Circular Bio-based Europe Joint Undertaking

Scope of the CBE JU 2025 call topics

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Bio-based Industries Consortium

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CBE AWP2025 topics

Topic	N	M€
IAFlag-01 Urban-industrial symbiosis for **biowaste** valorisation	1	20
IAFlag-02 Bio-based **drop-ins/smart drop-in platform chemicals**, via cost-effective, sustainable and resource-efficient conversion of biomass	1	20
IAFlag-03 Circular-by-design **fibre-based packaging** with improved properties	1	20
IAFlag-04 **Retrofitting of industrial plants** towards higher-value bio-based products	1	20
IA-01 Sustainable **macroalgae** systems for innovative, added-value applications: cultivation and optimised production systems	2	14
IA-02 SSbD bio-based solutions to replace hazardous conventional chemicals for **textiles production**	2	14
IA-03 Scaling-up nutritional **proteins** from alternative sources	2	14
IA-04 Cost-effective and robust **continuous biotech** bio-based processes	2	14
IA-05 SSbD bio-based **polymers/copolymers** unlocking new market applications	2	14
RIA-01 **Valorisation of untapped forest biomass**	2	7
RIA-02 Bio-based and biodegradable **delivery systems** for fertilising products to reduce microplastics pollution & promote soil health	2	7
RIA-03 Alternative biomanufacturing routes for **natural and synthetic rubber**	2	7
CSA-01 **Develop and deploy new curricula** and knowledge exchange practices relevant to bio-based systems	1	1

CBE 2025 topics – IA-Flagship

Topic	N	Total M€
IAFlag-01 Urban-industrial symbiosis for **biowaste** valorisation	1	20
IAFlag-02 Bio-based **drop-ins/smart drop-in platform chemicals**, via cost-effective, sustainable and resource-efficient conversion of biomass	1	20
IAFlag-03 Circular-by-design **fibre-based packaging** with improved properties	1	20
IAFlag-04 **Retrofitting of industrial plants** towards higher-value bio-based products	1	20

Funding: **20 M€ for 1 project selected**. Funding rate: **60%** for companies, **100%** for non-profit entities

IKOP threshold: at least **20% of eligible costs** of the project as a whole

End **TRL 8** for the main stream of activities

- activities at lower TRL are allowed (in some topics: required – see topic for specific details)

Multi-actor approach: see topic for specific actors to be involved

Links and complementarities to previous / ongoing projects: see topic for specific projects

Contribution to CBE specific requirements (applicable to all topics): additional topic-specific context

Business plan: executive summary (proposal Part B) **AND full business plan** (Annex to proposal)

- Hearing to clarify business plan assumptions – no new information, just clarification

IAFlag-01 Urban-industrial symbiosis for bio-waste valorisation

End TRL	8
Exp. outcomes (overview)	• Full-scale **biorefinery and related value chain(s)** for the sustainable valorisation of bio-waste • Reduction of bio-waste going to incineration or landfilled; reduction of GHG emissions and other pollutants • Economic and social benefits for the municipalities; value for society (jobs); social acceptance of products from bio-waste and citizen engagement
Scope (overview)	• Demonstrate **feasibility and viability of a full-scale biorefinery model converting bio-waste into added value products**. Synergies with existing waste management infrastructures and **urban-industrial symbiosis** approaches (up and/or downstream) are in scope. • Demonstrate production of **SSbD, added-value bio-based products**, minimising waste generation. • Address **logistics** influencing economic viability and social acceptance. In addition to CBE specific requirements: • Address **regulatory framework aspects** related to the use of bio-waste streams and their conversion to end products, with particular reference to the end of waste criteria. • Perform an assessment of **social involvement and benefits**. **Identify regions/areas** in EU/EEA/EFTA countries and ACs with high potential and include a task to **replicate/adapt** the concept NB: The main feedstock in scope for this topic is **separately collected urban bio-waste**, as defined under the Waste Framework Directive. According to the specific targeted conversion routes, **bio-based residues and waste from other sources can be used as supplementary feedstock**

IAFlag-02 **Bio-based drop-ins/smart drop-in platform chemicals, via cost-effective, sustainable and resource-efficient conversion of biomass**

