

Developing Policy Environments and Practices – knowledge and approaches

This brief is a part of the Blue-Green Bio Lab Tool Kit, that represents the findings in the Blue Green Bio Lab project. The project targets the urgent challenges of reducing nutrients to waters of the Baltic Sea Region, limiting greenhouse gas emissions, and enhancing European self-supply with food, feed, and energy. Together, aquaculture, agriculture and industry can provide solutions to these challenges through industrial symbiosis based on the sustainable exploitation of local blue and green biomasses initially grown and/or harvested with the objective to produce positive ecosystem services. The Blue-Green Bio Lab project is co-financed by Inter-Reg Baltic Sea Region with partners in Denmark, Latvia, and Sweden.

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The brief is a result of the work in the project on developing conducive policy environments and policy practices to spur bio-industrial symbioses. The brief provides overviews of existing knowledge, relevant information on the EU legislative framework as well as a description of the different approaches of developing the policy environment from partners in Latvia, Sweden and Denmark participating in this project.

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Existing knowledge from similar projects

With the rise of climate and environmental problems during the last ten years, effective and sustainable use of resources has become a topic also in the Baltic Sea region. Several projects (*Urban Baltic Industrial Symbiosis*, *Baltic Industrial Symbiosis*, *BSR Stars 3*, *Baltic Biomass 4 Value*, *Green VALLEys*, *LIFE_PHIPP*) have been devoted to looking for efficient ways of energy and resource use, including biomasses in the region. Below is a short overview of the key results in these projects.

The projects Baltic Industrial Symbiosis and BSR Stars 3 have identified several relevant factors for successfully establishing and implementing (bio)industrial symbiosis. The presence of **appropriate policies** was one of the most important factors. As most of the Baltic Sea region's countries have not explicitly addressed bio-industrial symbiosis in planning documents, the following steps are suggested:

- to communicate the potential of industrial symbiosis to include it in the national political agenda, emphasizing its relevance for circular economy; and
- to include industrial symbiosis in national circular economy strategies.

Given that existing industrial symbiosis activities have mostly started as mutual initiatives between businesses, foundations, and municipalities without specific policy support, it is also important to improve **national legal competencies** for developing and supporting of symbiosis initiatives. The projects suggest countries establish one national governmental agency responsible for symbiosis activities to ensure long-term development and competence.

Appropriate funding opportunities is another set of relevant factors for expanding industrial symbiosis. Direct national support of bio-industrial symbiosis via dedicated funding programmes is not typical (BB4Value, 2021). Fiscal support tends to occur through the help of for example: national CO2 tax regulations, missing subsidies for fossil fuels and providing more favourable environments for innovative startups. There are several EU funding initiatives for development of the circular

bio-economy (European Circular Bioeconomy Fund, Bio-based Industries Joint Undertaking) although the requirements for applications may not match the current potential of symbiosis partners.

Therefore, an increase in **regional and local level capacity** to support symbiosis is crucial. This can be done with a help of training programmes on circular bioeconomy for national authorities of various levels (Baltic Biomass 4 Value), creation of national networks for (bio)industrial symbiosis, regional information events for local businesses and match-making events for potential symbiosis partners.

Consequently, much of the success in creating and developing (bio)industrial symbiosis lies in the **communication of the idea**. Provision of easily accessible information, promotion of the best practice cases and networking are mentioned as useful communication tools.

The EU legislative framework

This section looks at the current landscape of the European Union legislative framework for environmental protection, including waste management and circular economy, with an emphasis on (bio)industrial symbiosis. Baltic Sea regional policies are also shortly characterized.

In general, European environment policy is governed by the principles of precaution, prevention, rectifying pollution at the source, and on the 'polluter pays' principle. The forthcoming legislative proposals and goals are summarised in multi-annual Environment Action Programmes (EAPs), with the 8th EAP currently in force. It sets the EU's legally agreed upon common agenda for environment policy until the end of 2030 and has six priority objectives:

- Achieving the 2030 greenhouse gas emission reduction target and climate neutrality by 2050,
- Enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change,
- Advancing towards a regenerative growth model, decoupling economic growth from resource use and environmental degradation, and accelerating the transition to a circular economy,

- Pursuing a zero-pollution ambition for air, water and soil and protecting the health and well-being of Europeans,
- Protecting, preserving, and restoring biodiversity, and enhancing natural capital (notably air, water, soil, and forest, freshwater, wetlands, and marine ecosystems),
- Reducing environmental and climate pressures related to production and consumption (particularly in the areas of energy, industrial development, buildings and infrastructure, mobility, and the food system).

The European Green Deal (effective December 2019) is the European umbrella policy framework which should help to focus EU policies on making Europe the first climate-neutral continent in the world. Thus, the current EAP is also targeted towards enhancement of Green Deal's goals.

