Interreg
Co-funded by the European Union
Öresund-Kattegat-Skagerrak
ACCEL AGROBIOGAS

Position paper
Biogas in a holistic bioeconomy strategy

Autumn 2026

Unlocking Europe's Untapped Agricultural Biomass Potential: A More Integrated Policy Framework for Biogas Production

Executive Summary

The European Union has set ambitious targets for renewable gas production, including the objective of reaching 35 bcm of sustainable biomethane by 2030, but it lacks a coherent biomass strategy to achieve these targets.

Current policy frameworks often treat food, environment, and bioenergy as competing priorities, leaving vast biomass potential untapped. The Nordic biogas model already valorises sewage sludge, food waste, and manure through the biogas system. However, scientific evidence shows that integrating underutilised resources from cropping systems, such as **ley, intermediate crops**, and **plant residues**, into the biogas cycle also delivers **renewable energy**, **climate mitigation**, and **agricultural resilience** simultaneously[1] [2].

While other bioeconomy applications continue to develop, the EU Bioeconomy Strategy does not fully recognise the role of biogas as an important complementary pathway for utilising and supporting biomass production. Many emerging bio-based industries are not yet sufficiently mature or large to absorb substantial biomass volumes. Biogas therefore provides a valuable outlet that ensures these resources (including side streams and cascades) are put to productive use in the transition towards a more developed and integrated circular bioeconomy.

An integrated EU biomass strategy would also strengthen European strategic autonomy by improving domestic resource efficiency, reducing dependence on imported energy, feed, and fertilisers, and supporting new bio-based regional value chains.

This position paper argues that the ambitions of the EU and individual member states, i.e. interconnecting food supply and energy security with fulfilment of environmental and climate targets, can be achieved through the production and utilisation of sustainable biomass resources. A more flexible and integrated legislative framework that recognises the multifunctionality of biomass production systems and improves coherence between the Renewable Energy Directive (RED), the Common Agricultural Policy (CAP), and the EU Bioeconomy Strategy is strongly advised.

Concretely, the following five policy recommendations are put forward:

1. **Recognise multifunctional biomass systems in RED**
2. **Recognise ecosystem services throughout the biogas value chain**
3. **Harmonise RED Accounting with CAP Principles through Model-Based Simplification**
4. **Increase flexibility in implementation**
5. **Improve coherence across EU legislation and certification systems**

[1] Launay, C., Houot, S., Frédéric, S. et al. Incorporating energy cover crops for biogas production into agricultural systems: benefits and environmental impacts. A review. Agron. Sustain. Dev. 42, 57 (2022). https://doi.org/10.1007/s13593-022-00790-8

[2] Levavasseur, F., Kouakou, P. K., Constantin, J., Cresson, R., Ferchaud, F., Girault, R., Jean- Baptiste, V., Lagrange, H., Marsac, S., Pellerin, S., & Houot, S. (2023 Energy cover crops for biogas production increase soil organic carbon stocks: A modeling approach. GCB Bioenergy, 15, 224–238. https://doi.org/10.1111/gcbb.13018

About the authors of this position paper

*With support from Energigas Sverige and Biogas Danmark, this position paper has been prepared by the Swedish–Danish **Accel AgroBiogas**[3] project consortium, a cross-sector partnership bringing together farmers, biogas producers, researchers, and innovation actors. The project is co-financed by the EU through the Interreg Öresund-Kattegat-Skagerrak programme with parts of the budget dedicated to activities informing EU and national policymakers specifically. The consortium works to unlock the sustainable biogas potential of underutilised agricultural biomass resources, with a particular focus on ley, intermediate crops, and crop residues in the Nordic region, specifically the intensively cultivated area covering Denmark and Southern Sweden. The recommendations presented in this paper build on practical experience, scientific research, and stakeholder collaboration, and are intended as a constructive contribution to ongoing EU policy discussions on renewable energy, agriculture, and the bioeconomy.*

Why this matters now

Biogas has become increasingly important in the European policy agenda. The REPowerEU Plan, the EU Biomethane Action Plan, and the specific target of producing 35 bcm of biogas and biomethane by 2030 all recognise renewable gas as an essential component of Europe's energy transition and energy security.