TRL	8
Exp. outcomes (overview)	• Full-scale **biorefinery and related value chain(s)** for the sustainable large-scale production of bio-based drop-in platform chemicals. • Availability of bio-based products meeting market and technical performance requirements • Improved sustainability, strategic autonomy, resilience and competitiveness of the European chemical industry • Reduction of fossil feedstock dependence; minimization of biomass imports dependencies • Increased value for society (jobs)
Scope (overview)	• Demonstrate cost-effective, robust, sustainable, large-scale production processes for obtaining **bio-based drop-in (including smart drop-in) platform chemicals** at **end TRL: 8**. Exclude substances of very high concern (SVHCs). • Target resource efficiency, minimisation of process waste and process safety aspects. Cascading valorisation of secondary biomass and residual streams is also in scope. • **Demonstrate the further conversion and integration of produced chemicals into market relevant products (reaching an end TRL 6 or higher).** In addition to CBE specific requirements: • Address **compliance with regulatory frameworks**, considering the targeted platform chemical(s) and related impurities type and concentration

IAFlag-03 Circular-by-design fibre-based packaging with improved properties

TRL	8
Exp. outcomes (overview)	• Full-scale **manufacturing facility and related value chain(s)** for the sustainable large-scale production of fibre-based packaging. • Availability of a broader range of circular bio-based packaging products meeting market requirements • Improved sustainability, safety and circularity of packaging • Increased value for society (jobs)
Scope (overview)	• Scale-up (TRL 8) production technologies and deploy the complete value chain to **fibre-based packaging materials with improved or novel properties** (over specified bio-based and/or non-bio-based benchmark) addressing relevant market applications. Consumer / industrial **primary, secondary and/or tertiary packaging** products are in scope. Fibre-derived packaging is also in scope . • Demonstrate (TRL: 8) the application of targeted fibre-based materials into **end packaging products, proving to meet market requirements**. Bio-based add-ons (e.g., additives, coatings, adhesives, etc…) are also in scope (proven that they are not hindering targeted EoL and that fibre-based materials are the main component) • **Design the packaging products for circularity** and validate their sustainable **end-of-life at relevant scale** (TRL 6 and above). Recycling, reuse and/or remanufacturing are all in scope. In addition to CBE specific requirements: • Consider **end-users/consumers** perception, behaviour and preferences in product design, use and end-of-life • Include a task to address the **regulatory status** of the packaging product(s) and their safety for the intended use

IAFlag-04 Retrofitting of industrial plants towards higher-value bio-based products

TRL	8
Exp. outcomes (overview)	• Full-scale **biorefinery based on a retrofitted industrial plant** towards bio-based products with a higher value than the ones produced in the old configuration. • Deployment of a competitive, replicable, regional/local business model • Improvement in overall sustainability and circularity compared to the old configuration. • Increased value for society (jobs, including those maintained in plants risking closure/downsizing)
Scope (overview)	• **Retrofit an existing industrial facility** with innovative and sustainable biomass conversion process(es) yielding more valuable product(s) than the one(s) produced with the old process(es). • Demonstrate the production of **bio-based chemicals and materials** (reaching end TRL 8) and their further **conversion into end products** (end TRL 6 or higher) to be validated in market-relevant application(s). **Food/feed ingredients are not in scope** as main product**.** In addition to CBE specific requirements: • Establish the **full value chain** including biomass supply and logistics, including biomass providers, fostering the creation or enhancement of a local/regional ecosystem centered around the biorefinery. • Design and test a **training programme(s) for upskilling/reskilling** the (bio)refinery and related ecosystem workforce. NB: Existing **biorefineries** and **fossil-based industrial plants** on brownfield are in scope of this topic as a target of the retrofitting action. Greenfield implementation is out of scope

CBE 2025 topics – Innovation Actions

Topic	N	M€
IA-01 Sustainable **macroalgae** systems for innovative, added-value applications: cultivation and optimised production systems	2	14
IA-02 SSbD bio-based solutions to replace hazardous conventional chemicals for **textiles production**	2	14
IA-03 Scaling-up nutritional **proteins** from alternative sources	2	14
IA-04 Cost-effective and robust **continuous biotech** bio-based processes	2	14
IA-05 SSbD bio-based **polymers/(co)polymers** unlocking new market applications	2	14

Funding: **14 M€ for 2 projects selected**. Funding rate: **60%** for companies, **100%** for non-profit entities

IKOP threshold: **at least 15% of eligible costs** of the project as a whole

End **TRL 6-7** for the main stream of activities

- activities at lower TRL are allowed (in some topics: required – see topic for specific details)

Multi-actor approach: see topic for specific actors to be involved

Links and complementarities to previous / ongoing projects: see topic for specific projects

Contribution to CBE specific requirements (applicable to all topics): additional topic-specific context

Quantified business case and **proposed business model** including potential for upscaling (proposal Part B)

