply mutatis mutandis to the actions covered in this Work Programme, taking into consideration the following:

Given the illegal invasion of Ukraine by Russia and the involvement of Belarus, there is currently no appropriate context allowing the implementation of the actions foreseen in this programme with legal entities established in Russia, Belarus, or in non-government controlled territories of Ukraine. Therefore, such legal entities are not eligible to participate in any capacity. Exceptions may be granted on a case-by-case basis for justified reasons. This criterion also applies in cases where the action involves financial support given by grant beneficiaries to third parties established in Russia, Belarus or in non-government controlled territories of Ukraine (in accordance with Article 204 of the Financial Regulation No 2018/1046).

Financial and operational capacity and exclusion criteria

The criteria is described in Annex C of the General Annexes to the Horizon Europe Work Programme 2023–2024 which shall apply mutatis mutandis to the actions covered in this Work Programme.

Award criteria

If admissible and eligible, the proposals will be evaluated and ranked, depending on the type of action, against the award criteria reported in the table below.

- **Innovation Actions:** In bold, it is highlighted the additional sub-criterion that will be used for Innovation Actions, including Flagships.

	Excellence	Impact	Quality and efficiency of the implementation
Coordination and support actions (CSA)	<ul style="list-style-type: none"> - Clarity and pertinence of the project's objectives. - Quality of the proposed coordination and/or support measures, including soundness of methodology. 	<ul style="list-style-type: none"> - Credibility of the pathways to achieve the expected outcomes and impacts specified in the work programme, and the likely scale and significance of the contributions from the project. - Suitability and quality of the measures to maximise expected outcomes and impacts, as set out in the dissemination and exploitation plan, including communication activities. 	<ul style="list-style-type: none"> - Quality and effectiveness of the work plan, assessment of risks, and appropriateness of the effort assigned to work packages, and the resources overall. - Capacity and role of each participant, and the extent to which the consortium as a whole brings together the necessary expertise.
Research and innovation actions (RIA) Innovation actions (IA), including Flagships	<ul style="list-style-type: none"> - Clarity and pertinence of the project's objectives, and the extent to which the proposed work is ambitious and goes beyond the state of the art. - Soundness of the proposed methodology, including the underlying concepts, models, assumptions, interdisciplinary approaches, appropriate consideration of the gender dimension in research and innovation content, and the quality of open science practices, including sharing and management of research outputs and engagement of citizens, civil society and end-users where appropriate. 		
Innovation actions (IA), including Flagships		Ability to ensure the level of in-kind contribution to operational activities (IKOP)¹⁰⁰ defined in the call/topic as % of total projects eligible costs (IAs 15% and IA-Flagship 20%)¹⁰¹	

Scores and weighting

Evaluation scores will be awarded for the criteria, and not for the different aspects listed in the table above. For full applications, each criterion will be scored out of 5.

- **All Types of Actions:** For the criteria 'excellence' and 'implementation' the threshold will be 3, whereas for the criterion 'impact' the threshold will be 4. The overall threshold, applying to the sum of the three individual scores, will be 11.

To determine the ranking for all 'Innovation actions' including Flagships, the score for 'Impact' will be given a weight of 1.5.

Proposals that pass the individual threshold AND the overall threshold will be considered for funding, within the limits of the available call budget. Other proposals will be rejected.

¹⁰⁰ Contributions by private members, constituent entities or the affiliated entities of either, by international organisations and by contributing partners, consisting of the eligible costs incurred by them in implementing indirect actions less the contribution of that joint undertaking and of the participating states of that joint undertaking to those costs

¹⁰¹ Please refer to the Annexes to be included in the proposal described below.

Documents

The documents including the submission of proposals are described in Annex A of the General Annexes to the Horizon Europe Work Programme 2023–2024 which shall apply mutatis mutandis to the actions covered in this Work Programme, taking into consideration the following:

Annexes

The following separate Annexes should be included in the Proposal.

- **Innovation Actions, including Flagships:** For all legal entities that are member of the BIC consortium, a certification from BIC attesting this fact should be included in the proposal¹⁰².
- **Only for Flagship topics:** a detailed business plan.

Evaluation procedure and ranking

The entire evaluation procedure, including indicative timetable for evaluation and for signature of the grant agreement, and ranking are described in Annex F of the General Annexes to the Horizon Europe Work Programme 2023–2024 which shall apply mutatis mutandis to the actions covered in this Work Programme, taking into consideration the following:

Hearings

- **Only for Flagship topics:** As part of the panel review, the CBE JU will organise hearings with applicants of all Flagships proposals.

Indicative timetable for evaluation and for signature of the grant agreement

Unless otherwise stated in the specific call conditions, the timing for evaluation and grant preparation is as follows:

- information on the outcome of the evaluation: around 5 months from the deadline for submission;
- indicative date for the signing of grant agreements: around 8 months from the deadline for submission.

Legal and financial set-up of the grant agreements

The Legal and financial set-up of the grant agreements, including funding rates, are described in Annex G of the General Annexes to the Horizon Europe Work Programme 2023–2024 which shall apply mutatis mutandis to the actions covered in this Work Programme, taking into consideration the following:

Funding rate

- **Innovation actions: up to 60% of the eligible costs** (except for non-profit legal entities, where the funding rate is up to 100% of the total eligible costs).

¹⁰² Each entity participating in the proposal with a PIC number has to provide a separate certificate

In addition to the standard provisions, the following specific provisions in the model grant agreement will apply:

IPR-CBE JU right to object

According to the Horizon Europe rules, and as foreseen in article 16 of the Grant Agreement, and in order to protect Union interests, the right for joint undertaking to object to transfers of ownership of results or to grants of an exclusive licence regarding results should apply to participants. Therefore, the provisions set out in General Annex G to the Horizon Europe work programmes on the right to object apply generally. It should be noted that in accordance with the Council Regulation and the MGA, the right to object applies also to participants that have not received funding from the JU and for the periods set therein.

Consortium agreement (ARTICLE 7 of the HE Model Grant Agreement)

In line with Horizon Europe Model Grant Agreement, the consortia of the proposals selected for funding must have internal arrangements set out in a written consortium agreement between the beneficiaries regarding their operation and coordination, to ensure that the action is implemented properly.

Contribution to the monitoring framework of the CBE JU – KPIs projects' reporting

For monitoring the contribution of each project to the CBE JU objectives and indicators, as described in the SRIA, all projects will have to report on an annual basis their KPIs progress during the course of Horizon Europe.

The reporting shall consist of filling a template questionnaire in a secure online data collection platform managed by the CBE Joint Undertaking. The projects will need to submit all information included the questionnaire(s) relevant for their type of action. The submission of the questionnaire(s) shall be integrated as a specific annual deliverable in the grant agreement. The template questionnaire(s) with the KPIs Handbook will be made available online at the time of the publication of this AWP.

2.2.3.2. Cooperation, synergies and cross-cutting themes and activities

Council Regulation (EU) 2021/2085 and the SRIA establish strong grounds for synergies in particular with other Horizon Europe and Union's initiatives, as well as with other R&I programmes that have an inherent potential for the bio-based sector.

In 2023, CBE JU will finalise the analysis of the identified R&I initiatives, programmes and funds at the EU, national and regional levels, with which synergies can be built and strengthened. As to maximise the scientific, socio-economic and environmental impacts of the CBE JU actions, a multipronged approach will be pursued:

- at the **EU and European levels**: priority will be given to the appropriate Horizon Europe programmes and partnerships, including co-programmed and institutionalised partnerships, as well as to relevant EIT Knowledge and Innovation Communities (KICs), e.g. Climate-KIC, EIT Food and EIT Raw Materials. CBE JU will pose particular attention in collaborating with the co-funded partnerships that falls within the scope of Horizon Europe Cluster 6 - **Food, bioeconomy, natural resources, agriculture and environment**, e.g. European Partnership for a climate neutral, sustainable and productive Blue Economy (SBEP) or European Partnership water security for the planet (Water4All), among others. A particular focus will be placed on ensuring a legacy with the synergy initiatives carried out successfully under BBI JU. Attention will be devoted also to cross-cutting aspects, such as digitalisation and Open Science, which fall within the scope of the European Open Science Cloud partnership.
- at the **national and regional levels**: CBE JU will continue to interact with Member States through the States Representatives Group to strengthen further its ability to aggregate and mobilise national and macro regional stakeholders, as to contribute to the adoption of policy and funding initiatives in the bioeconomy field.
- at **operational level**: synergies between and among programmes and instruments will be explored in the different possible forms, ranging from simple information exchange to strategic coordination and co-programming. CBE JU will identify the most appropriate actions for each of the selected initiatives, as to ensure meaningful complementarity and maximise impacts.

