



Policy messages from projects around the Baltic Sea Region

Coordinators of Policy Area Nutri working under the EU Strategy for the Baltic Sea Region have gathered policy messages from several ongoing and past projects relevant to the bioeconomy topic. The topics of projects, such as nutrient recycling, water re-use and improvements for wastewater treatment, reflect on issues that relevant to the Baltic Sea Region.

Contributing projects are:

[CiNURGi](#) - Circular nutrients for a sustainable Baltic Sea Region,
[GYPREG](#) - Tackling agricultural phosphorus losses by soil amendments
[Nursecoast II](#) - Model nutrients reduction solutions in near-coast touristic areas
[BalticReed](#)
[Sustainable Biogas](#) (2020-2022)
[Manure recycling project](#) (2020-2024)

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CiNURGi - Circular Nutrients for a Sustainable Baltic Sea Region

Feedback to the Public Consultation on the EU Bioeconomy Strategy (2025)

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This #MadeWithInterreg project helps drive the transition to a green and resilient Baltic Sea region and is part of the EU-funded Interreg Baltic Sea Region (BSR) core project #C049, titled CiNURGi, under the 2021-2027 PROGRAMME, Priority 3: Climate-Neutral Societies, Objective 3.1: Circular Economy.

Organisations from the following countries cooperate together to make that happen: Sweden (LP), Denmark, Estonia, Finland, Germany, Latvia, Lithuania and Poland.

Project homepage: <https://interreg-baltic.eu/project/cinurgi>

Project LinkedIn page: <https://www.linkedin.com/showcase/cinurgi>

CiNURGi Project Summary

CiNURGi (Circular Nutrients for a Sustainable Baltic Sea Region) is a flagship Interreg Baltic Sea Region Core Project dedicated to advancing a circular economy for nutrients by improving infrastructure, technologies, and policy frameworks for nutrient recovery. Running from November 2023 to October 2027, the project brings together 24 core partners and 13 associated organizations from eight countries—Denmark, Estonia, Finland, Germany, Poland, Latvia, Lithuania, and Sweden—working collaboratively to enhance nutrient recycling from agricultural, municipal, and industrial biomass streams. CiNURGi supports the development of safe, high-quality bio-based fertilizers (BBFs), field-tested through regional pilot sites, and co-developed with business owners, municipalities, and SMEs to ensure practical viability and market acceptance. The project contributes to key regional and European strategies, including the HELCOM Baltic Sea Regional Nutrient Recycling Strategy, the EU Circular Economy Action Plan under the Green Deal, and the Integrated Nutrient Management Action Plan of the Farm to Fork Strategy. A central output is the establishment of a Knowledge and Processing Service Centre to facilitate cross-sector adoption of nutrient circularity. Through its work, CiNURGi strengthens regional cooperation, reduces nutrient losses to the Baltic Sea, and provides policy input on integrating nutrient recycling into EU bioeconomy and water governance frameworks.

For more information about CiNURGi and its initiatives, please visit our project homepage: <https://interreg-baltic.eu/project/cinurgi>.

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1 General Endorsement

The CiNURGi consortium welcomes the Commission’s initiative to renew and advance the EU Bioeconomy Strategy. We are encouraged by its clear alignment with Europe’s climate, environmental, and competitiveness goals, and we strongly support the Strategy’s commitment to circularity, innovation, and green growth.

CiNURGi, a project funded under Interreg Baltic Sea Region, brings together 27 partners across research, municipal, private, and policy sectors to demonstrate viable solutions for nutrient recovery and circular fertilizer production. We are pleased to share some early reflections that we hope may be of relevance as the Strategy develops.

2. Reflections and Recommendations from CiNURGi Activities

1.1 Strengthening Linkages Between Circular Bioeconomy and Water Policy

While the Strategy outlines an ambitious pathway for circular bio-based solutions, there may be further opportunity to clarify how bioeconomy actions interact with existing water-related regulatory frameworks, such as:

- **Water Framework Directive (2000/60)**¹
- **Urban Waste Water Treatment Directive (91/271/EEC)**²
- **Nitrates Directive (91/676/EEC)**³
- **Water Reuse Regulation (2020/741)**⁴

Observation from CiNURGi: Our initial findings suggest that the valorisation of nutrients from wastewater, manure, and organic residues is deeply intertwined with water management

¹ <https://eur-lex.europa.eu/eli/dir/2000/60/oj>

² <https://eur-lex.europa.eu/eli/dir/2024/3019/2024-12-12/eng>

³ <https://eur-lex.europa.eu/eli/dir/1991/676/oj/eng>

⁴ <https://eur-lex.europa.eu/eli/reg/2020/741/oj/eng>

objectives. In several regions, innovative nutrient recovery systems not only support circular economy targets, but also reduce environmental pressures on aquatic ecosystems.