EU horizontal strategies support the objectives of EAPs and at present these are the most significant:

- Sustainable development strategy and related documents, outlining how to integrate the Sustainable Development Goals (SDGs) into EU policy priorities;
- Biodiversity strategy for 2030 as a comprehensive, ambitious and long-term plan to protect nature and reverse the degradation of ecosystems; and
- Farm to fork strategy, which aims to make food systems fair, healthy and environmentally friendly.

The binding directives and regulations for environmental protection are issued according to the type of threat, pollution, or habitat in need of being protected (water, air, soil). The general 'polluter pays' principle is implemented by the Environmental Liability Directive, which aims to prevent or otherwise remedy environmental damage to protected species or to natural habitats, water, and soil. The scope of the directive has been broadened three times to include the management of extractive waste, the operation of geological storage sites and the safety of offshore oil and gas operations respectively.

European waste management policy is part of the environmental policy framework, as it aims to protect the environment, human health, and help the tran-

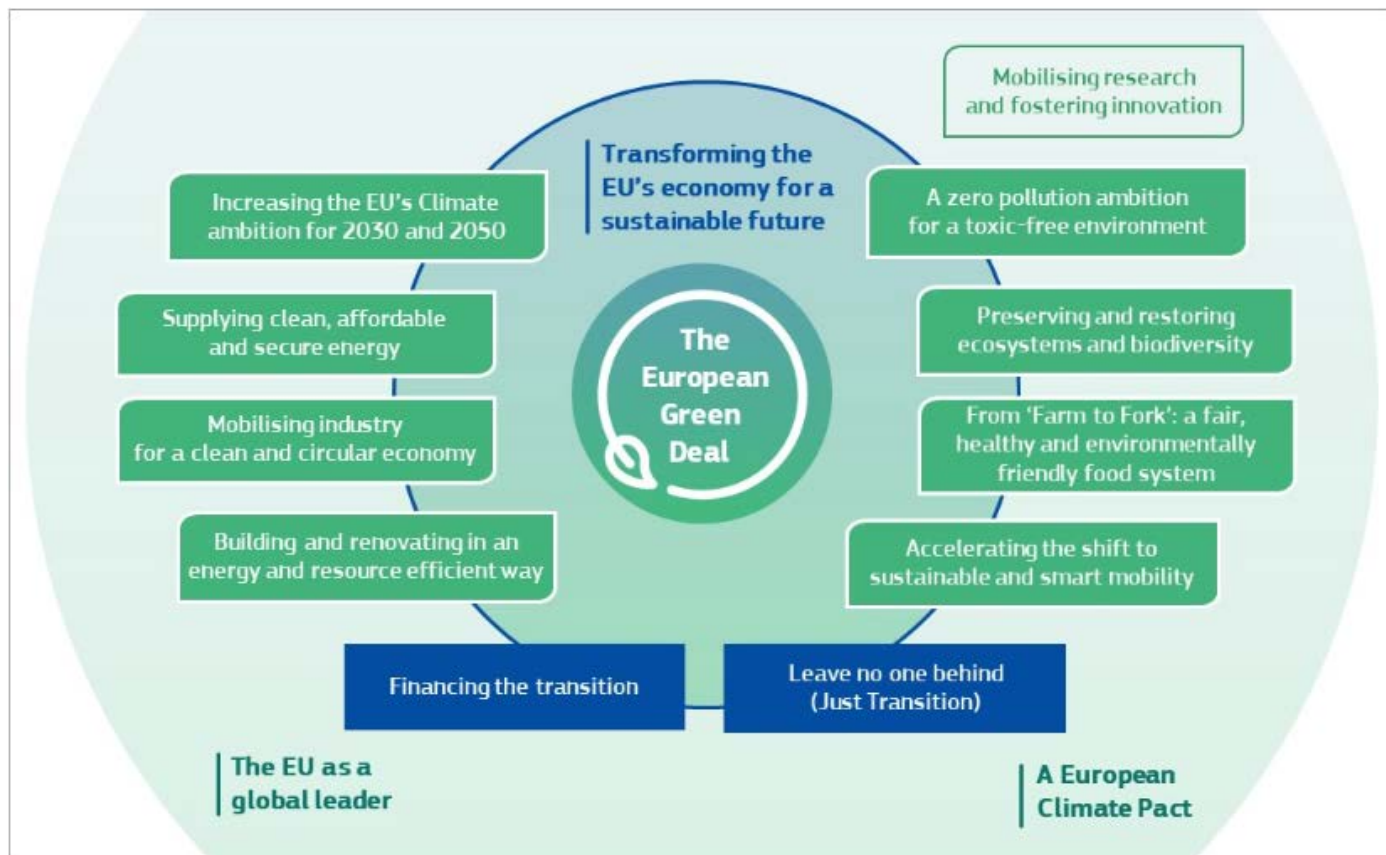


Fig 1. The European Green Deal Structure. The figure shows the areas of focus for transforming the EU's economy for a sustainable future. Source: Communication from the Commission, The European Green Deal, Brussels, 11.12.2019.