2.3. SUPPORT TO OPERATIONS

2.3.1.1. Communication, dissemination and exploitation

CBE JU communication: a strategic approach

Communication activities support CBE JU's strategic goals by:

- Raising awareness about bio-based industries and engaging with its stakeholders;
- Promoting the CBE JU and its funding opportunities;
- Highlighting the achievements of CBE JU's predecessor, BBI JU.

The Annual Communication Work Programme is based on the multi-annual Communication and Stakeholder Management Strategy. It provides a list of communication activities under each objective, along with the communication channels and budget.



Communication priorities in 2023

In 2023, CBE JU communication will focus on four objectives:

1. Promoting CBE JU funding opportunities
2. Promoting the achievements and impacts of CBE JU-funded projects
3. Promoting the new partnership
4. Engaging with stakeholders

Strengthening and widening the communication channels and networks will provide additional support to these activities.

- **Promoting CBE JU funding opportunities**

Promoting the second CBE JU call will be at the heart of the 2023 communication activities and as every year will include a dedicated call page on the website along with useful material for potential applicants. The in-person CBE JU Info Day will take place in Brussels in the first part of the year, with a remote participation option. The online CBE JU networking platform will be the main interaction hub for potential applicants and will provide such features as ideas pitching and meeting scheduling. CBE JU Programme Office will take part in national and regional info days across Europe and will pay attention to good geographical and sectoral distribution, in line with the Widening Participation Strategy. Funding opportunities will be promoted at every high-level event with CBE JU's participation.

Results the call 2022 will be highlighted in a dedicated campaign in the first quarter of 2023.

- **Promoting the achievements and impacts of CBE JU-funded projects**

In the second quarter of 2023, a dedicated campaign will mark the signature of the first grant agreements on projects selected under the 2022 call.

CBE JU will continue highlighting the environmental and socio-economic impacts of the initiative based on the KPIs reported in the annual activity report and analysis of the project portfolio through an integrated communication campaign. Examples of the initiative's added value for regions and people, as well as its use in the daily life of the EU citizens will support the campaign.

Communication about the CBE JU's investment in different countries will be shared throughout the year. CBE JU will also continue preparing communication packages on the contribution of the initiative to relevant EU policies, with a focus on those launched in 2023.

- **Promoting the new partnership**

CBE JU will invest in increasing the awareness of stakeholders and decision makers about the new partnership, in particular its novel aspects, such as the deployment group.

CBE JU's activities and funding priorities will also be highlighted as part of the promotion campaign on the annual work programme for 2023.

The CBE JU communication and stakeholder management strategy will get an update based on the evaluation of the current strategy and activities and in line with the CBE JU priorities.

- **Engaging with stakeholders**

The first CBE JU stakeholder forum will take place in the second part of 2023. It will be a long-awaited opportunity to take stock of the achievements and look forward to new challenges of the partnership but above all a space to exchange best practice and inspiring ideas among the CBE JU-funded projects.

CBE JU will also focus on showing the faces behind the initiative, from the Programme Office to beneficiaries, in new audio-visual material.

CBE JU staff will attend at least 10 key bioeconomy events to support the communication priorities. Communication tools and channels

The CBE JU website will remain the main information hub. All communication activities will link to its content. The last phase of the website development will be completed in early 2023, in collaboration with DG DIGIT of the European Commission.

CBE JU **newsletter and social media** accounts (Twitter, LinkedIn, YouTube) will drive CBE JU's digital communication and support campaigns. Increasing the follower base and reaching higher engagement rate on these channels will be a priority action in 2023.

A full return to physical **events** with enhanced networking opportunities will continue the 2022 trends. CBE JU will embrace this opportunity to connect with its community and showcase the partnership at national, European and international events. The events organised by CBE JU will however provide a remote participation option for those who cannot attend in person.

Public relations and advocacy will target CBE JU's stakeholders in support to the communication priorities. Developing further media relations with relevant bioeconomy outlets and building new media partnerships will be the focus of this activity strand. A dedicated section on the CBE JU website will support this channel.

Indicative budget

Title	Description	Amount, €
Events and campaigns	Organisation of CBE JU Info Day and stakeholder forum, participation in at least 15 key events, organisation of awareness raising and networking events, campaigns	420,000 ¹⁰³
Communication material	Publications, videos, promotional material	145,000
Communication tools	Website, digital dissemination tools, networking and stakeholder management tools, communication equipment	75,000
Public relations	Media relations and partnerships, prizes, sponsorship, branding	75,000
Total		715,000

Indicative list of events

Event	Date(s)	Place	CBE JU role
EU Industry Days	TBC	Brussels, Belgium	Speaker
CBE JU Info Day	20 April	Brussels, Belgium & online	Organiser
World Bio Markets	10 May	The Hague, Netherlands	Speaker
EUBCE	5-8 June	Bologna, Italy	Speaker, member of the Organising Committee
EU Green Week	TBC	Brussels, Belgium	TBC
IFIB 2023	28-29 September	Bologna, Italy	TBC
EFIB 2023	October	TBC	TBC
R&I Days	TBC	Brussels, Belgium	TBC

¹⁰³ Total amount for events to take place in 2023, commitment may be split between 2022 and 2023

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EUCYS award ceremony	September	TBC	Sponsor of the bioeconomy award
World Bioeconomy Forum and roundtables 2023	TBC	TBC	TBC
European Week of Regions and Cities	TBC	TBC	TBC
CBE JU Stakeholder Forum (no confirmed yet)	December	Brussels, Belgium	Organiser

2.3.1.2. Procurement and contracts

For the year 2023 the CBE JU will implement its administrative budget also by means of procurement procedures and contracts, supporting the administrative and operations services in accordance with its financial rules¹⁰⁴. It is essential that the CBE JU makes the most efficient use of its resources by using existing framework contracts and service level agreements (SLAs) with EC services. The extensive use of the existing contracts provides a lighter solution in terms of workload and the possibility to rely on quality service providers.

When framework contracts or SLAs are not available, CBE JU will need to launch individual procurement procedures in order to obtain desired services and implement its AWP effectively. Furthermore, as part of the back office arrangements the Joint Undertakings under the lead of Clean Aviation JU have establish working arrangements to identify potential joint procurements. Those procurements are launched and managed by the Clean Aviation JU.

The table below provides a summary of tenders planned for 2023 under administrative budget and the related procurement procedure expected to be used on the basis of the information currently available. It may be subject to modifications.

Subject	Indicative/Maximum amount, €	Type of procedure	Indicative timeline
Media campaigns and events (information and awareness raising events; online campaigns)	Up to 420.000,00	FWC/SLA and public procurement	Q1-Q4
Communication material (Publications, videos, promotional material)	Up to 145.000,00	FWC/SLA and public procurement	Q1-Q4
Communication tools (website, digital dissemination tools, networking tools, communication equipment)	Up to 75.000,00	FWC/SLA or public procurement	Q1-Q4
Public relations including media support	Up to 75.000,00	FWC/SLA and public procurement	Q1-Q4
Integrated IT tool to collect, monitor and elaborate information on projects KPIs	Up to 200.000,00	FWC/SLA	Q1-Q3
¹⁰⁵ CBE JU FWC Communication: events, social media, copywriting, graphic design and videos	Up to 2,300,225	Open	Q1

In the context of the setting up of the BOA procurement, CBE JU will maximise its effort in joining common procurement procedures run by the JUs in order to achieve efficiency gains and economies of scale. Some of the abovementioned procurement procedures will be led by another JU as leading contracting authority or by CBE itself according to the annual procurement plan of the BOA procurement.