Suggestion: A modest expansion of the Strategy to reflect the role of water-related directives may help ensure policy coherence and further support bio-based innovation in water-intensive sectors.

1.2 Supporting Bio-Based Fertilizer (BBF) Development and Uptake

Challenge: Many promising BBF solutions are advancing through pilot and demonstration stages, yet their path to market remains uncertain. Factors such as high production costs, variability in product characteristics, and limited awareness or trust among end users can slow uptake.

CiNURGi Insight: Our analysis of 24 nutrient recycling value chains across the Baltic Sea Region has identified several that show strong potential for emissions reduction and economic feasibility. In some cases, these solutions may offer up to **22.5 t CO₂e savings per 1,000 kg N+P** recovered, while reducing external fertilizer dependency⁵.

Suggestion: The Strategy may wish to highlight BBFs as a key product category within the bioeconomy, potentially linking to the EU Fertilising Products Regulation and supporting investment in quality standards, traceability, and user acceptance mechanisms.

1.3 Encouraging Regional Circular Markets and Redistribution

Observation: Regional imbalances in nutrient flows remain a challenge, particularly in livestock-dense areas. Fertilizer alternatives produced from local biomass streams can address both surplus and deficit conditions when coupled with appropriate processing and distribution infrastructure.

CiNURGi Insight: For example, phosphorus surpluses in parts of western Denmark are not currently redistributed to deficit regions in the east, despite clear agronomic potential. Regional platforms and logistics innovations, including pelletised BBFs, could offer an effective solution.

Suggestion: The Strategy could further encourage mechanisms that facilitate cross-regional nutrient circulation and support the development of market-ready circular bioeconomy infrastructures.

1.4 Understanding End-User Preferences and Behaviour

Observation: Market uptake of BBFs and other bio-based products is shaped not only by regulatory frameworks but also by business owners practical preferences, including ease of handling, compatibility with existing equipment, and transparency regarding origin and content.

⁵ This insight is based on a work-in-progress report to CiNURGi A1.3

CiNURGi Insight: Our field studies in Sweden, Finland, and Denmark show increasing interest among business owners in regenerative practices and recycled inputs. However, ensuring products meet user expectations—particularly in terms of nutrient availability and consistency—is essential to building trust.

Suggestion: The Strategy might benefit from including guidance or support for co-development processes involving producers, end users, and local advisors, ensuring innovations are fit-for-purpose and broadly accepted.

3. Final Thoughts

We are optimistic about the direction of the revised EU Bioeconomy Strategy and look forward to its adoption later this year. As CiNURGi's work continues, we would be pleased to share additional data and policy insights that may support the Strategy's implementation.

We appreciate the opportunity to contribute to this consultation and remain committed to supporting a circular, sustainable, and water-smart bioeconomy for Europe.

Feedback to the Public Consultation on the EU Bioeconomy Strategy 2025)

Project GYPREG – Tackling agricultural phosphorus losses by soil amendments, EU Interreg Baltic Sea Region, <https://interreg-baltic.eu/project/gypreg/>

Petri Ekholm (Finnish Environment Institute, Syke), leader of the GYPREG project

Soil amendments have been used for ages to improve soil structure and as fertilizers. Recently, they have also been applied to reduce negative impacts of agriculture on the environment. In Finland, gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) amendment of agricultural fields has been found to reduce phosphorus losses to surface water by 30–50%. In the country, gypsum is delivered to willing farmers in eligible areas for free, the national objective being to improve the state of coastal waters of the Baltic Sea. A specific aim is to alleviate eutrophication of the Archipelago Sea, which catchment is the only HELCOM hot spot in Finland due to agricultural loading. To this date, some 70 000 hectares have been treated with gypsum in Finland. Although gypsum amendment is first and foremost a water protection measure, the sulfur in gypsum has a value as a fertilizer. In addition, calcium in gypsum improves the quality of certain beets.

Structure lime ($\text{CaCO}_3 + \text{CaO}$ or $\text{Ca}(\text{OH})_2$) is another soil amendment, used in Sweden for agronomical and environmental purposes, the treated area being at the level of that for gypsum in Finland. Finally, pulp and paper mill sludges have also potential as an agri-environmental measure. As they are rich in organic carbon they may correct the structural problems specifically in soils with a low carbon to clay ratio.

