EERA Bioenergy Position Paper

Unlocking the Full Potential of Bioenergy and Biobased Technologies in Horizon Europe 2028–2034 and its European Partnerships

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1. Introduction and scope

The preparation of the tenth European Framework Programme for Research and Innovation (FP10), Horizon Europe 2028–2034, represents an important opportunity to strengthen Europe's research and innovation capacity, industrial competitiveness and strategic autonomy, while ensuring that the transition towards a climate-neutral and resource-efficient economy is supported by a coherent and effective European R&I framework.

Within this context, the future configuration of European Partnerships deserves particular attention, as these instruments will play an important role in defining and implementing strategic research and innovation priorities, mobilising resources and strengthening cooperation between research organisations, industry and public authorities.

EERA Bioenergy, representing over 40 leading European research institutions in bioenergy and biobased technologies, adopted its Position Paper on FP10 on 17 July 2025, identifying a series of scientific, technological and operational priorities to improve the effectiveness of European R&I funding.

As discussions on the future European Partnerships progress, EERA Bioenergy considers it essential to ensure that these priorities are also reflected in the design, thematic scope and implementation of the future Partnership portfolio.

In particular, EERA Bioenergy calls for the integration of biofuels and biomanufacturing/biotechnology within a single European Partnership, overcoming the artificial separation between energy and non-energy uses of biomass that has characterised previous European R&I programmes.

Biomass is a renewable source of both energy and carbon. Its transformation into fuels, energy, chemicals and materials frequently involves interconnected technological processes, shared infrastructures and integrated value chains. This is particularly evident in biorefineries, where the economic and environmental performance of industrial processes depends on the combined valorisation of multiple products and by-products.

Maintaining separate Partnerships for biofuels and biomanufacturing/biotechnology would risk perpetuating this fragmentation, limiting opportunities for technological integration, resource efficiency and industrial development.

A single Partnership encompassing these interconnected fields would provide a more coherent framework for addressing their common scientific and technological challenges, while preserving the specific research and innovation needs of each area.

Beyond the configuration of European Partnerships, EERA Bioenergy considers that FP10 should provide greater continuity across the innovation chain, support the development and industrial

scaling of complex technologies, facilitate cross-sectoral cooperation and improve the efficiency and accessibility of European research funding.

The recommendations presented in this document therefore address **both the overall design and implementation of Horizon Europe 2028–2034 and the thematic configuration, governance and operation of its European Partnerships**.

EERA Bioenergy stands ready to contribute its scientific and technological expertise to the ongoing discussions with the European institutions and Member States, with the aim of ensuring that the future European R&I framework fully reflects the potential of integrated bioenergy and biobased technologies.

2. Policy Recommendations

EERA Bioenergy calls for a robust and future-oriented FP10 that empowers sustainable bioenergy and biobased systems as cornerstones of Europe's energy transition, strategic autonomy, and circular economy. To fully realise the potential of the biobased sector and improve upon Horizon Europe's foundations, the design and implementation of FP10 and its European Partnerships should reflect the following priorities:

- Merge the envisaged European Partnerships on biofuels and biomanufacturing/biotechnology into a single Partnership covering integrated biomass valorisation for energy and non-energy applications, ensuring coherence across technological pathways, research priorities and industrial value chains. Such integration would reflect the technological reality of integrated renewable refineries and biocircular value chains, where fuels, energy carriers, chemicals and materials are produced through interconnected processes, often sharing feedstocks, conversion technologies and renewable carbon streams.

- Ensure that European Partnerships provide research-performing organisations with meaningful participation in their governance and strategic research agenda-setting, maintain continuity across different technology readiness levels, and guarantee transparent and effective access to funding opportunities for the research community.

- Overcome the artificial separation between energy and non-energy uses of biomass across Horizon Europe's Clusters 5 and 6, recognising biomass as a renewable carbon source and promoting integrated research and innovation approaches regardless of the final application of biomass-derived products.

