IPIFF Position Paper

Critical Gaps in the "Study on Biomass and Precision Fermentation": A Call for a Holistic EU Bioeconomy Strategy that Includes Insect Farming

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1. Executive Summary

The "Study on biomass and precision fermentation" (hereafter, "the Report") provides a valuable, albeit narrowly focused, literature review of fermentation-derived proteins.

While it effectively details the potential and challenges of microbial protein technologies, it suffers from a critical strategic flaw: it treats biomass and precision fermentation as near-siloed solutions, failing to position them within the broader, more mature, and immediately scalable bioeconomy landscape of the European Union.

This position paper argues that the Report's oversight of established biobased sectors, most notably the EU insect farming industry, leads to an incomplete and potentially misleading evidence base for policymaking.

By excluding sectors that are already contributing to the EU's Bioeconomy Strategy goals—such as circularity, waste valorisation, and reduced import dependency—the Report risks directing policy attention and resources toward technologies that are decades away from scale while neglecting immediate, scalable solutions.

This position is strongly reinforced by the findings of two critical reports:

1. **The 2026 Bellona report on 'Regulatory barriers to the use of biological by-products in European feed production'**, which demonstrates that Europe's primary challenge is not a lack of biological resources, but a lack of a coherent policy framework to enable their safe and circular use.
2. The **Environment Agency's 2025 Report on 'Assessing the potential to enhance circularity of bio-based waste'**, which explicitly identifies insect

farming as a high-efficiency pathway for valorising bio-waste and provides concrete, actionable recommendations for scaling the industry.

We recommend the urgent inclusion of the insect protein sector in all relevant foresight and analytical components of the study, as well as a more integrated approach to the Bioeconomy Strategy that leverages the complementary strengths of all biobased industries, guided by a clear biomass value hierarchy.

2. The Report's Myopic Focus: A Critical Gap

The Report offers a comprehensive technical taxonomy of traditional, biomass, and precision fermentation. **However, its scope is artificially narrow. It positions these technologies as the primary drivers of the protein transition, with occasional references to conventional agriculture and aquaculture only as benchmarks to surpass. This framing is problematic for two reasons:**

1. **It Ignores Existing, Scalable Solutions:** The Report discusses the *potential* of converting side streams (e.g., brewery spent grain, molasses) into protein but fails to acknowledge that the EU already hosts an innovative industry dedicated to this exact principle: **insect farming**. The insect sector is not a theoretical future pathway; it is a present-day reality that can successfully upcycling EU agricultural and food waste into high-value proteins, lipids, and fertilisers (frass).
2. **It Creates a Policy Blind Spot:** By omitting established sectors, the Report's "baseline understanding" of the agri-food system is incomplete. **This, risks creating a policy environment that inadvertently favours capital-intensive, high-energy, and technologically nascent fermentation platforms over diversified, circular, and readily deployable solutions. The Bioeconomy Strategy requires a portfolio of solutions, not a focus on a single technological branch.**

3. The EU Insect Sector: A Tangible Bioeconomy EU sector

The insect protein industry embodies the core objectives of the EU Bioeconomy Strategy—circularity, sustainability, and innovation—objectives that the Report's focus on fermentation technologies only promises to deliver in the long term.

- **Circularity in Action:** While the Report discusses the *potential* of waste valorisation for fermentation, the insect sector is already executing it at scale. **The Environment Agency report** confirms that insect farming is a **"high-efficiency pathway for converting food waste into valuable protein,"** contributing directly to a circular nutrient loop. EU insect producers

use regional side streams, including former foodstuffs, agricultural by-products, and brewery spent grain, as feed substrates. This process does not merely "divert waste" but transforms it into multiple high-value outputs in a matter of days.

- **Multi-Product Output:** The Report details the operational challenge of downstream processing for fermentation, noting that product purification can account for up to 60% of costs. **In contrast, insect farming offers a built-in, efficient biorefinery model:**
    - **Proteins:** Processed into high-quality aquafeed, pet food, and increasingly, human food ingredients.
    - **Lipids:** Used in animal nutrition and as a sustainable feedstock for biofuels and oleochemicals.
    - **Frass (Insect Residue):** A nutrient-rich organic fertiliser that can be used to close the loop on the farm, directly contributing to soil health and reducing reliance on synthetic or imported fertilisers. This output alone creates a direct and beneficial link back to EU agriculture that is absent in the closed-loop fermentation models.
- **Regulatory and Commercial Maturity:** The Report correctly identifies regulatory "gating" as a major hurdle for fermentation-derived proteins under the Novel Food Regulation. **The insect sector has navigated this path, with several species (e.g., *Tenebrio molitor*, *Acheta domesticus*) already authorised as Novel Foods. The regulatory pathway is clearer, and commercial production facilities are operating across the EU, contributing to the European protein strategy.**

4. Enriching the Analysis with Key Findings from the Bellona and Environment Agency Reports

Two recent reports provide critical evidence that directly addresses the Report's omissions and underscores the urgency of a broader approach.

A. Findings from the Bellona Report

The Bellona report, *"Regulatory barriers to the use of biological by-products in European feed production,"* concludes that:

- **Regulatory Barriers are the Primary Obstacle:** The central challenge is not a lack of resources but the persistence of policy and regulatory barriers that limit the safe and economically viable valorisation of biological by-products.
- **Significant Untapped Volumes Exist Today:** The report quantifies the substantial volumes of underutilised bioresources within Europe, including

over **40 million tonnes** of mixed food waste generated each year, currently excluded from feed use despite its potential as a safe substrate for insects.
- **A Biomass Hierarchy is Essential:** Bellona advocates for a robust EU biomass hierarchy, rooted in the cascading use principle, to prioritise high-value applications like feed over lower-value uses like bioenergy.