¹⁰⁴ https://www.bbi.europa.eu/sites/default/files/BBI_GB_12_19_revised_Financial_Rules.pdf

¹⁰⁵ FWC that was already reflected in the Work Programme 2022 and that finally could be launched in 2023

2.3.1.3. Other support operations

2.3.1.4. IT and logistics

ICT security

The new Cybersecurity Regulation and Information Security Regulation will require a close cooperation and correct implementation of the new information security rules common to all Union Institutions and bodies (EUIBAs). The CBE JU will have to further improve its framework for governance, risk management and control in the area of cybersecurity and implement a baseline of cybersecurity measures addressing the identified risks. Moreover, the programme office will have to conduct regular maturity assessments and put in place a plan for improving their cybersecurity

CBE JU KPI reporting tool - phase 2: Implementation

Based on the deliverables of the study project conducted in 2022 under the DIGIT-XM framework contract (FWC), the main development project will be concluded during 2023. The aim of the project is to deliver a reliable, secure, easy-to-use electronic platform that supports the data gathering and KPI reporting aspects of both BBI and CBE projects. The procurement channel will be an existing FWC as well.

Meeting rooms 2-3-4

Depending on the outcome of the housing procurement procedure/market analysis run by Clean Aviation JU on behalf of the White Atrium JUs, CBE JU will proceed with the upgrade of the common meeting rooms 2-3-4 located in the common meeting area on the first floor. As a first step, a study project will be conducted to assess functional requirements and to produce high-level budget estimations and even technical drawings that could be already used in the implementation phase, whether in the current location or even in a different building. The eventual implementation could also be launched during the year.

Transition to New Managed ICT Services FWC

The last specific contract under the current framework contract (FWC) will expire end of April 2023. By that time the new contract will have to be in place under the new FWC to provide continuity of managed ICT services.

Transition from EFSA FWC. To CLOUD II DPS

The framework contract (FWC) currently utilized to procure the non-SaaS cloud services (EFSA Cloud broker FWC) is expiring end of 2023. Although in the meantime most of the workloads are being transferred to SaaS providers, there will still be some requirement to host infrastructure-as-a-service (IaaS) workloads. The CLOUD II. Direct Purchasing System (DPS) of the European Commission's Directorate for Informatics will be used as the new procurement channel.

2.3.1.5. Building Management

The current contract to rent the office space in the building White Atrium the “Convention d’Usufruit of 16 November 2010” expires in at the end of 2024. The management of the tender procedure for the JUs’ premise falls under the back-office arrangement for public procurement and will be dealt with in 2023. As soon as the procedure is finalised, a new contract will be signed jointly with the other JUs and some adaptation work will be needed to adjust the office setup to the increased staff of CBE.

2.3.1.6. Human resources

HR management

The CBE JU Programme Office will continue implementing its activities in compliance with the applicable rules and procedures to support the appropriate management of public and private funds, under the leadership of the Executive Director who is the Chief Executive responsible for the day-to-day management of the CBE JU in accordance with the decisions of the Governing Board.

In the HR domain, the CBE JU aims to achieve its goals through a solid HR Strategy covering effective recruitment procedures, proper allocation and administration of resources and in developing, motivating and retaining valuable/high qualified staff while maintaining an optimal and efficient working environment.

In the current context and in the foreseeable future staff well-being, as well as health and safety of staff remain the top priority for the Programme Office. Since the start of the pandemic, the CBE JU provided staff with the tools and conditions to perform their tasks in an optimal way. By re-arranging the office area in the New Ways of Working and by providing a reliable IT infrastructure, IT equipment and IT tools for shared remote working, lending ergonomic furniture and materials, staff is in condition to enjoy full flexibility for what concern the remote work and the presence in office. At the same time, the Programme Office will continue to maintain high attention to the vaccination campaign launched by the EU institutions to ensure the best coverage in terms of vaccination from the COVID-19. Staff will be provided with personal protective material (masks, hydro-alcoholic gel, disinfectant wipes etc.) that is at their disposal in the office.

CBE JU staff will continue to be provided with clear guidelines and framework to continue enjoying the new work experience in the New Ways of Working.

This objective will be implemented in four main HR areas:

Staff implementation and recruitment

In 2023, the CBE JU will reach its full staff establishment plan. Therefore, no additional recruitments are foreseen.

The CBE JU will give the opportunity to trainees to acquire a first-hand experience as well as an understanding of the objectives and activities of the JU. With these traineeships, the CBE JU will

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benefit from the input of enthusiastic young graduates, who can give a fresh point of view and up-to-date academic knowledge, which will further enhance the everyday work of the JU.

The HR function will also perform an analysis on how the Programme Office should evolve in the near future in terms of staff allocation ensuring that the organisation achieve its objectives.

Legal matters and HR management

In 2023, the CBE JU will continue to develop its internal guidelines and strengthen its legal framework, paying particular attention to how EC staff implementing rules apply to the JU particularities. Following the adoption of the EC implementing rules on working time and hybrid work the HR function will develop in 2023 internal guidelines. The Programme Office will also organise an annual appraisal and reclassification exercise.

New staff implementing rules are expected to be adopted in 2023 in consultation with DG HR and the Standing Working Party¹⁰⁶.

Learning and development opportunities for better efficiency and staff engagement and motivation

The CBE JU promotes the continuous development of its staff to ensure that they are competent in their roles and can respond to the challenges of their job in fast changing world. Learning and development is also a tool to engage staff, ensuring their professional growth. Learning and development is an integral part of the CBE JU human resources policy and serves the interests of both the individual and the organisation. Therefore, in 2023 the HR function will continue to develop a learning and development framework focusing on the following priorities:

- **Collaborative working and knowledge-sharing** in order to favour effective teamwork across the whole organisation;
- Improve the capacity of staff members to **communicate** effectively among themselves and with external stakeholders;
- **Vision, leadership** and effective **management** of people, projects and processes in an increasingly complex world, with increasing pressure on staff;
- **Staff well-being** in order to foster the quality and safety of the staff in the working environment and to maintain their wellbeing while teleworking from home in the context of the new ways of working and the hybrid return to the office. Staff well-being is a key factor in determining the CBE JU long term effectiveness.

The HR function will also organise coaching opportunities for specific key functions and team coaching to help staff to develop their growth and potential within the organisation. Moreover, teambuilding activities will be organised in order to foster and promote team spirit and strengthen the collaboration among staff members. In addition, several common learning events will be organised in house in order to build common working methods and to further foster the cohesion

¹⁰⁶ The Standing Working Party, composed of DG HR, representatives of agencies and partner DGs, has been created by the Commission to discuss and draft implementing rules to the Staff Regulations in agencies, allowing the harmonisation of HR rules in the agencies network.

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in the team. Tailor-made trainings will be organised to reinforce the knowledge and use of IT tools as part of the digitalisation of our processes (e.g.: ARES, SYSPER, SYSTAL...).

The HR function will also continue to improve the CBE JU Intranet to improve the communication within the team and facilitate the access to key documents for staff. In addition, the HR function will continue to build on the CBE JU agreed corporate values and these values will be integrated in the staff assessment process. A Staff Engagement Survey will be organised to gain insight into job satisfaction, employee commitment, engagement and motivation. The aim of our annual staff engagement survey is to use the insight gained, to address possible issues and to make targeted improvements where necessary.

Digitalisation of the HR processes and transition to the New Ways Of Working In 2023, the HR function will continue to implement the digitalisation of the CBE JU HR processes. In that respect, the HR function will reinforce the use of the following IT tools:

- SYSTAL: an innovative recruitment solution, aiming to better attract, source and select talented staff, trainees and seconded experts. The solution includes a recruitment tool capable to support the CBE JU recruitment team as well as to improve the candidates' experience of a selection process. The new tool is on the cloud and it's designed to facilitate the selection process for applicants and selection committee members.
- SYSPER: the use of this EC HR Management tool will be extended to staff performance management (for probation periods and hopefully for annual appraisals);
- NDP: Numerisation des Dossiers Personnels. The HR function started in 2021 with the digitalisation all its personnel files. The objective is to finalise the project by the Spring 2023.

In 2023 a new Executive Director will be appointed and the HR function will ensure an effective phase in by providing the mandatory trainings and the key information in the HR domain.

2.3.1.7. Strategy for achieving efficiency gains, synergies through Back Office Arrangements

For what concerns the common back-office arrangements (BOA) foreseen by the Single Basic Act, the common working arrangement for accounting is in force since December 2022, and in 2023 the JUs will continue to work jointly in the implementation of BOA in these priority areas:

- HR support
- Legal support to joint procurement
- IT
- Accounting
- Logistics;

The CBE JU is the lead JU on the implementation of BOA in the area of HR support, that will foster collaboration in the following areas:

- Recruitment: Alignment and harmonisation of recruitment processes (valorisation of best practices), organisation of joint selection procedures for same grade, sharing of reserve lists/profile library.
- Legal framework: establishing a shared network of Confidential Counsellors, ensuring JUs' representation in EUAN meetings and liaise with DG HR about common HR matters, establishing a shared HR strategy.
- HR digitalisation: harmonisation of JUs' IT landscape in the HR domain.