- Support integrated value chains and networks, including biomass supply, process technologies, resource efficiency and circularity as well as end-use, through inter- and transdisciplinary as well as cross-sectoral and cross-cluster collaboration.

- Support multiproduct technology approaches (such as biorefineries) and multifunctional products (like energy carriers or chemical intermediates) that are independent of their end use and as hybrids of biomass and other renewable sources.

- Support the valorisation of all biobased outputs, including by-products and side-streams such as digestate, aqueous streams, biogenic CO_2, ashes and waste heat, while maximising resource and carbon efficiency through integrated processes and circular carbon management.

- Support the creation of regional biohubs for raw materials, products and by-products, building on regional biomass availability, industrial capacities and scientific expertise, while considering resource quality, carbon cycle length and climate value, and promoting complementary specialisation across European regions.

- Enable longer project durations, multi-phase funding and dedicated scale-up and de-risking instruments to ensure continuity across the full innovation pathway, from research and demonstration to first-of-a-kind industrial facilities and commercial deployment, particularly for complex technologies requiring substantial investment and extended development periods.

- Facilitate agile and rapid deployment of project ideas to concrete projects, with shorter time-to-action mechanisms.

- Promote the creation and long-term retention of qualified employment in bioenergy and biobased innovation systems, ensuring that training efforts translate into sustainable career opportunities and that human capital is anchored in Europe's green and circular economy value chains.

- Engage in dialogue with EU institutions and stakeholders to explain, refine and collaboratively advance the proposals outlined in this position paper. EERA Bioenergy stands ready to contribute with its technical expertise and coordinated input from across Europe.

3. EERA Bioenergy at a Glance

EERA Bioenergy (EERA JP Bioenergy) is a Joint Programme of the European Energy Research Alliance representing over 40 leading research institutions in the field of bioenergy and biobased technologies. Since 2016, BIOPLAT (Spanish Technology and Innovation Platform on Biocircularity) has served as the Secretariat of the JP, coordinating its strategic input into EU R&I policy. The programme contributes to strengthening Europe's capacity to design, develop, and scale innovative biobased solutions aligned with the SET-Plan, Green Deal, REPowerEU, and Fit-for-55 objectives.

4. Strategic needs for bioenergy and biobased technologies R&I in FP10

4.1. Rethinking Project Timeframes: Matching Technology Complexity with Realistic Horizons

The current 3–5 year timeframe typical of EU-funded R&I projects may be suitable for rapidly deployable renewable technologies, such as those known from PV and wind. However, it proves

insufficient for technology approaches of higher complexity and a strong need for industrial involvement to upscale and integrate, such as biorefinery approaches, e.g., advanced biofuels, biogenic gases, and biobased chemicals. These technologies involve complex physicochemical, biochemical, and thermochemical processes, as well as multi-step valorisation chains that include resource recovery, recycling and the integration of material and energy streams, with extensive upscaling requirements before reaching market readiness. Often, a feedstock supply chain component is involved that requires crop growth over a longer period of time. The same is true for different biobased products, and e.g. their combination with other renewables. These require extensive process validation, pilot scaling, and regulatory integration as well as standardisation.

To enable Europe to compete with global players such as China, India, Brazil, and the US, the EU must provide longer-term and continuous support for biobased innovation. We recommend:

- Introducing flexible long-term project schemes (e.g. 6–8–12 years) that allow sufficient time for complex innovation tracks, such as new cropping schemes, integrated biorefinery pathways or industrial-scale upscaling. These schemes should include intermediate milestones and performance-based continuation criteria, enabling the European Commission to reassess and reallocate funding if needed while ensuring long-term support for successful approaches, or

- Creating multi-phase funding mechanisms where successful outcomes of earlier phases (low TRLs) are rewarded with additional funding (continuity bonus in streamlined evaluation) for increased TRLs. This allows a continuous development, with a consortium fitting the TRL of the development.