B. Findings from the Environment Agency's 2025 Report on Insect Farming

The Environment Agency's report provides a detailed, practical blueprint for scaling the insect farming industry, directly challenging the Report's implicit framing of fermentation as the primary technological frontier. Its key takeaways include:

- **High Potential for Nutrient Recovery:** The report explicitly identifies insect farming as a **"high-efficiency pathway for converting food waste into valuable protein"** and a scalable alternative for managing food waste, particularly where direct use as animal feed is restricted. This directly addresses the Report's silence on how to valorise the very waste streams it acknowledges are abundant.
- **Critical Challenges Identified:** The Environment Agency report does not shy away from the challenges facing the insect sector, including feedstock quality, market immaturity, and regulatory ambiguity. **This level of nuance is precisely what is missing from the Report's analysis of fermentation technologies.**
- **Actionable Recommendations to Scale the Industry:** Crucially, the Environment Agency report provides a **concrete set of policy recommendations that the EU can implement today to unlock the potential of insect farming. These include:**
    1. **Strengthen R&D and De-risk Deployment:** Continue and expand EU funding for pilot and demonstration projects (e.g., via Horizon Europe, LIFE program) to improve technology readiness levels and prove commercial viability. This mirrors the Report's own calls for de-risking but applies it to a sector closer to market.
    2. **Clarify and Harmonize Regulations:** Accelerate the development of clear, science-based EU-wide regulations for the use of insect proteins in animal feed for all livestock sectors (currently limited mainly to pet food, aquaculture, swine and poultry). This directly addresses the "regulatory gating" identified in the Report.
    3. **Create Market Demand:** Introduce incentives or mandates for the inclusion of insect-based proteins in compound feeds and include insect-derived products in Green Public Procurement (GPP) criteria. This is a concrete market-creation mechanism absent from the Report.
    4. **Ensure Feedstock Quality and Supply:** Link support for insect farming to policies that improve the separate collection of bio-waste. The report emphasizes that **38-47 million tonnes of bio-waste remains in**

mixed municipal waste, representing a massive lost opportunity that the insect sector is uniquely positioned to capture.

5. Recommendations: From Narrow Assessment to Holistic Strategy

To ensure the Bioeconomy Strategy is built on a complete and actionable evidence base, we propose the following recommendations:

1. **Broaden the Scope of the Study:** The analytical and foresight components of the study must be expanded to include the EU insect protein sector. This should involve a comparative techno-economic and environmental analysis that places insect farming, biomass fermentation, and precision fermentation on an equal footing, evaluating them against the same criteria:
    - **Resource Efficiency:** Compare land, water, and energy use across all platforms.
    - **Circularity:** Evaluate the ability of each sector to utilise diverse EU-sourced waste streams and produce valuable co-products (e.g., frass).
    - **Scalability and Maturity:** Assess the current production capacity, capital expenditure, and time-to-market for each sector, acknowledging that insect farming is already operating at commercial scale.
    - **Regulatory Hurdles:** Compare the regulatory pathways (Novel Food, GMO, feed, animal by-products) and the associated compliance costs and timelines, including the specific recommendations from the Environment Agency report.
2. **Adopt a Portfolio Approach in Policy:** The Bioeconomy Strategy should move away from a single-technology focus. **Policymakers must recognise that different protein production systems serve different purposes and markets. A robust strategy will leverage the complementary strengths of:**
    - **Insect Farming:** For rapid, circular valorisation of organic side streams (especially mixed food waste) into animal feed, pet food, and fertilisers. **This should be prioritised, as recommended by the Environment Agency, to unlock the 38-47 million tonnes of untapped bio-waste.**
    - **Biomass Fermentation:** For producing bulk fungal and yeast proteins for processed foods and feed, where feedstock quality and consistency can be controlled.
    - **Precision Fermentation:** For high-value, bio-identical functional ingredients where there is no viable alternative.
3. **Establish a Biomass Value Hierarchy:** As recommended by Bellona, the European Commission should develop and implement a binding biomass

hierarchy that prioritises the use of biological resources for food and feed before energy or disposal. This framework should be integrated into all relevant policy areas, including the Renewable Energy Directive (RED), the Waste Framework Directive, and the Circular Economy Act.

4. **Leverage Synergies and Remove Barriers:** Future policy and funding should not treat these sectors as competing but as potential partners. Critically, the EU must act on the regulatory barriers identified in the Bellona and Environment Agency reports by:
    - **Implementing the Environment Agency**'s recommendation to allow the safe use of mixed food waste as a substrate for insects, supported by quality standards for source-segregated bio-waste.
    - **Creating a differentiated feed category for pet food** to prioritise high-quality feed for food-producing animals.
    - **Establishing harmonised End-of-Waste (EoW) criteria** for insect-based products (frass/fertiliser) to facilitate market entry and cross-border trade, as recommended by the Environment Agency.

6. Conclusion

The "Study on biomass and precision fermentation" is a well-executed technical review, but its narrow scope makes it an inadequate foundation for shaping a comprehensive EU Bioeconomy Strategy.

By failing to account for the existing, scalable, and demonstrably circular insect protein sector, and by ignoring the detailed, actionable policy recommendations from the Bellona and Environment Agency reports, the Study presents an incomplete picture of the bioeconomy landscape.

We urge the European Commission to rectify this oversight by integrating the insect farming industry into the ongoing study and by adopting a holistic portfolio approach to the Bioeconomy Strategy. Only by leveraging the full spectrum of biobased solutions—from the insect to the fermenter—can the EU achieve its goals of strategic autonomy, circularity, and a sustainable future for its farmers and rural areas.