The objective of the BOA HR will be to maximise synergies among the JUs, harmonise procedures by valorising best practices, ensure coherent HR support services, achieve efficiencies and economy of scale, increase the negotiation power of JUs operating under the SBA towards contractors and service providers.

The collaboration will also continue with the agency network and the EC HR support services (DG HR and PMO) with participation of the HR function to different working groups. This will be particularly important in the light of the new ways of working. The HR function will also continue to follow the evolution of the new HR strategy of the European Commission.

2.3.1.8. Staff establishment plan

Function group and grade	2022				2023	
	Authorised budget		Actually filled as of 31/12		Authorised budget	
	Permanent posts	Temporary posts	Permanent posts	Temporary posts	Permanent posts	Temporary posts
AD 16						
AD 15						
AD 14		1				1
AD 13						
AD 12		1		1		2
AD 11		1		1		
AD 10						
AD 9		3		3		5
AD 8		4		4		2
AD 7						
AD 6						
AD 5						
TOTAL AD		10		9		10
AST 11						
AST10						
AST 9						
AST 8						
AST 7						
AST 6						
AST 5		1		1		1
AST 4		1		1		1
AST 3						
AST 2		1		1		1
AST 1						
TOTAL AST						
AST/SC 6						
AST/SC 5						
AST/SC 4						
AST/SC 3						
AST/SC 2						
AST/SC 1						
TOTAL AST/SC		3		3		3
TOTAL AD+AST+AST/SC						
GRAND TOTAL						

Contract Agents	FTE corresponding to the authorised budget 2022	Executed FTE as of 31/12/2022	Headcount as of 31/12/2022	FTE corresponding to the authorised budget 2023
Function Group IV	10	10	10	10
Function Group III	6	5	5	6
Function Group III				
Function Group I				
TOTAL	16	15	15	16

Seconded National Experts	FTE corresponding to the authorised budget 2021	Executed FTE as of 31/12/2021	Headcount as of 31/12/2021	FTE corresponding to the authorised budget 2022	FTE corresponding to the authorised budget 2023
TOTAL					

Recruitment forecasts 2023 following retirement/mobility or new requested posts					
Job title in the JU	Type of contract (Official, CA, TA)		TA/Official		CA
			Function group/grade of recruitment internal (Brackets) and external (single grade) foreseen for publication		Recruitment Function Group (I, II, III and IV)
	Due to foreseen retirement/mobility	New post requested due to additional tasks ¹⁰⁷	Internal (brackets)	External (brackets)	

¹⁰⁷ As included in the legal and financial statement of the Council Regulation (EU) 2021/2085, of 19 November

2.4. GOVERNANCE ACTIVITIES

2.4.1.1. Governing Board

CBE JU's Governing Board has overall responsibility for the strategic orientation and the operations of the CBE JU and shall supervise the implementation of its activities in accordance with Article 17 of the Council Regulation (EU) 2021/2085.

The GB is composed of five representatives of the European Commission on behalf of the EU, and five representatives of BIC.

The indicative key decisions of the GB in the year 2022 are listed below:

Key decisions in 2022 – timetable	Quarter (Q1, Q2, Q3, Q4)
Approval Evaluation outcome Call 2022	Q1
Assessment of the Annual Activity Report for 2022	Q2
Adoption of the AWP for 2024	Q4
Appointment new Executive Director	Q3-Q4

2.4.1.2. Executive Director

The Executive Director is the chief executive responsible for the day-to-day management of the CBE JU in accordance with the decisions of the Governing Board.

The Governing Board appointed Mr Nicolo Giacomuzzi-Moore as the CBE JU Executive Director ad interim as from 1 September 2022, until the appointment of the new Executive Director, to perform the tasks defined in Article 19 of the Council Regulation (EU) No 2021/2085.

During the first CBE JU Governing Board meeting in December 2022, the interim Executive Director presented the following priorities for 2023 englobed in four areas:

1. Governance:
 - Establish the Investment Deployment Group and continue working on the definition of the scope of the Bio-based Feedstock deployment group (primary production).
 - Consolidate the role of the SRG and the SC under the CBE JU mandate.
 - Organise the CBE Strategic Governing Board meeting and ensure follow up of the conclusions.
 - Approve the monitoring method for the financial contributions to CBE JU.
 - Ensure the transition to new Executive Director maintaining efficiency in CBE daily operations.

2. Programme implementation
 - First CBE JU grant agreements preparation and kick-off of the CBE projects from call 2022.
 - Promotion of the CBE JU call 2023 and its evaluation.
 - Launch of the new web-based KPIs reporting tool and first reporting from legacy projects.
 - Coordinate the AWP 2024 preparation according to the established CBE JU programming procedure.
3. Communication and stakeholders' management
 - Organise the CBE JU stakeholder forum.
 - Reinforce the communication on CBE/BBJ JU projects and their impact.
 - Update the CBE JU Communication strategy in line with the new mission.
 - Launch targeted communication actions in underrepresented areas and sectors in close collaboration with EC, BIC and the SRG.
4. Administration and finance
 - Lead the implementation of the back-office arrangement - HR support.
 - Contribute to the back-office arrangement in other key areas (IT, logistics, procurement), in particular by finalising the accounting closure.
 - Finalise the office set-up in line with the new ways of working and conclude the procedure for the building in collaboration with the other JUs.

Furthermore, in accordance with article 17.2(a1), of the Council Regulation establishing the Joint Undertakings under Horizon Europe, the Executive Director will present in 2023 to the Governing Board a plan for the phasing-out of the joint undertaking from Horizon Europe.

For each priority the management has defined the timeline and elaborated objectives for the organisation that will be cascaded into individual objectives for the CBE JU staff.

2.4.1.3. States Representatives Group

The States Representatives Group (SRG) is one of the advisory bodies of CBE JU. In line with Article 20 of the of the Council Regulation (EU) 2021/2085, the SRG provides recommendations and the opinion of EU's Member States and associated countries on the operations of CBE JU, including: the progress of the programme implementation, the SRIA, the draft annual work programmes, the annual activity report, as well as other measures taken to address specific objectives of the initiative.

During 2023, at least two SRG meetings are planned: one in Q1 and the second in Q3. Additional meetings could take place, if needed, to address major issues. In all the meetings, the SRG members will be invited to report information about national and regional activities and initiatives linked to CBE JU with a view to ensure complementarities and identify areas of cooperation with the CBE JU.

SRG Timetable for 2023

<p>3rd SRG Meeting will focus on: discussing SRG's comments to the 1st draft of the CBE JU Annual Work Programme 2024 and the revision of the Multi-Annual Programming document; presenting the results from the Call 2022 evaluation and information on the granted projects; and presenting the progress of the CBE JU programme progress and achievements.</p>	Q1
<p>4th SRG Meeting will focus on: discussing the final draft of the CBE JU Annual Work Programme 2024; presenting the Call 2023 submission statistics; and the CBE JU programme progress, among any other relevant activities.</p>	Q3

2.4.1.4. Scientific Committee

The Scientific Committee (SC) is one of the advisory bodies of CBE JU. According to Article 21 and 55 of the Council Regulation (EU) 2021/2085, the SC provides advises to the Governing Board on the scientific priorities to be addressed in the annual work programmes and feedbacks on the scientific achievements described in the annual activity report. It will suggest, in view of the progress of the Strategic Research and Innovation Agenda and individual actions, corrective measures or re-orientations to the governing board, where necessary; and will provide independent advice and scientific analysis on specific issues as requested by the governing board, in particular as regards developments in adjacent.

The CBE SC is composed by 15 independent experts with a balanced representation of world-wide recognised experts from academia, industry, SMEs, non-governmental organisations and regulatory bodies. Collectively, the Scientific Committee members have the necessary scientific competencies and expertise covering the technical domain needed to make science-based recommendations to the CBE JU. The SC is supported in all its activities by the SC Secretariat, embedded in the CBE JU Programme Office.