This is crucial to ensure that Europe achieves strategic autonomy, reduces dependency on fossil imports, and drives industrialisation of its clean technologies.

4.2. Overcoming the Separation Between Energy and Non-Energy Uses of Biomass in FP10 and European Partnerships

Current research structured under Horizon Europe places bioenergy and biofuels under Cluster 5 (Climate, Energy, Mobility) and biobased products under Cluster 6 (Food, Bioeconomy, Natural Resources). Recognising the important role of biomass as renewable carbon source, this artificial separation hinders the development of integrated, circular, and resource-efficient biorefineries, which can deliver both energy and non-energy products (high added value chemicals and biobased materials) from the same biomass feedstock, a key pillar in the development of this sector.

We argue for a cross-cluster approach that:

- Fosters synergies between energy and non-energy uses of biomass as a renewable carbon source.

- Encourages holistic project design for renewable refineries that maximise resource efficiency, achieve economic return through the coproduction of energy, fuels, chemicals, and materials, and mitigate greenhouse gas emissions.

- Supports a systems-thinking perspective to unlock multiproduct value chains.

Establish a single European Partnership integrating biofuels and biomanufacturing/biotechnology, providing a common framework for research and innovation across energy and non-energy applications of biomass, while preserving the specific technological priorities of each field.

We recommend:

- Launch joint calls between DG RTD, DG AGRI, DG ENER, and DG CLIMA.

- Design funding instruments that support systemic integration of energy, materials, and carbon flows.

4.3. Europe as a Single Market for Biomass, Innovation and Technologies

The biomass value chain must be understood and governed at the **EU scale**, not within fragmented national frameworks. We advocate for:

- Recognising Europe as a single market for biomass resources, technologies, and R&I activities.

- Facilitating cross-border biomass supply chains to match regional surpluses with industrial demands, promoting open biomass trading systems and digital traceability frameworks.

- Supporting the development and digitalisation of tools to implement sustainability criteria efficiently, such as biomass tracking systems, certification schemes, and LCA-based decision support platforms.

- Increasing EU-wide data mining and structured data compilations on biomass availability, process-related characteristics, and technology suitability to accelerate the development of AI applications for system optimisation.

- Developing & validating digital tools/digital twins for advancing current bioenergy technologies and for innovating new technologies (e.g. chemical looping combustion of biomass, MILD combustion of biomass).

This would unlock economies of scale, enable resource complementarity, and accelerate the industrial deployment of biobased systems across the Union, while also supporting resilience.

4.4. Prioritising Biomass and Bioproduct Supply and Commoditisation

Despite its strategic importance, the supply and logistics of biomass as feedstocks and bioproducts have received little attention in recent framework programmes. This undermines efforts to make biobased technologies competitive with others, whose global markets are commodity-driven and highly standardised.

To correct this, we call for:

- Specific topics on provisioning, treatment, standardisation, and logistics for biomass and biobased products that are not traded as commodities so far.

- Development of common quality standards and commoditisation pathways for European biomass (e.g. digestate, forest residues, straw, aquatic biomass) and biobased products, including side streams.

- Support for the implementation and interoperability of robust sustainability certification schemes, aligned with RED III, to reinforce traceability and facilitate cross-border trade and market acceptance.

- Support for digital and AI-based solutions for biomass-biobased products, flow monitoring, and market optimisation.

Only by making biomass and biobased products a reliable, traceable, and tradeable resource can Europe ensure its full integration into clean energy and circular economy value chains.

4.5. Valorisation of Biogenic Outputs and Regional Biohubs

Biogenic outputs such as waste heat, biogenic CO_2, aqueous side-streams, chars and ashes, and digestate often remain underutilised despite offering substantial circular and economic value. These by-products represent untapped streams for renewable energy recovery, nutrient cycling, carbon capture and reuse, and heat valorisation within industrial clusters.