A recent EU meta-study demonstrates the high potential of plant-based agricultural biomasses as a complement to manure and other biogas substrates. It also points to the need for a coherent approach to unlocking sustainable biomass resources as one of the key challenges[4].

From our perspective, Europe's high ambitions and urgent need to increase renewable gas production are not yet matched by a comprehensive strategy for the sustainable use of biomass resources. Existing legislation continues to reflect the assumption that food production, environmental protection, and bioenergy inevitably compete for limited land and biomass resources. While this may apply to some biomass streams, it overlooks the potential demonstrated by many researchers: agricultural systems are capable of delivering multiple public goods that address some of our main environmental challenges simultaneously, such as eutrophication, soil degradation, herbicide resistance, climate change, and more[5].

The revisions of both the Renewable Energy Directive (RED) and the Common Agricultural Policy (CAP) offer opportunities to create a more coherent framework delivering solutions to the multiple grand challenges (climate, food security, sustainable agriculture, geopolitical threats, and rural development) through production and valorisation of intermediate crops and ley.

An untapped opportunity: Multifunctional agricultural systems

Agricultural policy already creates incentives, e.g., through eco-schemes in CAP, to increase the implementation

of intermediate crops and ley in cropping systems to provide ecosystem services and safeguard the productivity of agricultural land. Harvesting these biomasses and supplying them to the biogas system is, however, not rewarded in that management system, but rather viewed as conflicting with ecosystem services or the principles of the CAP. We question that view on the basis of research documenting that multifunctional agricultural systems based on ley and intermediate crops can deliver multiple ecosystem services, including reduced nitrate leaching and improvements in soil quality[6],

[3] www.accelagrobiogas.eu

[4] Biogases: Europe´s overlooked path to energy independence? Reassessing sustainable production potential. Guidehouse, 2026.

[5] Launay, C., Houot, S., Frédéric, S. et al. Incorporating energy cover crops for biogas production into agricultural systems: benefits and environmental impacts. A review. Agron. Sustain. Dev. 42, 57 (2022). https://doi.org/10.1007/s13593-022-00790-8

[6] Biogases: Europe´s overlooked path to energy independence? Reassessing sustainable production potential. Guidehouse, 2026.

while also producing biomass suitable for biogas production without significantly affecting direct N2O emissions[7].

These ecosystem services arise primarily from the cultivation and management of ley and intermediate crops. Harvesting these biomasses can, under appropriate management, even generate additional ecosystem services.

- Reduced nutrient leaching.

Harvesting green biomasses from ley, intermediate crops, and plant residues to supply biogas production can improve nutrient utilisation within the agricultural system. If this biomass is left on the field to decompose, a significant share of its nutrients may be released at times when crop uptake is limited, increasing the risk of nutrient losses through leaching. By contrast, harvesting the biomass and processing it through anaerobic digestion allows nutrients to be recovered and recycled via digestate in a more plant-available and manageable form. This enables nutrients to be applied when subsequent crops have a demand for them, supporting higher nutrient use efficiency, improved crop yields, and reduced nutrient leakage to water bodies. In this way, biogas production can contribute simultaneously to renewable energy generation, more effective nutrient management in agricultural systems, and water protection.

If farmers can sell their residual biomass to biogas producers, additional incentives are created to increase the area under intermediate crops, thereby generating multiple additional ecosystem services, including reduced nitrate leaching.

- Reduced nitrous oxide emissions.

Harvesting the biomass of intermediate crops, ley, and plant residues such as potato leaves and sugar beet leaves will likely prevent nitrous oxide emissions that would otherwise occur if green material were left to decompose on the field over winter[8]. As new scientific evidence emerges[9], the European Commission should reassess how nitrous oxide (N_2O) emissions from the decomposition of intermediate crops, ley crops, and crop residues are accounted for under RED. For the same reason, it should be considered to incentivise the harvesting of green biomass from intermediate crops through the Common Agricultural Policy.

- Reduced pesticide requirements.

The primary contribution of ley to the management of herbicide-resistant weeds, such as black-grass, is its ability to outcompete weeds and interrupt their life cycle. Repeated harvesting suppresses weed growth and limits seed production, reducing weed pressure in subsequent main crops. When the harvested biomass is used for biogas production, an additional benefit is achieved as weed seeds may be devitalised during the digestion process, further limiting their spread. This ecosystem service can reduce reliance on herbicides and support the long-term productivity and resilience of agricultural land.