SC Timetable for 2023

<p>3rd SC Meeting will focus on: discussing SC's comments to the 1st draft of the CBE JU Annual Work Programme 2024 and the revision of the Multi Annual Programming document, presenting the results from the Call 2022 evaluation and presenting the progress of the CBE JU programme progress and achievements.</p>	Q1
<p>4th SC Meeting will focus on: discussing the final draft CBE JU Annual Work Programme 2024, presenting the Call 2023 submission statistics and the CBE JU programme progress, among any other relevant activities.</p>	Q3

2.4.1.5. Deployment Groups

In accordance with Article 56 of the Council Regulation 2021/2085, Deployment Groups shall be established to advise the Governing Board on issues critical to market uptake of bio-based innovation and to promote deployment of sustainable circular bio-based solutions.

The Deployment Groups will be expected to provide their opinion on the basis of a request from the Governing Board, the State Representative Group or the Scientific Committee but they may also act on their own initiative and provide recommendations to the Governing Board and the Executive Director on various deployment aspects.

Without prejudging the future decision of the Governing Board, three Deployment Groups covering the following groups of stakeholders are under discussion: primary sector and biological feedstock providers, regional authorities and investors. The Deployment Group on finance and investment will be built up on the results of the Synergy Label Pilot initiative implemented by the predecessor BBI JU. In the same way, the Deployment Group on the primary sector will take into consideration the Action Plan agreed by the members of the Task Force¹⁰⁸ on 8 October 2021.

In 2023, the CBE JU Programme Office will finalise the proposal for the Governing Board on the Deployment Groups including their composition, objectives and timeline; and launch the establishment of at least one Deployment Group, starting with the Deployment Group on Finance and Investments.

¹⁰⁸ Following the publication of the Study *Participation of the agricultural sector in the BBI JU: business models, challenges and recommendations to enhance the impact on rural development*, a Task Force was created with representatives from the EC (DG AGRI and DG RTD), BIC and CBE JU to analyse the feasibility and the impact of the proposed recommendations and set up an Action Plan to prioritize, in an effective and in a coherent way, its implementation.

2.5. STRATEGY AND PLANS FOR THE ORGANISATIONAL MANAGEMENT AND INTERNAL CONTROL SYSTEMS

The Internal Control Framework (ICF), approved in 2019, provides reasonable assurance to the GB regarding the achievement of BBI JU's objectives as well as those of the CBE JU. In line with the requirements expressed in the CBE JU Financial Rules and in the EU Financial Regulation¹⁰⁹, it shall:

- Ensure that operational activities are effective and efficient. The CBE JU meets its objectives defined in the AWP using the adequate human and financial resources.
- Ensure that legal and regulatory requirements are met. The CBE JU operates in full accordance with all legal and regulatory requirements.
- Ensure that reporting is reliable. The CBE JU management produces regular, reliable and easily accessible management information on financial management, use of resources and progress on the achievement of operational objectives.
- Ensure that assets and information are safeguarded. The CBE JU managers take the measures necessary to ensure the completeness and preserve the integrity of the data on which management decisions are taken and reports are issued.

All the CBE JU management processes and functions concur to these four objectives granting the largest possible preventive, detective and corrective controls in line with the available resources.

In 2022 the CBE JU will continue to run its operations by improving the quality level of programme implementation while integrating the corrective actions that were identified in the past.

The main activities that will be performed include the following:

- Report on compliance and effectiveness of internal control in the annual activity report;
- Carry out periodic review of risks at least yearly in the context of preparing the annual work programme;
- Coordinate visits of the European Court of Auditors and of the external auditor of CBE JU accounts;
- Liaise with the auditors of the Internal Audit Service;
- Follow up on the implementation of action plans on audit recommendations and on observations of the discharge authority;
- Ensure a smooth implementation of the findings of the ex post audit strategy and optimise the JU's specific audit efforts based on the analysis of the first ex-post audits and of the specificities of CBE JU beneficiaries.

¹⁰⁹ Regulation (EU, Euratom) 2018/1046 of the European Parliament and of the Council of 18 July 2018 on the financial rules applicable to the general budget of the Union, amending Regulations (EU) No 1296/2013, (EU) No 1301/2013, (EU) No 1303/2013, (EU) No 1304/2013, (EU) No 1309/2013, (EU) No 1316/2013, (EU) No 223/2014, (EU) No 283/2014, and Decision No 541/2014/EU and repealing Regulation (EU, Euratom) No 966/2012

2.5.1.1. Financial procedures

In 2023, the CBE JU will continue to consolidate and improve its financial procedures in both the administrative and grant management areas, in line with its Manual of Financial Procedures as well as the general EU financial regulatory framework and IT tools used for financial transactions performed by the CBE JU.

On the grants side the majority of transactions will continue to be dealt with via the corporate tools COMPASS/SYGMA, with certain grants-related transactions being performed directly in the EC accounting system ABAC, or completed in ABAC following initiation in other tools (e.g. COMPASS/SYGMA or EMI). Staff (existing as well as newly-recruited where relevant) will continue to be trained adequately to ensure maximum competence in the use of the IT tools as well as the various different transactions which can arise (e.g. grant amendments, the participant guarantee fund mechanism, recoveries).

On the administrative side, the business procedures already in force should ensure high-quality processing, optimal budgetary implementation and accurate accounts. There will be continued monitoring of these procedures to evaluate their efficiency and fine-tune or update them where necessary.

The administration and finance unit and the programme unit will continue to coordinate with corporate services in order to ensure coherent understanding and implementation of the financial rules. This will also ensure the speedy and efficient verification and validation of all transactions.

2.5.1.2. Ex ante and ex post controls

Ex ante controls:

There is a full set of processes and procedures which regular application in 2023 will continue to provide reasonable assurance that the principles of sound financial management have been applied to each transaction. In particular ex ante controls on operational expenditure will be implemented by the CBE JU in line with the adopted Horizon 2020 and Horizon Europe ex ante control strategies.

In order to implement ex ante controls, desk reviews will be performed by the CBE JU Programme Office; on top of this reviews periodic reports will be carried out by external experts and ad-hoc technical reviews can also be launched when deemed necessary. The CBE JU will continue to update and develop internal procedures defining the *ex ante* controls to be performed and taking into account risk-based and cost-effectiveness considerations.

In 2023, the CBE JU will continue to cooperate with the Fraud and Irregularities in Research (FAIR) Committee of the R&I family as well as with the CAS, in line with the H2020 working arrangements for OLAF cases. Relevant Programme Office staff has received training on fraud detection and prevention; the possibility to deepen the knowledge in this field will continue to be promoted within the learning and development framework of the CBE JU.

For what concerns the prevention of possible double funding, the CBE JU will continue to collaborate with EC services and the Research Executive Agency in order to detect at an early stage possible overlapping during the grant agreement preparation, subsequent to the adoption of the ranking list by the Governing Board. Any possible overlapping at the level of topic definition is monitored by EC services responsible for the preparation of relevant work programmes. Regarding possible double funding controls during the project implementation, the H2020 grant management tools launches automatically a double funding and plagiarism check during GAP and the Programme Office implements any appropriate measure in accordance.

Ex post controls:

Ex post controls of operational expenditure will continue to be implemented in line with the Horizon 2020 Audit Strategy. The Common Implementation Centre (CIC) of the European Commission developed this audit strategy in cooperation with all its clients (i.e. the entities that implemented the Horizon 2020 budget: Services of the European Commission, Executive Agencies and Joint Undertakings). In 2023, CBE JU will participate in the same framework to the definition of the Horizon Europe Audit Strategy.

The main objective of the Audit Strategy is to provide the individual Authorizing Officers with the necessary elements of assurance in a timely manner, thus allowing them to report on the budget expenditure for which they are responsible. Ex-post controls on operational expenditure contribute in particular to:

- assessing the legality and regularity of expenditure on a multi-annual basis;
- providing an indication of the effectiveness of the related ex-ante controls;

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- providing the basis for corrective and recovery mechanisms, if necessary.

The Common Audit Service (CAS) of the European Commission is the part of the CIC serving all Horizon Europe stakeholders in the implementation of the audit strategy. Its mission is to deliver a corporate approach for the audit cycle: audit selection, planning, application of rules, relations with beneficiaries and management information on the audit process.