GYPREG is an Interreg Baltic Sea Region Core Project that examines whether soil amendments also reduce phosphorus loading in the other Baltic Sea countries and whether they could be adapted to locally varying environmental, agronomic and social conditions. The final objective is to build national operating models for the methods with close cooperation with target groups. Running from November 2023 to October 2026, the project has 8 core partners and 14 associate partners from Finland, Latvia, Lithuania, Poland and Sweden. A nationally funded sister project (NordGypsum, 2023–2025) took Denmark and Norway on board.

Many soil amendments are by-products. For example, phosphogypsum is voluminously formed in phosphoric acid manufacturing and flue-gas desulfurization gypsum in coal-fired power plants. In addition, gypsum may originate from building and demolition. Structure lime is available as a side-stream of CaO manufacturing, and of pulp, paper and steel mills. Making pristine quick lime from calcium carbonate is not meaningful because of the considerable climate footprint. Pulp and paper mill sludges consist of lignin and cellulose and have been treated by composting or liming for safe use in food production.

Applying soil amendments in agriculture forms an excellent example of circular economy where the by-product, which otherwise might end up as waste, increases the sustainability of agriculture and replaces the use of virgin resources. GYPREG encourages new uses for phosphogypsum and flue gas desulfurization gypsum, industrial side-products which would not otherwise be circulated in the society. The same applies to recycled gypsum to be tested in the project. If gypsum amendment turns out to be feasible solution in the other Baltic Sea countries, it has a high potential in making farming systems more water friendly. When applied together with agricultural lime, it can also help to correct chemical imbalances of acid soils found Lithuania and Poland. The extensive dissemination and

communication of the results ascertain that information on gypsum amendment reaches all relevant target groups from decision makers to individual actors.

The use of by-product-based soil amendments is principally not allowed in organic farming (EU 2018/848). This EU regulation forms a major obstacle for their extensive use. Mined natural gypsum is allowed but its environmental impacts may exceed those of corresponding by-products and the costs for the farmer and the society may be higher. Paradoxically, mined gypsum and by-product gypsum are chemically nearly identical products. Given that there are many sources of gypsum and other soil amendments, obviously each must be chemically analysed to secure purity and thereby safe use in food production.

Cost-effectiveness analyses have shown that soil amendments do not produce so much private benefits for the farmer that their use would be economically feasible for the farmer. However, the increase in societal well-being as a lessened damage (such as eutrophication) exceeds the cost of soil amendments (including transport and spreading). That is, as the society benefits from the use of soil amendments, the costs should be subsidized to the farmer. If they are not, their use will probably be minimal.

Finally, there are still open questions how different soil amendments work in various agri-environment settings. Thus, research on their performance and feasibility is needed. For their part, the GYPREG and NordGypsum projects will produce such knowledge.

Bioeconomy Policy-Relevant Results from NURSECOAST-II

The Nursecoast-II project addresses the critical issue of seasonal wastewater surges in coastal tourist areas, which often overwhelm small-scale treatment systems. This is particularly relevant for bioeconomy policies aiming to close nutrient loops and reduce environmental impacts from tourism. Based on the latest updates from the NURSECOAST-II project, several policy-relevant results have emerged that are highly significant for advancing the bioeconomy in the Baltic Sea Region. Here are the key takeaways:

- In a bioeconomy, efficient wastewater treatment is crucial for sustainability and resource utilization.
- Special attention should be paid to improving the efficiency of small wastewater treatment plants with less than 2000 PE, especially during large seasonal fluctuations. While the EU's Urban Wastewater Treatment Directive (UWWTD) focuses on larger plants, the performance and management of smaller plants, especially during seasonal fluctuations, can significantly influence local water resources and contribute to overall environmental protection.
- Using nanobubble technology for aeration can significantly enhance the capacity of biological treatment plants. Nanobubbles, smaller than traditional bubbles, offer increased surface area and enhanced oxygen transfer, leading to more efficient wastewater treatment. The use of nanobubble technology in aeration can significantly improve the capacity of biological treatment plants. The use of nanobubble technology can enhance the treatment efficiency of high seasonal nutrient loads and thus avoid the need to renew the entire plant.
- Wetlands, both natural and constructed, can be effectively used to improve wastewater treatment efficiency. They utilize natural processes like biodegradation, sorption, and phytoextraction to remove pollutants from wastewater, offering a sustainable and cost-effective alternative to traditional methods.
- Aeration of constructed wetlands (intensified constructed wetlands) can be used to reduce nitrogen concentration in the effluent. It also reduces the required footprint of the system—an advantage if space is limited at the tourist place. However, this approach requires more precise monitoring of tourist numbers (wastewater load) to avoid excessive energy consumption by compressors and aeration systems.
- If boosting the existing wastewater system is not sufficient and a full renewal is required, simplifying and accelerating the environmental permitting process becomes crucial.
- Legislative measures can play a key role in promoting the adoption and use of new innovative wastewater treatment technologies and nature-based and circular solutions by creating incentives and financing opportunities. This can help overcome barriers to adoption, encourage innovation and ultimately lead to more sustainable wastewater treatment practices.