- Increased soil carbon sequestration.

The positive effect of intermediate crops and ley on stable soil carbon sequestration and improvement of soil structure stems primarily from the root system, not the aboveground biomass. It is well documented in research, including studies from the Swedish University of Agricultural Sciences, INRAE (France)[10], Biogasdoneright (Italy)[11], and the United States[12],

[7] Abdalla M, Hastings A, Cheng K, et al. A critical review of the impacts of cover crops on nitrogen leaching, net greenhouse gas balance and crop productivity. Glob Change Biol. 2019;25:2530–2543. https://doi.org/10.1111/gcb.14644

[8] Hansen, S., Berland Frøseth, R., Stenberg, M., et al (2019). Reviews and syntheses: Review of causes and sources of N2O emissions and NO3 leaching from organic arable crop rotations, Biogeosciences, 16, 2795–2819, https://doi.org/10.5194/bg-16-2795-2019

[9] E.g. the European project ResidueGas: Improved estimation and mitigation of nitrous oxide emissions and soil carbon storage from crop residues

[10] Levavasseur, F., Kouakou, P. K., Constantin, J., Cresson, R., Ferchaud, F., Girault, R., Jean- Baptiste, V., Lagrange, H., Marsac, S., Pellerin, S., & Houot, S. (2023). Energy cover crops for biogas production increase soil organic carbon stocks: A modeling approach. GCB Bioenergy, 15, 224–238. https://doi.org/10.1111/gcbb.13018

[11] Gattoni (CIB): Biological CO_2 must be exploited, Italy should strive for biomethane Materia Rinnovabile | Renewable Matter

[12] Moukanni N, Brewer KM, Gaudin ACM and O'Geen AT (2022) Optimizing Carbon Sequestration Through Cover Cropping in Mediterranean Agroecosystems: Synthesis of Mechanisms and Implications for Management. Front. Agron. 4:844166. doi: 10.3389/fagro.2022.844166

that the build-up of stable soil carbon from cover crops can, in many cases, compensate for the complete removal of crop residues from the fields[13].

Energy policy that encourages the use of biomass from ley and intermediate crops, where it is produced sustainably, should reinforce the goals of agricultural policy, not counteract.

Biogas complements the circular bioeconomy

The EU Bioeconomy Strategy rightly promotes the cascading use of biomass by prioritising higher-value material applications over energy use. At present, however, many of these potentially higher-value uses remain in the early stages of product and market development and are not yet able to absorb the substantial volumes of sustainable biomass that can be mobilised from ley, intermediate crops, and other agricultural residues.

In the short term, biogas therefore provides an important complementary market for utilising these biomass resources today, while supporting the development of future bio-based value chains. Biomasses such as ley can increase biomethane production in the near term and, over time, may also supply green biorefineries producing plant-based food and feed proteins. Side streams from biorefining can, in turn, be used in other bio-based products, including packaging, construction materials, and textiles.

Even in a mature bioeconomy, substantial side streams and residual biomass fractions will continue to require valorisation, making biogas an important complementary pathway alongside higher-value material uses. Utilisation of the biomass in biogas plants, either directly or from side stream residues and cascades can, however, contribute to achieving the EU's ambitious biomethane goals. The biogas sector therefore enables the productive utilisation of biomass during the transition towards a more mature and integrated circular bioeconomy, while remaining compatible with future higher-value material uses, particularly serving as a reliable offtaker of biomass side streams and residuals.

Why current legislation falls short: Evidence from the Nordic region

Current legislation does not fully recognise the multifunctional benefits generated in agricultural production systems, while agricultural policy fails to capture the opportunity to utilise this biomass for renewable energy and nutrient recycling. Even in the Nordics, despite strong societal demand for biomethane and a research-backed potential for introducing agricultural biomass into the biogas system, implementation is slowed down by the lack of a coherent strategy and supporting legislation.

Denmark, for instance, has ambitious political goals for expanding biomethane production. At the same time, strengthened environmental and climate regulations linked to the Green Tripartite Agreement (GTA), the Nitrates Directive, and the Water Framework Directive (WFD) are expected to increase the cultivation and availability of ley and intermediate crops. This creates both a need and an opportunity to utilise these biomass resources more efficiently.