The CBE JU is effectively integrated in this control chain: it participates in the audit process definition and in the monitoring of its implementation in continuous collaboration with CAS and its clients. The main objectives of the cooperation are to align operations and exploit synergies on the common audit effort. The efficiency gains should reduce the audit costs and the administrative burden on auditees, always in line with the specific objectives for ex-post controls explained above.

In 2023, the CBE JU will continue to implement the results of the ex post audits on its beneficiaries and will provide adequate reporting through the budget discharge process.

2.5.1.3. Audits

The audit environment is an accountability pillar within the CBE JU's internal control Framework since it provides reasonable assurance about the state of effectiveness of risk management and control processes and serves as a building block for the annual Declaration of Assurance of the Executive Director.

In 2023, the CBE JU will continue to ensure the coordination and support to the audits carried out by the Internal Audit Service (IAS), and the Court of Auditors (ECA) and by the external auditor of the CBE JU accounts. The CBE JU will also continue to follow up and confirm the implementation of the relevant recommendations.

3. BUDGET YEAR 2023

The 2023 budget covers all administrative needs for 2023 as well as H2020 operational activities. It is noted that the budget of the JU shall be adapted to take into account the amount of the Union contribution as laid down in the budget of the Union. The only potential updates to the budget relate to any change in EFTA rate for 2023. The EFTA rates in use are 2.11% for all BBI JU remaining budget (“frontloaded” by the EC from the previous MFF), and for CBE JU, 2.47% for 2023.

STATEMENT OF REVENUE (EUR)

Heading	Item	Budget 2023 CA (in €)	Budget 2023 PA (in €)	Amended Budget 2022 CA	Amended Budget 2022 PA	Executed Budget 2021 CA	Executed Budget 2021 PA
EU contribution (excl. third countries contribution/EFTA)		149,712,288	98,477,488	250,079,489	42,589,453	2,253,230	121,702,564
of which Administrative (BBI)	1001	1,912,288	1,912,288	2,174,051	2,174,051	2,347,294	2,347,294
of which Administrative (CBE)	1007	800,000	0	812,045	812,045	0	0
of which Operational (BBI)	1002	0	10,885,723	0	38,603,357	0	119,355,270
Of which Operational (CBE) (no EFTA)		0	0	0	1,000,000	0	0
of which Operational (CBE)110	1007	147,000,000	84,879,477	247,093,393	0	0	0
Third countries contribution (including EFTA) ¹¹¹		3,691,009	2,386,322	6,169,137	1,019,453	54,303	3,229,153
of which Administrative EFTA (BBI)	1001	40,349	40,349	65,930	65,930	54,303	54,303
of which Administrative EFTA (CBE)	1007	19,760	19,760	0	0	0	0
of which Operational EFTA (BBI)	1002	0	226,689	6,103,207	953,503	0	3,174,850

¹¹⁰ For 2022 amended operational payment appropriations (including EFTA) include EUR 1 million for the budget of the expert evaluators for the CBE Call 2022 (managed by REA on behalf of CBE) – moved from Title 2 under BBI JU to Title 3 under CBE JU.

¹¹¹ This figure takes into account an EFTA rate of 2.11% used for BBI JU remaining budget (calculated annually up to the end of the BBI JU programme), as well as a rate of 2.47% used for the 2023 EU administrative and operational contribution to the CBE JU.

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of which Operational EFTA (CBE)	1008	3,630,900	2,096,524	0	0	0	0
Industry (financial) contribution		2,772,397	2,772,397	3,052,026	3,052,026	2,307,533	2,307,533
of which Administrative (BBI)	1003	1,952,637	1,952,637	3,052,026	3,052,026	2,307,533	2,307,533
Of which Administrative (CBE)	1009	819,670	819,670	0	0	0	0
Other		0	0	0	0	0	125,775
SUB-TOTAL revenues		156,175,695	103,636,207	259,300,651	46,660,911	4,615,066	127,365,025
C2 reactivation of unused appropriations from administrative expenditure 112		2,201,480	2,589,376	1,135,769	1,566,182	600,000	600,000
<i>of which from 2019 (BBI)</i>	2030	0	0	35,769	266,182	300,000	600,000
<i>of which from 2020 (BBI)43</i>	2030	38,010	450,998	1,100,000	1,300,000	300,000	0
<i>of which from 2021 (BBI)</i>	2030	1,013,470	1,083,463	0	0	0	0
<i>of which from 2022 (BBI)</i>	2030	150,000	54,915	0	0	0	0
<i>of which from 2022 (CBE)</i>	2032	387,896	0	0	0	0	0
<i>of which from 2022 (CBE)</i>	2032	612,104	1,000,000	0	0	0	0

¹¹² Unused budgetary commitment and payment appropriations from prior years' administrative budget, which can be reactivated in the budgets of up to 3 subsequent years following the year of origin, in accordance with the "N+3" rule applicable to Joint Undertakings

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C2 reactivation of unused appropriations from operational expenditure ¹¹³		65,281,955	30,000,000	476,647	28,803,205	0	46,881,708
of which from 2017		0	0	0	0	0	0
of which from 2018	2031	0	0	0	0	0	4,291,956
of which from 2019 (voted)	2031	0	0	476,647	0	0	42,589,752
of which from 2020 (voted) (BBI)	2033	281,955	0	0	28,803,205	0	0
of which from 2021(voted) (CBE)	2033	66,300,000	0	0	0	0	0
Of which from 2021 (voted)(CBE)	2033	0	30,000,000	0	0	0	0
SUB-TOTAL reactivations		67,455,933	32,284,461	1,612,416	30,369,387	0	47,481,708
TOTAL REVENUES		224,959,130	136,225,583	260,913,067	77,030,298	5,215,066	174,846,733

¹¹³ Unused budgetary commitment and payment appropriations from prior years' operational budget, which can be reactivated in the budgets of up to 3 subsequent years following the year of origin, in accordance with the "N+3" rule applicable to Joint Undertakings

STATEMENT OF EXPENDITURE (EUR)

Title/ Chapter	Heading	Budget 2023 CA (in €)	Budget 2023 PA (in €)	Amended Budget 2022 CA (in €)	Amended Budget 2022 PA (in €)	Executed Budget 2021 CA (in €)	Executed Budget 2021 PA (in €)	% Ratio 2021 CA to 2023	% Ratio 2021 PA to 2023
1	Staff Expenditure	3,231,044	3,231,044	4,185,733	4,185,733	2,955,525	2,883,275	91.47%	89.24%
11	Staff in active employment	2,791,144	2,791,144	3,738,990	3,738,990	2,697,548	2,697,537	98,41%	98,41%
12	Staff recruitment / Miscellaneous expenditure	76,000	76,000	102,564	102,564	30,783	21,606	40,50%	28,43%
13	Mission and duty travels	60,000	60,000	79,767	79,767	7,000	1,394	11,67%	2,32%
14	Other staff costs (socio-medical structure)	293,900	293,900	254,412	218,147	218,147	160,691	74,22%	54,68%
15	Entertainment and representation expenses	10,000	10,000	10,000	10,000	2,047	2,047	20,47%	20,47%
2	Other administrative expenditure	2,313,751	2,313,751	1,918,318	1,918,318	1,599,348	1,370,053	69,12%	59,21%
20	Rental of buildings and associated costs	408,628	408,628	466,095	466,095	339,350	311,054	83,05%	76,12%
21	Administrative information technology)	401,000	401,000	360,967	360,967	412,671	528,854	102,91%	131,88%
22	Movable property and associated costs	4,000	4,000	1,451	1,451	5,440	1,700	136,00%	42,50%
23	Current administrative expenditure	33,000	33,000	41,905	41,905	17,884	7,940	54,19%	24,06%
24	Telecommunications and postal charges	24,000	24,000	23,838	23,838	13,182	5,182	54,93%	21,59%
25	Expenditure on formal meetings	78,400	78,400	107,785	107,785	0	0	0,00%	0,00%
26	External communication, information, publicity	664,000	664,000	505,547	505,547	465,840	156,653	70,16%	23,59%
27	Service contracts	450,723	450,723	142,354	142,354	164,981	159,545	36,60%	35,40%
28	Experts' contracts and evaluations	0	0	0	0	0	0	N/A	N/A
29	Expert reviewers	250,000	250,000	268,376	268,376	180,000	199,125	72,00%	79,65%