To maximise its valorisation and unlock regional (currently unused) potentials, we propose:

- Launch funding lines for projects that demonstrate the integrated valorisation of biomass coproducts across energy and material sectors, as well as consider circulating aspects.

- Prioritise the development of regional biohubs, which aggregate biobased stream inputs and outputs, enable co-location of biobased industries, and serve as strategic nodes of circular economy infrastructure.

- Support the integration of biogenic CO_2 into e.g. synthetic fuel and product production, greenhouse valorisation, or mineralisation processes.

- Promote the valorisation of digestate in soil amendment and nutrient recovery applications under harmonised safety and environmental frameworks.

4.6. Integrated Systems for Energy and Climate Impact

Biobased technologies must be evaluated beyond their immediate output type. Their systemic value lies in contributing to defossilisation, enhancing energy system flexibility, enabling seasonal storage, and reinforcing industrial and societal resilience. The current framework underrepresents these contributions by categorising technologies mainly by end use.

We suggest:

- Integrate additional system-level KPIs — such as net GHG mitigation potential, resource circularity, and contribution to energy resilience — alongside existing indicators like TRL, FRL, and GHG abatement. When relevant, assess the biogenic carbon residence time (i.e., carbon loop length) to distinguish between short- and long-cycle biomass resources.

- Incentivise projects that combine energy production with grid services, such as demand response, thermal balancing, or off-grid energy backup.

- Promote integrated systems where biobased processes provide both primary outputs (e.g., biobased products like fuels or chemicals) and secondary services (e.g., carbon capture, storage, grid stability, circularity).

- Embed climate and resilience co-benefits into project evaluation criteria under FP10.

5. Operational Innovations for FP10

5.1. Agile Project Launch Mechanisms

Current R&I processes are too slow, with a 12+ month timeline from topic to project, which is incompatible with the fast-changing innovation landscapes and policies.

We believe it could be sped up by e.g.:

- Pilot "hackathons for ideas" and rolling calls. This means that from a large group, a short selection is invited to develop their proposal after one or a few days. Limiting the number of submissions, reducing costs at both the national and EU levels (which are usually financed by funding as well), and improving success rates.

- Allow short pre-consortia expressions of interest to trigger faster evaluations.

5.2. Cross-sectoral and cluster Engagement

A lack of coordinated input between DGs leads to fragmented and siloed topics.

We propose:

- Institutionalise cross-DG working groups (e.g. RTD-ENER-AGRI-CLIMA) for integrated call drafting.

- Include soil, circularity and land-use experts from the outset.

6. Conclusion

FP10 represents a unique opportunity to place bioenergy and biobased systems at the heart of Europe's twin transitions. EERA Bioenergy is committed to contributing its expertise and vision to shape a more integrated, industrial, and resilient bioeconomy through ambitious, efficient and well-structured research and innovation frameworks.

In this context, the configuration of the future European Partnerships will be particularly important. EERA Bioenergy calls for the integration of biofuels and biomanufacturing/biotechnology within a single Partnership, reflecting the technological and industrial interconnections between energy and non-energy uses of biomass. Such an approach would help overcome the fragmentation of the current R&I framework, facilitate the development of integrated biobased value chains and ensure that Europe's research and innovation capacities can contribute more effectively to its industrial competitiveness and strategic autonomy.

In addition to strengthening technological leadership and climate action, FP10 must also contribute to the creation and long-term retention of high-quality employment. Bioenergy and biobased innovation systems have the potential to provide stable and future-proof jobs, particularly in rural and industrial regions.

To ensure a just and resilient transition, FP10 should explicitly support innovation pathways and project models that help absorb, retain, and develop qualified workers, securing the human capital needed to sustain Europe's bioeconomy and reducing the risk of talent loss to other sectors or regions — particularly in light of increasing competition from automation and AI.

EERA Bioenergy is open to discuss and explain further the ideas mentioned in this position paper.