IA-01 Sustainable macroalgae systems for innovative, added-value applications: cultivation and optimised production systems

TRL	6-7
Exp. outcomes (overview)	• Industrial scalability of sustainable **cultivation, pretreatment and valorisation** options for macroalgae species • Novel bio-based product(s) and business opportunities for bio-based applications from cultivated macroalgae • Socio-economic benefits: job creation and/or preservation (e.g. in case of declining blue economy professions). • Demonstrated environmental sustainability, encompassing biodiversity and water quality preservation and/or enhancement, and, when applicable, restoration.
Scope (overview)	• **Select and optimise macroalgal feedstock** focusing on applications with high market potential. **Harvesting macroalgae from the wild is excluded**, as the topic focuses on cultivation. • Demonstrate **cultivation in suitable and scalable sustainable systems**, aiming at high biomass yield, optimised production parameters. **Cultivation in open environment and in closed systems** are both in scope. **Multitrophic and mixed cultivation approaches** (e.g. multiple algae species, algae and fish/shellfish farming etc) are also in scope, as well as algae-mediated remediation and the use of nature-based solutions • Demonstrate **further biomass processing and conversion steps** into bio-based products. In addition to CBE specific requirements: • Ensure **environmental safety** and **avoidance of environmental risks, incl. monitoring and mitigation measures**. Environmental assessment must also include aspects such as biodiversity protection and possible enhancement, avoidance of invasiveness, and toxicity, carbon sequestration and nutrients loads NB: for the sake of this topic, **marine plants such as seagrass are also considered in scope**

IA-02 SSbD bio-based solutions to replace hazardous conventional chemicals for textiles production

TRL	6-7
Exp. outcomes (overview)	• Availability of **SSbD bio-based solutions for the textile industry** • Improvement in sustainability, circularity and safety of the textiles industry. • Reduction of pollution (including micropollutants and emerging contaminants, as relevant) from the production, use and end-of-life phases of textile value chains, with potential ripple effects in downstream sectors. • Improved social impacts along the textiles value-chain and broad socio-economic benefits.

Scope (overview)	• Demonstrate SSbD **bio-based alternatives to hazardous conventional chemicals used in the production of textiles**. Bio-based solutions applicable to bio-based and/or fossil-based textiles production are both in scope. Chemicals in scope for replacement include both those that are currently only used in production processes and also those that are included in the end-product(s). SSbD bio-based solutions in scope are:
	  ○ **chemicals (organic and/or inorganic compounds)** AND/OR
	  ○ **processing routes, removing the need for chemical-to-chemical substitution .**
	• Ensure **compatibility** of the innovative chemicals and/or processes with textile manufacturing equipment and practices
	• Test the **impact of the alternative bio-based chemical(s) and/or process on the end-product(s),** based on available standards.

IA-03 Scaling-up nutritional proteins from alternative sources

TRL	7
Exp. outcomes (overview)	• Increased availability of sustainably sourced nutritional proteins. • Increased resilience of food systems via diversification of protein sources. • Contribution to the sustainability of food systems (land & water use, energy consumption, N cycle, nutrients). • Improved consumers' awareness and acceptance of proteins from alternative sources
Scope (overview)	• Demonstrate innovative processes for the **extraction/production of proteins for application as nutritional food** starting from alternative sources: **plants, invertebrates, microorganisms, fungi, aquatic biomass, fermentation of bio-based feedstock (including biogenic gaseous carbon).** • **Target nutritional proteins for food**; cascading co-production of proteins for feed is also in scope. **Pure proteins, protein-rich mixtures and protein-enriched ingredients** are in scope • **Address DSP** (when applicable), to meet the targeted quality and stability for final applications. • Demonstrate **nutritional adequacy** of the proteins and their effect on food formulations. Additional properties are also in scope depending on the application In addition to CBE specific requirements: • Test the safety of developed proteins and formulations in line with EU regulatory requirements and EFSA guidelines. Identify potential regulatory gaps and provide recommendations to overcome potential bottlenecks. • Include a task on consumer awareness and acceptance: **involve end-users (including consumers)** to assess market acceptance of the novel proteins and incorporate insights in product development.