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	Reactivations of prior year unused administrative budget 114	2,201,480	2,589,376	1,135,769	1,566,182	0	0	N/A	N/A
	of which from 2019 (BBI)	0	0	35,769	266,182	0	0	N/A	N/A
	<i>of which from 2020 (BBI) (included at chapter level)</i>	<i>38,010</i>	<i>450,998</i>	<i>1,100,000</i>	<i>1,300,000</i>	<i>0</i>	<i>0</i>	<i>N/A</i>	<i>N/A</i>
	<i>of which from 2021 (BBI) (included at chapter level)</i>	<i>1,013,470</i>	<i>1,083,463</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>N/A</i>	<i>N/A</i>
	<i>of which from 2022 (BBI) (included at chapter level)</i>	<i>150,000</i>	<i>54,915</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>N/A</i>	<i>N/A</i>
	<i>of which from 2022 (CBE) (included at chapter level)</i>	<i>387,896</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
	of which from 2022 (CBE)	612,104	1,000,000	0	0	0	0	0	0
3	Operational expenditure	150,630,900	98,091,412	253,196,600	39,556,860	0	120,822,327	N/A	123,17%
32	Expert evaluators CBE	1,667,783	1,667,783	1,000,000	1,000,000	0	0	N/A	N/A
30	Previous years' calls BBI	0	11,115,412	0	38,362,474	0	39,977,165	N/A	41,46%
	Previous years' calls CBE	0	85,308,217	0	0	0	0	0	0
31	Current year's call CBE	148,963,117	0	252,196,600	0	0	80,845,162	N/A	N/A
	Reactivations of prior year unused operational budget 115	66,581,955	30,000,000	476,647	28,803,205	0	0	N/A	N/A
	of which from 2019	0	0	476,647	0	0	0	N/A	N/A
	of which from 2020	0	0	0	28,803,205	0	0	N/A	N/A
	of which from 2021 (BBI)	281,955	30,000,000	0	0	0	0	N/A	N/A
	of which from 2022 (CBE)	66,300,000	0	0	0	0	0	N/A	N/A
	SUB-TOTAL reactivations	68,783,435	31,534,461	1,612,416	30,369,387	0	0	N/A	N/A
	TOTAL EXPENDITURE	224,959,130	136,225,583	260,913,067	77,030,298	4,554,873	125,075,655	2,04%	91.82%

¹¹⁴ Unused budgetary commitment and payment appropriations from prior years' administrative budget, which can be reactivated in the budgets of up to 3 subsequent years following the year of origin, in accordance with the "N+3" rule applicable to Joint Undertakings

¹¹⁵ Unused budgetary commitment and payment appropriations from prior years' operational budget, which can be reactivated in the budgets of up to 3 subsequent years following the year of origin, in accordance with the "N+3" rule applicable to Joint Undertakings

4. ANNEXES

4.1. IKAA PLAN

As stated in the article 51 of Council Regulation 2021/2085, the additional activities are those directly linked to projects and activities of the Circular Bio-based Europe Joint Undertaking, including in particular:

- (a) investments in new facilities demonstrating a new value chain, including investments in durable equipment, tools and accompanying infrastructure, in particular related to regional deployment and its sustainability verification;
- (b) investments in a new innovative and sustainable production plant or flagship;
- (c) investments in new research and innovation and justified infrastructure, including facilities, tools, durable equipment or pilot plants (research centres);
- (d) standardisation activities;
- (e) communication, dissemination and awareness-raising activities.

2. The investments directly linked to projects are in particular:

- (a) non-eligible investments needed for the implementation of a Circular Bio-based Europe Joint Undertaking project during the duration of that project;
- (b) investment made in parallel with a Circular Bio-based Europe Joint Undertaking project, complementing the results of the project and bringing it to a higher TRL;
- (c) investments needed for the deployment of a Circular Bio-based Europe Joint Undertaking project's results following the closure of the project until the winding up of the Circular Bio-based Europe Joint Undertaking. In justified cases, the investment related to deployment of results of projects from the preceding initiative (BBI Joint Undertaking) may be taken into account.

The exact nature of the activities and amount planned will be known only when the Governing Board will approve the results of the call (selection of projects).

4.2. GLOSSARY

Added-value product = a product with a significantly increased value from a technical, economic and/or environmental perspective, compared with the starting material or feedstock from which the product is obtained

B2B product = a product destined to be sold by one business entity to another business entity

B2C product = a product destined to be sold by one business entity directly to the end consumers

Benchmark = a standard product/process/service representative of a specific technological field or market application, used as reference with which features of another product, process or service developed are compared. Depending on the bio-based output developed, the benchmark can be fossil- and/or bio-based

Bio-based = derived from biomass

Biodiversity enhancement (coming on top of biodiversity protection) = refers to reporting practices, methodologies and tool improvements about the integration and improvement of biodiversity aspects related to bio-based systems. Note that the European Commission will put forward a proposal for legally binding EU nature restoration targets¹¹⁶ Restoring EU's ecosystems will help to increase biodiversity, mitigate and adapt to climate change, and prevent and reduce the impacts of natural disasters

Biodiversity protection (see also biodiversity enhancement) = is expected to be a starting condition for all CBE projects (100 % of projects should comply). Several drivers for biodiversity protection should be accounted for: climate change mitigation, LULUCF, sea/freshwater pollution, soil pollution, invasive alien species, direct exploitation of endangered plants, animals, other organisms, and their habitats, and respective ecosystems services

Bioeconomy = the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy

Biogenic = derived from biomass. Such as 'biogenic carbon cycle': the natural carbon cycle

Biomass = 'material of biological origin excluding material embedded in geological formations and/or fossilised

(Bio-based) dedicated chemicals = Bio-based chemicals that are produced via a dedicated pathway and do not have an identical fossil-based counterpart. As such, they can be used to produce products that cannot be obtained through traditional chemical reactions and products that may offer unique and superior properties that are unattainable with fossil-based alternatives.

(Bio-based) drop-in chemicals = Bio-based versions of existing petrochemicals which have established markets. They are chemically identical to existing fossil-based chemicals.

Bio-based product = a product wholly or partly bio-based

¹¹⁶ https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030/eu-nature-restoration-targets_en#:~:text=The%20European%20Commission%20will%20put,the%20impacts%20of%20natural%20disasters

(Bio-based) smart drop-in chemicals = a special sub-group of drop-in chemicals. They are chemically identical to existing chemicals derived from fossil resources, but their bio-based production pathways provide advantages compared to the conventional pathways

Biodegradation = complete breakdown of an organic matter by microorganisms, in the presence of oxygen (aerobic biodegradation), to carbon dioxide, water, and mineral salts of any other elements present (mineralisation) and new biomass, or in the absence of oxygen (anaerobic biodegradation) to carbon dioxide, methane, mineral salts, and new biomass

Biodegradable = a material or product is biodegradable if it can, under specific environmental conditions and with the help of microorganisms, naturally break down into basic components (e.g., water, carbon dioxide and biomass)

Bio-based polymer = a polymer comprised, at least in part, of building blocks called monomers, produced from renewable feedstock. Bio-based polymers can lead to a number of products like bio-based plastics

Bio-waste = defined as biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants (Waste Framework Directive). It does not include forestry or agricultural residues, manure, sewage sludge, or other biodegradable waste such as natural textiles, paper or processed wood. It also excludes those by-products of food production that never become waste.

Brand owners = refer to industrial stakeholders selling commodities under a registered brand. They may be existing or new stakeholders of bio-based value chains, contributing thus to the market uptake of bio-based products

Building block = a molecule which can be converted to various secondary chemicals and intermediates, and, in turn, into a broad range of different downstream uses. Examples of large markets for bio-based chemical building blocks are in the production of bio-based polymers, fibres, surfactants, and solvents

Business case = a justification for investing in a project to generate a profitable business. It is typically related to pursuing an opportunity or solving a problem. It may include technical, economic, market, social, environmental and regulatory aspects, even if only at a qualitative level. A business case includes an evaluation of risks, costs and benefits of the proposed project versus alternatives. It may involve a relatively high level of uncertainty.

Business model = a description of the way in which an commercial activity for conducting a business, generates revenues and value for its customers/ involved stakeholders. It describes the costs and revenues, the actors involved and the relationships among them. It includes a quantification of the cost and revenue streams but no time dimensions or specific actions.