However, the current method of calculating the CI score for biomasses harvested as a residue from crops grown primarily for environmental purposes disincentivises the use of these biomasses in the biogas sector. Offtake in the form of animal feed is expected to remain stagnant or even decline over time and other utilisations in the bioeconomy are still at a low level. While a simplified implementation of the Bioeconomy Strategy may be preferable from an administrative perspective, it comes at the cost of undermining the multifunctional value of these crops. The result is a wide array of missed opportunities across the broader climate, environmental, bioeconomy, energy, and strategic autonomy goals shared by the EU. The sustainable use of biomass according to the cascading principle, combined with stronger incentives and reliable offtake mechanisms, will support the utilisation of grass for biogas production. Biogas plants provide a readily available solution that can serve as a stepping stone towards more advanced uses, which will still be dependent on the use of residues in biogas plants.

[13] Barrios Latorre, S. A., Aronsson, H., Björnsson, L., Viketoft, M., & Prade, T. (2024). Exploring the benefits of intermediate crops: Is it possible to offset soil organic carbon losses caused by crop residue removal? Agricultural Systems, 215, 103873. Published in Agricultural Systems.

One Danish example is the use of clover-grass ley as green manure in organic stockless farming. Danish rules on sustainable biogas production exempt organic clover-grass ley from classification as an energy crop when used for biogas. This reflects its wider agronomic value: It supplies nitrogen to crop rotations, reduces weed pressure, and improves soil quality. However, these multifunctional benefits are not sufficiently recognised at the EU level, despite their relevance for both Danish and EU targets to expand organic farming by 2030.

In Sweden, the industry established a biogas commission to communicate the need for a rapid, substantial expansion of biomethane production to meet the demands of the green transformation and energy security. Industrial demand alone accounts for 10 TWh, excluding transport, shipping, and electricity. This volume far exceeds the available biogas potential from manure, food waste, and wastewater sludge. To meet this demand, the sector relies on other biomasses, and research clearly demonstrates the untapped potential of ley and intermediate crops.

In both countries, these biomass resources represent an important opportunity to scale up biomethane production without undermining food security or environmental objectives. However, the Accel AgroBiogas consortium and its partners see a need for broader recognition of this potential across both policy and implementation levels. There seems to be limited recognition of the central role that ley, intermediate crops, and plant residues can play in supporting the expansion of sustainable biogas production. This missed opportunity leaves actors in the biogas value chain facing an unclear direction, resulting in a lack of economic feasibility and severe market uncertainty for biogas produced from these untapped substrates.

Several key shortcomings reduce incentives for both farmers and biogas producers:

- **Undervalued Systems**: Sustainability criteria do not adequately value the multifunctional benefits of strategic cropping systems, such as clover-grass ley as green manure in organic crop rotations.
- **Impractical Accounting**: The RED method for greenhouse gas accounting from soil carbon sequestration in advanced agricultural practices is impractical for industry actors, including farmers.
- **Rigid Frameworks**: One-size-fits-all implementation limits necessary regional adaptation.
- **Policy Misalignment**: Poor alignment between RED, CAP, and environmental legislation creates unnecessary, artificial trade-offs.
- **Inadequate Certification**: Certification systems aligned with RED, such as ISCC, do not recognise the potential for multifunctionality of ley and intermediate crops.

Ultimately, this regulatory approach risks creating a false conflict between renewable energy production and environmental protection, despite growing evidence that advanced biomass systems support both objectives simultaneously.

Policy recommendations

1. Recognise multifunctional biomass systems in RED

When using biomasses derived from crops that are established and managed primarily for ecosystem services, the emissions related to the establishment and management of the crop should be exempt from accounting. This holds, of course, only if harvest does not compromise the primary function. In the biogas value chain, common examples of ecosystem service functions of crops are nitrogen retention, carbon sequestration, erosion control, biodiversity enhancement, and the usage of clover-grass ley as green manure in organic crop rotation. Furthermore, emissions from harvest and transport should be excluded if harvest and handling in the biogas system contribute to the ecosystem service.