IA-04 Cost-effective and robust continuous biotech bio-based processes

TRL	6-7
Exp. outcomes (overview)	• Increased **scale-up potential and sustainability** of biotech processes to produce bio-based chemicals, materials and/or ingredients, contributing to increased competitiveness of industrial biotech in EU. • Increased and stable **productivity and selectivity** compared to benchmark batch/fed-batch process(es), if available at industrial scale. • **Purity** of end-product(s) in line with application requirements.
Scope (overview)	• Identify the **existing bottlenecks in the switch to continuous process(es)**, how the proposed innovative approach can overcome challenges of targeted processes, which are currently only operating in batch or fed-batch mode, and specify the advantages of switching to continuous. • Demonstrate **continuous biotech processes** (microbial, cell factories and/or enzymatic) for the sustainable production of bio-based chemicals/products addressing identified bottlenecks. • Together with addressing **continuous upstream** processing (encompassing biocatalysis optimisation), **demonstrate integration of efficient DSP** systems to achieve high purity, in compliance with final applications requirements, while also facilitating/not hindering the continuous upstream operation. Focus on one or more bio-based chemicals/products with high market potential. • Address resource efficiency and circularity by applying process intensification and by valorising upstream and downstream side-streams (e.g., water, fermentation media, exhausted cells, etc…)

IA-05 SSbD bio-based polymers/(co)polymers unlocking new market applications

TRL	6-7
Exp. outcomes (overview)	• Availability of broader range of SSbD bio-based (co-)polymers meeting market requirements. • Improved or novel properties unlocking novel applications and/or market sectors. • Improved sustainability, safety and circularity when compared to selected benchmarks. • Improved social acceptance of bio-based products in the transition to sustainable materials.
Scope (overview)	• Demonstrate (TRL: 6-7) the production of **bio-based (co-)polymeric structure(s)** with functional properties at least on par with fossil-based counterparts (if any) and/or higher than bio-based benchmarks (if any). Adding new functionalities compared to benchmarks is also in scope. • Address resource efficiency measures to achieve costs reduction and higher sustainability, as for example reduction of primary energy consumption, water recycling, (bio)-catalyst recycling, side-streams/by-products valorisation, etc. • Include a task to **validate (at minimum at end TRL 5) the targeted (co-)polymeric structure(s) into end products** proving to meet market requirements. Ensure (co)polymer(s) processability and compatibility with downstream conversion route(s) into end products. The development of bio-based composites is not in scope. Proposals should target **at least two application sectors**. • **Eco-design** the bio-based (co)polymeric structure and related end products to address sustainable EoL. Validate the selected EoL option(s) of the (co)-polymeric structure at minimum at TRL 5. Landfilling/incineration are not in scope as EoL options.

CBE 2025 topics - RIA

Topic	N	M€
RIA-01 **Valorisation of untapped forest biomass**	2	7
RIA-02 Bio-based and biodegradable **delivery systems** for fertilising products to reduce microplastics pollution & promote soil health	2	7
RIA-03 Alternative biomanufacturing routes for **natural and synthetic rubber**	2	7

Funding: **7 M€ for 2 projects selected**. Funding rate: **100%** for companies, **100%** for non-profit entities
IKOP threshold: **at least 5% of eligible costs** of the project as a whole **(NEW FOR 2025)**

- Since the maximum funding rate is 100% for all, IKOP is obtained by voluntary reduction of the funding rate of BIC member(s) in the proposal.

End **TRL 4-5**
Multi-actor approach: not mandatory unless specified in the topic
Links and complementarities to previous / ongoing projects: see topic for specific projects
Contribution to CBE specific requirements (applicable to all topics): additional topic-specific context
Qualitative business case for investment showing promise when upscaled

RIA-01 Valorisation of untapped forest biomass

TRL	5
Exp. outcomes (overview)	• Climate change mitigation/adaptation, forest restoration/resilience, biodiversity, rural development • Added value to the feedstock at the point of origin • Informed decision-making by forest owners and managers; development of new value chains, innovative business models and technologies; engagement and innovation capacity; positive social impact in rural areas
Scope (overview)	• Develop **innovative planning tools and technologies for harvesting, storage, pre-treatment** of residual and/or low value, unused or underutilized forest biomass or lower volume or/and less homogeneous biomass. Adopt **decentralised approaches** (including small-scale, mobile, containerised units) considering challenges across different European regions and among large, medium-sized, and small companies. • Develop and test **the feasibility of conversion routes** to bio-based chemicals and compounds, materials, products, assessing the viability of new business models around these concepts. • Test the **local value chain** by optimising logistics, improving cost efficiency, and collaborating with central hubs for further processing and refining. Actively involve local forest owners, managers, and other primary sector operators (e.g., farmers, horticulturists) to develop and test novel value chains in pilot areas. • Address feasibility for different ownership types and cooperative structures In addition to CBE specific requirements: • Provide recommendations for the development of EU carbon farming certification methodologies • Actively prevent soil degradation and biodiversity and carbon loss

