

Rationale of the Biotechnology IPCEI candidates

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The three Biotechnology IPCEI candidates aim to support highly innovative projects that can help build competitive, sustainable and resilient biotechnology value chains in Europe. Depending on the results of the national selection procedures, the participating MSs may decide to merge two or all three IPCEI candidates. The biotechnology IPCEI initiative focuses on three closely connected but distinct IPCEI candidates:

1. bio-based chemicals;
2. bio-based materials;
3. bio-based food and feed ingredients.

Across all three IPCEI candidates, the common objective is to support projects that move from research towards first industrial deployment. The Biotechnology IPCEI candidates are therefore intended for highly innovative projects that aim to scale innovative technologies, develop fundamentally innovative new processes or products that have not yet been brought to industrial scale, but have the potential to become part of strategic European value chains.

Applicants should demonstrate that their project entails a major innovative element, addresses a clear scale-up challenge, and contributes to the development of fundamentally new biotechnology-based production processes, products, or value chains. Accordingly, the three Biotechnology IPCEI candidates are not intended to support routine modernization, replacement investments, standard capacity expansions, incremental product improvements, routine or mass production activities, or the commercial roll-out of mature and already established technologies.

What the IPCEI candidates are looking for

Biotechnology IPCEI candidates are looking for highly innovative projects that can contribute to the industrial scale-up of biotechnology in Europe. Projects must comply with the applicable rules and demonstrate how they address one or more of the following objectives:

- scaling up innovative biotechnological processes towards first industrial deployment;
- developing production processes with high research and innovation content;

- creating or strengthening European value chains in bio-based chemicals, bio-based materials, or food and feed ingredients;
- reducing dependence on fossil-based resources, imported raw materials or non-European supply chains;
- improving circularity by using biomass, side streams, waste streams, recycled raw materials, biogenic CO₂ or other renewable carbon sources;
- enabling cross-border collaborations with projects directly participating in the same IPCEI;
- generating and sharing benefits and knowledge spillovers beyond the individual company or project, Member State, market or sector concerned.

Applicants should explain not only what they intend to produce, but also why the project is highly innovative, why it is difficult to implement under normal market conditions, and how it contributes to the wider European biotechnology ecosystem.

IPCEI candidate on bio-based chemicals

The bio-based chemicals IPCEI candidate focuses on the development of innovative processes for producing chemicals and chemical intermediates from renewable or circular carbon sources. This may include, for example, platform chemicals, intermediate chemicals, monomers or building blocks for polymers, specialty chemicals, fine chemicals, dyes, pigments, auxiliaries, or chemical intermediates for downstream sectors; final drugs and mass-production are excluded.

Projects in this IPCEI candidate should show how they contribute to the transition from fossil-based to bio-based or circular chemical value chains. Relevant projects may involve fermentation, gas fermentation, enzymatic or biocatalytic conversion, advanced biomass processing, CO₂-based routes, downstream purification, process intensification, or other innovative technologies that enable the production of bio-based chemicals at industrial scale.

Applicants should clearly explain the role of their project in a wider value chain. This includes identifying the feedstock or input streams used (Upstream), core processes of biotechnological conversion (Midstream), downstream processing and product formulation (Downstream) and integration into industrial end applications (System integration and Deployment).

IPCEI candidate on bio-based materials

The bio-based materials IPCEI candidate focuses on the development of innovative materials and material-related processes based on renewable biological resources,

recycled raw materials, waste streams or biogenic carbon sources. This may include advanced bio-based materials for packaging, textiles, construction, automotive applications, cosmetics, bioplastics, composites, fibre-based materials, lignin-derived materials, hard carbon materials, novel forest-based products or other high-value material applications.

Projects in this IPCEI candidate should demonstrate how they contribute to replacing or complementing fossil-based or imported materials with sustainable, circular and high-performance alternatives. The focus should be on technologies and processes that go beyond the current state of the art and require first industrial deployment to prove their technical, economic and environmental performance at scale.

Applicants should explain how their project addresses material performance, scalability, sustainability, circularity and integration into downstream value chains. Where relevant, projects should also consider recycling, end-of-life solutions, lifecycle performance, and how the proposed material can be taken up by industrial users.

IPCEI candidate on bio-based food and feed ingredients

The food and feed ingredients IPCEI candidate focuses on the development of innovative downstream biotechnological production processes for key ingredients and functional components used in food and feed value chains. This may include alternative proteins, fermentation-derived ingredients, cell-cultivated ingredients, microbial or algal lipids and oils, amino acids, vitamins, enzymes, biocatalysts, functional ingredients, bioactive compounds, probiotics, postbiotics, prebiotics, technological additives and sensory additives.

Projects in this IPCEI candidate should focus on ingredient-level outputs intended for integration into downstream food and feed value chains. This IPCEI candidate is not aimed at supporting finished branded consumer food products, primary agriculture, farming or standalone feedstock production.

Applicants should explain how their project contributes to European resilience in food and feed ingredients, including by reducing reliance on imported protein sources or other critical inputs, valorising side streams, improving sustainability, or enabling new food-grade or feed-grade biomanufacturing capacities in Europe.

Common features expected from projects

Regardless of the particular IPCEI candidate, applicants should consider whether their project has the characteristics expected from an IPCEI project. Projects should be able to demonstrate:

Major innovative nature

Each project must involve a biomanufacturing process, product or value-chain solution that goes beyond the current state of the art in the relevant sector or application. Biomanufacturing refers to industrial, technology-neutral production through biological, chemical and mechanical processes to convert renewable resources into bio-based products, bio-based chemicals and food and feed products at scale.