In practice, we suggest that crops grown to provide ecosystem services or other multifunctional benefits, while simultaneously producing biomass for biogas, can be accounted for in one of two ways: Either by establishing new

appropriate categories such as “multifunctional crops” or “environmental crops” in the RED system, or, alternatively, by classifying these biomasses as residuals.

2. Recognise ecosystem services throughout the biogas value chain

Advanced greenhouse gas methodologies should better account for abated emissions associated with harvesting biomass rather than leaving it to decompose in the field, such as avoided nitrous oxide emissions, and avoided emissions stemming from improved nutrient recycling through biodigestate.

Further, we recommend expanding the RED and ISCC systems to take into account other ecosystem services beyond carbon footprint mitigation. By allowing these systems to account for other ecosystem services such as reduced nitrogen leakage, protection against soil erosion, biodiversity protection, and increased organic food production, multiple EU goals could be supported simultaneously. While the esca factor in the RED GHG calculation method theoretically allows for support of some of these goals, it is impractical for farmers. Alternatively, echoing the previous recommendation, a separate “environmental crop” classification or the classification of biomasses derived from ecosystem service crops as residuals could largely solve this issue.

3. Harmonise RED Accounting with CAP Principles through Model-Based Simplification

Under RED, obtaining recognition for the soil-carbon-sequestration effects of intermediate crops and ley currently requires burdensome and costly methods, including soil sampling. Research questions whether comparing soil samples over a limited number of years gives reliable results.

Instead, we suggest aligning the approach in RED with the practice-based compliance approach of the Common Agricultural Policy (CAP). Instead of requiring burdensome, farm-specific soil testing and complex calculations, RED should adopt a **simplified, model-based compliance pathway** similar to the CAP framework. Research on this is already ongoing[14] [15].

4. Increase flexibility in implementation

EU legislation should establish common principles while allowing Member States sufficient flexibility to adapt implementation to regional agronomic conditions.

This could be achieved through greater flexibility in implementation, including:

- Regional differentiation of sustainability values for the calculation of CI scores for different biomass categories in RED and in the CAP to reflect variation in climate, soil types, and agronomic context
- A CAP that supports flexible, regionally adapted timing requirements for sowing and harvesting ley and intermediate crops, enabling Member States to respond to weather conditions and other external factors while facilitating the use of biomass for biogas production.

5. Improve coherence across EU legislation and certification systems

In order to create clear and consistent incentives for the sustainable use of biomass across the biogas value chain and encourage multifunctionality, certification systems, such as the International Sustainability and Carbon Certification (ISCC) system, should be aligned with the regulatory framework, including the Renewable Energy Directive (RED), the Common Agricultural Policy (CAP), and the EU Bioeconomy Strategy.

[14] Levavasseur, F., Kouakou, P. K., Constantin, J., Cresson, R., Ferchaud, F., Girault, R., Jean- Baptiste, V., Lagrange, H., Marsac, S., Pellerin, S., & Houot, S. (2023). Energy cover crops for biogas production increase soil organic carbon stocks: A modeling approach. GCB Bioenergy, 15, 224–238. https://doi.org/10.1111/gcbb.13018

[15] Example of soil carbon sequestration model development: R. Kröbel, M.A. Bolinder, H.H. Janzen, S.M. Little, A.J. Vandenbygaart, T. Kätterer. 2016. Canadian farm-level soil carbon change assessment by merging the greenhouse gas model Holos with the Introductory Carbon Balance Model (ICBM), Agricultural Systems, Volume 143:76-85.

Conclusion

Europe possesses considerably greater sustainable biomass potential than is currently utilised, primarily due to disincentives in current legislation.

The challenge is therefore not the availability of biomass, but the absence of an integrated policy framework capable of recognising multifunctional agricultural systems and the multiple public goods they provide.

A more coherent legislative approach would enable the utilisation and valorisation of underutilised biomass resources while simultaneously contributing to renewable energy production, climate mitigation, biodiversity, water quality, and nutrient recycling. Such an approach would simultaneously foster rural development and strengthen European strategic autonomy, particularly through energy independence, reduced reliance on fertiliser imports, and increased fodder production through protein biorefining.

Rather than treating these objectives as competing priorities, future EU legislation should recognise and reward the synergies that multifunctional biomass systems can deliver, as well as the critical role of these systems in realising a circular bioeconomy.