RIA-02 Bio-based and biodegradable delivery systems for fertilising products to reduce microplastics pollution & promote soil health

TRL	5
Exp. outcomes (overview)	• Scalable, SSbD biodegradable delivery systems of fertilising products, with potential spillover effect on other additional inputs (such as pesticides and seeds) applicable to agriculture • Enhanced understanding of the biodegradation process, control factors of biodegradable delivery systems of fertilising products and their impact on plant development, on soil health (including soil microbiome) and water. • Creation of new value chains with increased synergies between farmers and bio-based industries.
Scope (overview)	• Develop circular and sustainable production processes for **novel bio-based and biodegradable delivery system(s) for fertilising products**. In addition, assess the applicability/adaptability of the delivery system(s) to **additional possible agricultural inputs** such as pesticides and seeds. • Validate the delivery system(s) at **lab-scale and/or small-scale field trials**, ensuring agronomic efficiency, safety, scalability and sustainability with similar or improved properties compared to conventional systems. • Assess the **long-term effect and biodegradability** of delivery system(s) when applied in natural soil conditions, applying standard tests, methods and protocols. Considering also dispersion in water In addition to specific CBE requirements: • In applying the **SSbD framework** consider the **delivery systems and their decomposition products** (**including microplastics**) and take into account **different farming systems** (incl. organic agriculture). • As part of MAA, **engage with farmers** to develop and test the newly established delivery systems **on demo/pilot farms,** and analyse the effects on plant development, soil health and water.

RIA-03 Alternative biomanufacturing routes for natural and synthetic rubber

TRL	4-5
Exp. outcomes (overview)	• Wider availability of **sustainable sources of natural and/or bio-based synthetic rubber** supporting European industrial competitiveness and strategic autonomy across various sectors of the (bio)economy • **Competitive and robust production routes** for natural and/or synthetic rubber, with high environmental performance, resource efficiency and sustainability. • Biomanufactured alternatives to conventional natural and/or to fossil-based synthetic rubber meeting **market requirements** for targeted final applications
Scope (overview)	• Identify and characterise the **suitable sources** of rubber-bearing genetic backgrounds (e.g., plants, yeast, microbial hosts, etc…) which are **suitable for optimisation for natural and/or synthetic rubber biomanufacturing**. When targeting plant-based sources, proposals should focus on implementing low-ILUC solutions. • **Develop bio-based solutions** aiming at **high yield** of isoprenoid and/or other elastomers, e.g. by deploying the modern tools of biotechnology or other biomanufacturing approaches. • Advance EU/AC-based **production, extraction and/or processing methods**, to enable high productivity and quality of high molecular weight natural rubber and/or other bio-based elastomers. Test the suitability of the developed biomanufactured alternatives into end-products.

CBE 2025 topics - CSA

Topic	N	Total M€
CSA-01 **Develop and deploy new curricula** and knowledge exchange practices relevant to bio-based systems	1	1

Funding: **1 M€ for 1 project selected**. Funding rate: **100%** for all participants
End TRL: Not applicable
Multi-actor approach: not mandatory unless specified in the topic
Links and complementarities to previous / ongoing projects: see topic for specific projects
Contribution to CBE specific requirements (applicable to all topics): additional topic-specific context

CSA-01 Develop and deploy new curricula and knowledge exchange practices relevant to bio-based systems

TRL	N/A
Exp. outcomes (overview)	• Developed and validated **curricula**, related to skills' development for the sustainable bio-based systems and increased circularity. • Deployment of **EU-wide actions** supporting the acquisition of new skills, as relevant for the sustainable and circular bio-based systems.
Scope (overview)	• Establish a **network of industry and universities/RTOs**. Ensure engagement of stakeholders from the '**Widening' countries** and make sure that their specificities and needs are incorporated in the development and testing of the curricula. Mutual learning from/to rural and coastal/blue bioeconomy, including primary producers, should also be considered. • **Mobilise the network to co-create a set of curricula** for education, training and retraining/reskilling/upskilling of students and professionals in the field of circular bio-based systems. Curricula should include **both STEM and SSH disciplines**. Capitalise on any best practices and success stories, available also at international level. • **Test the implementation of the developed curricula with pilot groups of students and professionals.** Some of the training methodologies that may be considered are laboratory practices, field work, internships, simulation, case studies, problem-based learning, supervised projects, vocational training, online classes/webinars etc.