Business plan = a detailed description of how the business will be developed. It includes a quantification of the cost structure, financing thereof, and foreseen revenues, a description of the actions to be performed, their timing and the actors involved. It includes technical, economic, market, social, environmental and regulatory aspects and is based on data, as much as possible, and/or assumptions (to cover areas where data are not available). The level of uncertainty is lower than in the Business case. Risks are described and contingencies are foreseen.

Carbon removal = the carbon removals described in the Commission Communication on sustainable carbon cycles¹⁶ include *'recycle carbon from waste streams, from sustainable sources of biomass...to use it in place of fossil carbon in the sectors of the economy that will inevitably remain carbon dependent...promote technological solutions for carbon capture and use (CCU) and the production of sustainable synthetic fuels or other non-fossil based carbon products... upscale carbon removal solutions that capture CO₂ from the atmosphere and store it for the long term, either in ecosystems through nature protection and carbon farming solutions or in other storage forms through industrial solutions'*

CAGR= Compound Annual Growth Rate

CCS = Carbon dioxide capture and storage. The geological storage is ruled by Directive 2009/31/EC¹⁷. Other storage are mentioned in the Communication on sustainable carbon cycles¹⁶. See the European Commission framework for carbon capture, use and storage: https://ec.europa.eu/clima/eu-action/carbon-capture-use-and-storage_en

CCU = Carbon dioxide capture and use. See the European Commission framework for carbon capture, use and storage: https://ec.europa.eu/clima/eu-action/carbon-capture-use-and-storage_en

Circular bio-based system = a full operational system, from feedstock intake through market application and use of resultant bio-based products, and their end-of-life handling to close the circle (cradle-to-cradle)

Circular-by-design = including circular economy considerations at the design stage of a product and/or business model considering their lifecycle. It aims to minimise resource consumption intensity, waste generation, extend the lifetime of products and optimise production and logistics

Circular economy = a business concept aiming to create a closed-loop system and maintain the value of products, materials, and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste. In this economic system, 'waste' can become a feedstock source for another process or value chain.

Climate change adaptation = is the process of adapting to climate change, taking action to prepare for and adjust to both the current effects of climate change the predicted impacts in the future.

Climate change mitigation = consists of actions to limit global warming and its related effects. This involves reductions in human emissions of greenhouse gasses (GHGs) as well as activities that reduce their concentration in the atmosphere. It is one of the ways to respond to climate change, along with adaptation.

Ecosystem services = the benefits that people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth' (Millennium Ecosystem Assessment). An ecosystem service could also include practices that prevent or cut down pollution. People describe e.g., the green

biorefinery to have an ecosystem service function by cutting down the run-off of nutrients that could otherwise have polluted the surrounding waters.

Emissions (Scope 1, 2 and 3) = Scope 1 greenhouse gas emissions are emissions coming directly from a company and its controlled entities (including process emissions). Scope 2 emissions come indirectly from the generation of purchased energy. Scope 3 emissions are all indirect emissions that are not included in scope 2 and occur in the value chain of the reporting entity, including both upstream and downstream emissions.

Feedstock = any unprocessed/raw material fed into a manufacturing/conversion process

FMCG= Fast-moving consumer goods

Fossil-based = made from fossil resources

GHG emissions = GHGs comprise carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and fluorinated gases. There are direct and indirect emissions that need to be monitored and addressed (see also emissions (scope 1, scope 2 and scope 3))

HS&E= health, safety and environment

Indirect land use change (ILUC) = displacement of agricultural production into non-croplands (e.g., grasslands and forests) due to the destination of croplands previously used for food agricultural production having been shifted to the production of non-food bio-based products (e.g., biofuels). Indirect land use change risks causing an increase in greenhouse gas emissions because non-croplands such as grasslands and forests typically absorb high levels of CO₂. By converting these land types to cropland, negative environmental effects may occur, including increase of atmospheric CO₂ levels, and biodiversity loss

Industrial symbiosis/ Industrial-urban symbiosis = the concept affects both material and energy flows. It refers, partly, to a process by which waste or by-products of an (industry) or an (industrial) process become the raw material for another. Application of this concept allows for materials to be used in a more sustainable way and can contribute to circular (bio)economy. Industrial symbiosis creates an interconnected network that strives to mimic the functioning of ecological systems within which energy and materials cycles operate in a continuous mode, without waste products. Deploying industrial and/or industrial-urban symbiosis solutions for energy, water and waste and other by-products can also contribute to the regional development of circular bio-based systems

Intermediate product = a product (e.g. material) requiring further processing or conversion steps to obtain the final product

Life cycle assessment (LCA) = assessment of the environmental impacts of a product, process, or service throughout the entire life cycle. The main references for LCA methodologies are the international standards ISO 14040 and ISO 14044. **Environmental LCA** is complemented by **life cycle costing assessment (LCCA)**, which aims to assess the economic impacts of a product/process/service, and by **social life cycle assessment (S-LCA)**, which aims to evaluate social implications of a product/process/service

Life cycle sustainability assessment (LCSA) = assessment of the environmental, economic, and social impacts of a product, process, or service throughout the entire life cycle.

Material = a substance or a mixture of substances also resulting from a production process, constituting one of the components which more complex products are made by

Multi-material, Multi-layered products = products composed of multiple layers where the choice on material per layer depends on the final product technical characteristics (e.g. providing barrier properties, mechanical strength, heat resistance etc)

Multi-material products, Composites = materials composed of at least two materials of different properties. When combined, they provide unique and superior properties (e.g. strength and lightweight characteristics), compared to those of the individual constituents. The individual components do not dissolve or blend into each other, with one material being the matrix and combined an additional material (the reinforcement)

Nature-based solutions = solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions

New = refers to a product or a process that entails clearly described innovative and/or advanced properties or enhancements compared to existing benchmarks (for example a 'new material' does not mean that such types of material currently does not exist on the market, but it means that the material has properties that are unmatched by existing benchmark products available on the market)

Novel = novel technologies are such as new, emerging, so far unused for bio-based feedstock conversion; novel bio-based feedstock

Organisational innovation= an idea, a new product, a new method, a new service, a new process, a new technology, or a new strategy adopted by an organisation

Outputs = referring to the following product categories: i) Chemicals (platform chemicals, additives, solvents, surfactants...), ii) Materials, 3) other products related with end use. Use established classification for reporting, for example the one in: EU Biorefinery outlook 2030

Plastic = any synthetic or semisynthetic organic polymer entailing the property of plasticity, i.e., the ability to deform without breaking. For example, thermoplastics and thermosetting polymers are the two types of plastic

Platform chemical = intermediate molecules which can be converted to a wide range of chemicals or materials

Primary biomass producers = biomass feedstock suppliers (primary and/or secondary biomass), including the following sectors: agriculture, forestry, fisheries, and aquaculture/marine

Resource efficiency = means using the Earth's limited resources in a sustainable manner while minimising impacts on the environment. It allows us to create more with less and to deliver greater value with less input. Improved energy efficiency addresses technoeconomic feasibility but also environmental sustainability aspects. Resource efficiency aspects addressed in bio-based processes covers biomass feedstock valorisation efficiency but also encompasses the other resources such as water, solvents, (bio)catalysts and other auxiliaries etc.

SSbD= Safe and sustainable by design

Secondary bio-based feedstock = waste that can be recycled in a circular economy and is injected back into the economy as secondary raw materials. In this context, secondary bio-based feedstock is any waste that can be used in bio-based processes

Sustainable = this refers to a product/process/system that enhances and creates benefits for the environment, economy, and society. In a broad sense, sustainability has four dimensions: environmental sustainability, productivity, fairness, and macroeconomic stability (European Commission, 'Annual Sustainable Growth Strategy 2020', COM(2019) 650 final, 17 December 2019).

Waste hierarchy = (a) prevention;(b) preparing for re-use;(c) recycling;(d) other recovery, e.g. energy recovery; and (e) disposal, as in the Waste Framework Directive 2008/98.

Zero-pollution ambition = on 12 May 2021, the European Commission adopted the EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil" (and annexes)- a key deliverable of the European Green Deal. The action plan aims to strengthen the EU green, digital and economic leadership, whilst creating a healthier, socially fairer Europe and planet. It provides a compass to mainstream pollution prevention in all relevant EU policies, to step up implementation of the relevant EU legislation and to identify possible gaps

Zero waste = preserving the natural resources and significantly reducing/eliminating waste during production but also across the value chain.