First industrial deployment orientation

The project should aim to bridge the gap between RDI and industrial-scale deployment by focusing on first industrial deployment (e.g. demonstration, or pilot validation). It must include high research and innovation content and may include further RDI, piloting or demonstration activities where these are necessary for first industrial deployment, but it should not be limited to early-stage research only.

Challenges demonstrating the need for public support

Applicants should explain why the project would not be carried out or would not be carried out in the same way, scale or timeframe, without public support. Relevant challenges may include high technological risk, high CAPEX or OPEX, long payback periods, uncertain demand, lack of industrial references, fragmented value chains, lack of suitable scale-up assets, or insufficient private financing.

Cross-border collaborations

Effective collaborations with direct participants in the same IPCEI which are located in other participating Member States is a core feature of an IPCEI. Applicants should already consider what types of cross-border collaboration could be relevant for their project, such as joint development, shared testing, and downstream validation. For further information please check [project portfolio template](#), p. 32.

Positive spillover effects

Projects must commit to generate benefits beyond the participating undertaking, beyond their own projects, their markets, their sectors, their position in the supply chain and their Member State concerned. This includes commitments to knowledge sharing, and dissemination of both IP-protected (via licensing on FRAND terms) and non-IP-protected know-how and results, training and skills development, open and non-discriminatory access to facilities created with State Aid, e.g. for SMEs and positive spillovers to downstream users.

Contribution to EU strategic objectives

Projects should contribute to the following objectives:

https://knowledge4policy.ec.europa.eu/glossary-item/cascading-use_en

- **Scaling up innovation for a subsequent creation of biomanufacturing capacity (from lab to deployment)** in Europe, reducing strategic dependencies on non-EU production sites and strengthening the EU's technological sovereignty in key biotech value chains
- **Accelerating the market deployment of bio-based innovations**, supporting the transition from research and pilot scale to commercial-scale production of bio-based products, processes and services as competitive alternatives to fossil-based equivalents
- **Securing and diversifying access to sustainable biological feedstocks**, including through valorisation of agricultural residues, side streams and waste, in line with the sustainable supply principles of the Bioeconomy Strategy
- **Driving industrial decarbonisation** through substitution of fossil-based feedstocks, chemicals and materials with bio-based alternatives, contributing to the EU's net-zero industry targets
- **Strengthening the European biotech ecosystem**, including support for SMEs and scale-ups, bio-foundry capabilities, scale-up assets, and talent development as envisaged under the EU Biotech Act

Where relevant, projects should apply the principle of **cascading use** of biomass and bio-based resources — prioritizing valorization in higher-value material applications (e.g. biochemicals, biomaterials, bio-based intermediates) ahead of energy recovery, in line with resource efficiency goals of the Bioeconomy Strategy.

Integration between the three Biotechnology IPCEI candidates

Integration is an important element for and within each IPCEI candidate; the direct participants in each of the three IPCEI candidates must create effective collaborations with other direct participants in the same IPCEI. The integrated approach is important because the Biotechnology IPCEI candidates support more than individual projects. Integration is demonstrated by cross-border collaborations, the structure of the IPCEI, complementarity between the projects, within each step of biotechnological value chains and/or enable connection of different value-chains to help create a coordinated European biotechnology ecosystem, where projects reinforce each other and collectively contribute to industrial scale-up, competitiveness and resilience.

The three IPCEI candidates are, however, closely connected. Their final structure may be reviewed at a later stage of the design process, once participating Member States have a clearer view of the project applications emerging from national selections and European-

level coordination. Depending on the project portfolio, value-chain links and integration potential, participating Member States may decide whether there is a justified reason to combine two or more candidates, or whether they should remain separate.

A summary on what applicants should keep in mind

When preparing for the National Call / Expression of Interest, applicants should clearly explain:

- which Biotechnology IPCEI candidate their project fits into and how it directly addresses the objectives of that candidate;
- what the project aims to develop, scale or deploy;
- what feedstocks, inputs, technologies and outputs are involved;
- what makes the project significantly innovative compared with the current state of the art, including how it goes beyond the global state of the art in the relevant sector or application;
- what stage of maturity the technology has reached and what scale-up step is proposed;
- what first industrial deployment challenge the project addresses;
- which part of the value chain the project covers, including, where relevant, downstream use and end-of-life, circularity or recyclability aspects;
- what downstream applications or users are targeted;
- how the project contributes to an integrated European value-chain approach, including how it is complementary and compatible with other potential IPCEI projects, or how it could offer added value for other IPCEI projects and their objectives;
- what cross-border cooperation with direct participants in the same IPCEI could be established, as integration is achieved through effective cross-border cooperation between direct participants;
- how the project contributes to relevant EU policy objectives, including climate neutrality, circularity, strategic autonomy, industrial competitiveness, resilience and the development of the European bioeconomy, and how it aligns with relevant EU strategies and initiatives.
- what wider European spillovers the project could generate;
- what proven market or systemic failure the project addresses;
- why public intervention is needed and justified;
- what evidence demonstrates that the project could not be realised, or could only be realised with significant delay, reduced scope or increased risk, without IPCEI

support, for example due to a funding gap, high technological or investment risk, lack of off-take or insufficient private financing.

The purpose of the National Call for Expression of Interest is therefore not only to describe a company's technology or investment plan. It is also to show how the project could fit into the relevant Biotechnology IPCEI candidate, how it could contribute to an integrated European value chain, why IPCEI support is necessary, and how the project could generate benefits for other participants, sectors, Member States and the wider European biotechnology ecosystem.