sition to a circular economy by extracting as many high-quality resources from waste as possible. The Waste Framework Directive is the EU's legal framework for treating and managing waste in the EU. Certain categories of waste require specific approaches (such as batteries, building materials, and biodegradable waste). Therefore the EU has many laws to address different types of waste. The waste is seen as a resource in the circular economy although the EU Circular Economy action plan does not explicitly connect the waste with industrial symbiosis. On the regional level the European Union Strategy for the Baltic Sea Region (EUSBSR) is the overarching policy planning agenda in regional development and incentives. The Strategy's three main pillars are to save the Baltic Sea, to connect the region and to increase prosperity. The latest 2021 Action Plan stresses the importance of climate change and therefore horizontally includes it in all 14 Actions. Development of

circular economy, specifically in the form of industrial symbiosis, is included in the "Bioeconomy" Policy Area.

Although there is a strong linkage between EUSBSR and the Baltic Sea Action Plan of Helsinki Commission (BSAP), the focus of the BSAP is on protection measures for the marine environment. It should be noted that there are no other overarching governance documents on regional issues, other than the BSAP. However, the holistic approach and wide coverage of the BSAP, with four action segments and almost 100 actions in more than 10 sectors, is in line with efforts toward an EU-wide circular and sustainable (bio) economy.

Related research findings

As research on bio-industrial symbiosis in the context of our project is not available, this section focuses on

findings from studies of industrial symbiosis in the Baltic Sea Region and beyond. The concepts of circular bio-economy or the bio-economy innovation ecosystem also to large extent represent idea of bio-industrial symbiosis. A review by OECD (2019) has stated that *“building regional and national bio-economies is proving to be difficult. Joining them to make an international (circular) bio-economy will require a major transition for society, away from fossil dependence and towards a more sustainable economy and future. The mix of policies that is required reflects both the complexity and the importance of this transition. (...) Far more difficult, however, is enabling an ecosystem of stakeholders, from the feedstock owners and producers, to the customers for bio-based products and on towards end-of-life/recycling.”*

A recent wide review (Lybæk et al., 2021) on policy frameworks for the deployment of industrial symbiosis has identified a set of factors together with proposed solutions.

- **A lack of policy interventions.** Here a suggested solution is to have firm regulation as a policy intervention together with more incentive-based initiatives, especially at the local level.
- **Direct and indirect policies** influencing the development of industrial symbiosis systems. Indirect policies are related to waste management practices (taxes on landfill, bans on organic waste landfilling); direct policies are incentives to companies by e.g. government programs, co-operation platforms and other interventions formulated within the frame of an overall national Industrial symbiosis strategy, providing a clearer governmental policy.
- **Greater cooperation between companies** within devoted platforms for information exchange on side streams and by-products.
- **A knowledge gap on the concept of industrial symbiosis**, technologies, options, and funding opportunities. This gap could be overcome by the facilitation of a learning environment, e.g., via online platforms with information resources.
- **Need for more flexible funding schemes.**
- **Local political and public support** by municipalities and administration is crucial, as well as by local inhabitants.

Results from a case study on the facilitation of local biogas system development in Norrköping focuses on interventions with public and private actors through a workshop series (Lindfors et al., 2020). These interventions generated knowledge of Norrköping's significant potential for producing and using biogas, and its potential as a location for a transport hub. The workshop series created a shared understanding that cooperation and coordination to distribute resources and knowledge about biogas was critical for realizing these potentials. Furthermore, the municipal organization was identified as an important actor for coordinating these efforts.

Institutional capacity and involvement, regarding the role of sectoral actors and need for mutual trust is emphasized in several studies (Bacudío et al., 2016, d. Abreu&Ceglia, 2018, Patala et al., 2020). It has been identified that government, or other respective authorities, is vital in building and maintaining an industrial symbiosis coordination network, but that ultimately other actors and driving forces are necessary to ensure the cyclical flow of materials and energy. A change in thinking from linear towards systemic is also essential for successful implementation of industrial symbiosis.

Co-creating conversations

Earlier in the Blue Green Bio Lab project workshops were held by each of the public authority partners in the project, where barriers and challenges to bio-industrial symbiosis were identified. These workshops used a common approach (see project brief “Participatory Workshop Design for the Blue Green Bio Lab Project”).

After the workshops a transnational dialogue between the partners ended with identifying 2 themes to work with further.