- The Life Cycle Assessment (LCA) should confirm the environmental benefits, as well could show the hotspots of wastewater treatment systems.
- Key environmental impact categories that should be assessed in LCAs of wastewater systems include are divided into the typically energy related and toxicity related. The energy related impact categories are Global warming, Acidification and Photochemical ozone formation. The toxicity related impact categories are: Ecotoxicity and Human toxicity. Eutrophication is of high relevance for the wastewater effluent. Resource consumption, stratospheric ozone depletion, land use, photochemical ozone formation and waste generation are also very important and should be treated separately. These assessments support evidence-based decisions for selecting technologies that align with climate goals, nutrient recycling, and resource efficiency in the bioeconomy.
- It is important to develop and support ecotourism initiatives that align with bioeconomy principles by minimizing environmental impacts, promoting local resource cycles (e.g. water and nutrients), and raising awareness of sustainable practices in coastal and rural areas.

Policy Recommendations for the EU Bioeconomy Strategy Based on NURSECOAST-II

Well-managed and flexible wastewater solutions support sustainable tourism by protecting water quality and enabling nutrient recycling in tourism areas. This directly reflects the core principles of the EU Bioeconomy Strategy: the sustainable and efficient use of biological resources, the protection of ecosystem services, and the strengthening of regional resilience.

In tourism-intensive areas—especially in rural regions, coastal zones, and seasonal destinations—wastewater is not only an environmental concern but also a bio-based resource. When properly managed, it enables the local recovery and reuse of nutrients, water, and energy, supporting the development of circular and sustainable bioeconomy models, improving water resource sustainability, and fostering regional bio-based innovations.

Therefore, the upcoming EU Bioeconomy Strategy (2025) should:

- Acknowledge tourism infrastructure (e.g. wastewater systems) as a relevant application area of the bioeconomy,
- Support regional, scalable and seasonally adaptive technologies that help safeguard ecosystem services,
- Promote policy instruments that enable small municipalities and tourism regions to transition toward circular, bio-based solutions.
- Provide incentives for touristic objects owners to minimize the environmental impacts of seasonally increased wastewater discharges

- Provide incentives for local municipal wastewater treatment plants dealing with wastewater transports from scattered touristic locations, causing extreme daily peaks and overloading the wastewater treatment plant



John Nurminen Foundation's Perspectives on the EU Bioeconomy Strategy 2025

The Bioeconomy Strategy should support the development of local value chains for nutrient-rich biomaterials. For example, common reed can be used as a substitute for peat. Likewise, nutrient-rich manure and sewage sludge can replace the need for virgin mineral fertilizers. However, under current conditions, the use of these circular materials is not economically viable because using virgin materials is still cheaper.

Sewage sludge contains significant amounts of nutrients that should be recycled back into productive use. However, further development is needed to enable the safe use of sludge in agriculture, particularly to prevent harmful substances from contaminating fields.

It is also crucial to ensure that biogas plants operate in a way that supports sustainable nutrient recycling—so that the nutrients in sludge are not released into the environment, causing eutrophication, but are instead put to productive use.

The EU's agricultural subsidy system does not support the recycling of nutrients from manure. Livestock farms would benefit from support for transporting manure from nutrient-surplus to nutrient-deficient areas. However, due to the EU's "polluter pays" principle, subsidies for manure transport are currently not permitted.

The classification of many biomaterials as waste poses a barrier to their utilization. Once a biomaterial is defined as waste, it cannot be used in products that require virgin or by-product materials. Waste status can also impose unnecessary regulatory burdens on businesses trying to use biomaterials, thereby hindering the circular economy.

Nutrient and carbon-rich common reed growing on eutrophicated shorelines could be returned to circulation through mowing and harvesting. However, the unclear legal framework surrounding mowing permits—especially in areas managed by unorganized water cooperatives—complicates utilization. The Finnish Water Act should be revised and clarified to streamline the permitting process for reed harvesting.

This opinion is based on John Nurminen Foundation's work in these projects_

- [BalticReed 2023-2026](#)
- [Sustainable Biogas 2020-2022](#)
- [Manure recycling project 2020–2024](#)

More information can be found on these policy briefs:

- [Industrial-scale mowing of lake reeds – water law solutions](#)
- [Sustainable disposal and use of sludge-based biomasses](#)
- [Sustainable nutrient management in the biogas sector](#)

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