1. **National regulations** that are perceived barriers for circular bio-industrial symbiosis regarding the biomasses we are focused on in each country (and to the extent possible the EU level regulations that they relate to).
2. **Communication** about circular bio-industrial symbiosis ideas and potentials with our selected biomasses

The transnational dialogue revealed the importance of delving more into communication issues. The partners

discussed how easy implementations of bio-industrial symbiosis plans could be if not obstructed by communication that takes on a life of its own, which tends to be based upon feelings and personal opinions rather than knowledge-based facts. The partners agreed to focus on better understanding the role of communication and its role in enhancing understanding and development of bio-industrial symbiosis and the transformation to a sustainable future.

After the transnational dialogue each of the 3 project sites held co-creative meetings on developing conducive environmental policies and practices to support the establishment of bio-industrial symbiosis.

Skive, Denmark

After the first workshop in Skive focusing on bio-industrial symbiosis of blue biomasses, the partners took a step back and really looked at what the stakeholders wanted – more options for dialogue. Therefore, their needs and interests were in the center of 2nd workshop. The invitation was crafted around a collaborative question: What is needed to achieve a cleaner fjord, and what can each of us contribute to support this?

The result was constructive conversations between participants that before the workshop likely saw themselves as opponents. The mixing of entrepreneurs and business development interests stimulated discussions about innovation, which are essential to reach climate, environmental and business goals. More information on this workshop can be found in the project brief “Spurring blue bio-industrial symbiosis in Skive, Denmark”.

Zemgale Planning Region, Latvia

A co-creative online meeting was held and attended by 21 participants. The attendees represented the Ministry of Climate and Energy, local municipalities (environmental and energy specialists), energy producers and respective professional associations. The participants were chosen based on an assessment of stakeholders that might have key importance for the development of bio-industrial symbioses in Zemgale region.

The online meeting was well attended, however knowledge about and options for using green biomasses in bio-industrial symbiosis are currently limited



Fig. 2 Participatory workshop held in Skive, Denmark in April 2023.

in Latvia. More communication is needed to shine light on and better understand the availability of green biomasses, new value chain actors, logistics, and innovation around final products and sustainability issues. More information on this workshop can be found in the project brief “Spurring green bio-industrial symbiosis in Zemgale Planning Region, Latvia”.

Lysekil, Sweden

In Lysekil two co-creative meetings in the format of roundtable discussions were held in the fall of 2023. The first meeting focused on societal engagement and how to communicate with different stakeholders in transforming society. The workshop was in cooperation with Linköpings University, Lysekil, Luleå and Slite municipalities. The topic, the transformation to sustainable societies, echoed the challenges identified in the previous workshop related to communication and trust.

The second roundtable discussion had a more “hands-on” approach to the environmental policy – how do we create a land-based aquaculture system in harmony with environmental regulations? Lysekil

municipality, LEVA in Lysekil (municipal electricity and wastewater company), Smögenlax (aquaculture company), Rena Hav (wastewater and biogasplant) and IVL (Swedish environmental institute) participated.

The outcomes of the meetings were positive in different ways. The broad representation of stakeholders and perspectives added dynamism and value in the first meeting. The second meeting had a similar roundtable setup, but with a more practical approach in problem-solving. These conversations added significant value to developing the wastewater treatment concept design for a bio-industrial symbiosis park. The meeting also became a starting point for closer collaboration between the businesses. Read more on activities in Lysekil in project brief “Spurring blue bio-industrial symbiosis in Lysekil, Sweden”.

Transnational evaluation – what did we learn together?

The co-creative meetings at each project sites were transnationally evaluated in November 2023. The part-



Fig 3. Transnational workshop in Jelgava, Latvia.

ners concluded that even though we are starting from different points of departure with regard to technology and innovation-readiness, we still have a lot of issues in common. We all have the challenge of working with fast tempo innovation processes in an administrative body – where policy development occurs at a slower pace.

We also gained further insights regarding the importance of making space for retrospective learning for ourselves and our stakeholders. We experienced that working goal-oriented (in a common direction), rather than goal-fixed (toward a specific outcome) can enhance collaboration and innovation in complex projects.

Regarding the designing of co-creative meetings, we learned to prioritize a point of departure in the pre-understanding among the workshop participants. Allowing participants to form both content and process (open space) is one approach.

In short, it's about keeping it simple (despite the complexity!), using practical examples to illustrate and create common understanding, and ensuring respect for stakeholders' different "languages" (for example scientific vs layman's understandings). At the end of the day this work requires flexibility on the spot and a willingness to learn along the way. You might have to change how to proceed based upon where the participants are – and you don't know that until you've met them in the workshop.

Relevant Sources

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Project facts

- The Blue-Green Biolab project is co-financed by Interreg Baltic Sea Region.
- Total budget: 499,399.60 Euro.
- Project period: October 2022- March 2024.
- Homepage: <https://interreg-baltic.eu/project/blue-green-bio-lab/>
- Lead partner: Energibyten Skive, Skive Municipality.
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Blue Green Bio Lab Associated Partners:



Food & Bio Cluster
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