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REPORT ON THE IMPLEMENTATION OF THE BUSINESS INVESTMENTS BELONGING TO THE PORTFOLIO

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CONTENT

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1. INTRODUCTION

Baltic MUPPETS is a three-year project supported by the Interregional Innovation Investment (I3) instrument. The project aims to create a new value chain for small Baltic Sea blue mussels by developing nutritious and high-quality pet food products. It focuses on investing in innovative techniques for cultivation, harvesting and processing of the Baltic Sea's native blue mussel. This initiative is expected to support local economic development and increase quality employment opportunities. In addition, mussel farming is expected to provide several ecosystem services such as nutrient removal, water quality improvement and biodiversity enhancement. Baltic MUPPETS is a follow-up of the BalticBlueGrowth (BBG) project, and support for farmers can also be found in the BBG reports.

This document is part of the project´s Work Package 1: Prepare market and sustainable businesses for scale-up. It describes the implementation of the business investments belonging to the portfolio of the commercial companies within the project, namely Ecopelag, Grobruket, Wittrup Seafood and Kieler Meeresfarm.

2. ECOPELAG EF

2.1 Founding and development

Ecopelag EF was founded in 2015 by marine biologists Martin Reutgard and Martin Karlsson.

2.2 Legal structure and organization

Ecopelag EF is a private non-profit economic association registered as an R&D company, providing a platform from which members can take employment within the projects and or assignments run by the association.

Current businesses include aquaculture, research about environmental impact of aquaculture and development of marketable products from aquaculture, supported by both public funding (EU programs, national sustainability and innovation grants) and private investments (e.g., Miljönen Fund)

2.3 Pre-project product portfolio, core activities and services

The focus is on mussel farming as a measure for nutrient removal and the restoration of the Baltic Sea.

2.4 Portfolio expansion through Baltic MUPPETS

During the project, the mussel farming capacity was increased from an estimated 100 tonnes per year to over 200 tonnes per year and the harvester was optimized in such a way that the harvesting time could be reduced by roughly one third.

2.4.1 New product lines

Added pre-processing steps and introduced quality control to receive permits for sale of mussels to commercial feed.

2.4.2 Market access and positioning

Brand associations were strengthened by linking the initiative to the circular-economy narrative developed within Baltic MUPPETS.

2.4.3 Revenue potential and business scalability through baltic muppets products

Ecopelag EF is a non-profit organization but sells mussels to Ecopelag AB for €0.46 per kilogram. This is below the estimated production cost of €0.54 per kilogram, which is based on an annual production capacity of 245 tonnes at the existing Ecopelag farms, as estimated in Baltic MUPPETS and earlier projects. The gap between production and sales prize is today bridged by private donations and others (e.g., payment for the environmental service), and may narrow with further upscaling and better market opportunities.

2.5 Outlook

Ecopelag EF aims to expand mussel production to 1,000 tonnes per year in the coming years and is working to establish partnerships with stakeholders in other Baltic Sea countries interested in supplying mussels to the Ecopelag AB processing line. At this stage, the organization plans to make further investments in product development supporting a healthier Baltic Sea.

3. ECOPELAG AB

3.1 Founding and development

The founders of Ecopelag EF registered the new company Ecopelag AB in 2020 together with shareholders to invest in mussel processing equipment. Build-up of a mussel processing line

has been financed by public funding (EU programs and innovation grants), academic and industrial partnerships (SLU, Laulima AB, Akvafarm AB) and private investments) and commercial subsidiary

3.2 Pre-project product portfolio, core activities and services

The initial processing step involves producing dried mussel meal, which is used experimentally in livestock and aquaculture feed. To enable further development and scaling, the Baltic Sea Factory processing plant has been established in Västervik. This facility provides the infrastructure for continued utilization of mussels as a resource within the region.

3.3 Portfolio expansion through Baltic MUPPETS

3.3.1 New product lines

A cooking line was established for the de-shelling of mussels and for the development of high-quality protein feed ingredients derived from mussels farmed in the eastern part of the Baltic Sea, a newly utilized cultivation area. In addition, commercial products were introduced in the form of freeze-dried and heat-dried mussel treats for pets. By-products were also valorised through the market introduction of a mussel shell-based fertilizer in cooperation with Grobruket AB. Furthermore, automated processing technologies were integrated to increase efficiency and scalability.

3.3.2 Market access and positioning

The project facilitated entry into new markets, particularly in the areas of pet food and functional animal feed. Within the Baltic MUPPETS framework, efforts were also directed towards brand development and the design of appropriate packaging. These activities supported the positioning of mussel-based products in emerging market segments.

3.3.3 Revenue potential and business scalability through Baltic MUPPETS products

Product diversification contributes to greater market resilience and the creation of additional revenue streams. Value is further increased through end-consumer products that can be positioned with premium pricing. The first commercial clients and distribution partners have been established in the pet sector. In addition, the developed products have advanced from TRL 4 to TRL 9, demonstrating their suitability for market introduction.

3.4 Outlook

An assessment was carried out to evaluate Ecopelag's long-term scalability and sustainability for a mussel farm in the low saline Baltic proper, such as Ecopelag's. The analysis also considered the potential for expanding into both national and international markets.

4. GROBRUKET

4.1 Founding and development

The company was founded by horticultural engineer Niklas Hjelm and environmental scientist Niclas Lundius Mörck. It is located in Alnarp, Sweden, where it operates greenhouses, field plots, and development facilities. These resources provide the basis for research, testing, and the advancement of new cultivation and production methods.

4.2 Legal structure and organization

The company is privately owned and operates with a small team of 2–10 employees, with activities focused on product development and consultancy. It is a member of the Alnarp Partnership and collaborates closely with the Swedish University of Agricultural Sciences (SLU) as well as various industry stakeholders.

4.3 Pre-project product portfolio, core activities and services

The company is engaged in testing, prototyping, and verifying sustainable horticultural products. Its activities include offering tailored cultivation solutions, education, consultancy, and specialized courses in hydroponics. A particular focus lies on the development of sustainable fertilizers and plant nutrition products, such as "HYDROmineral" and "Biomineral." Prior to its involvement in Baltic MUPPETS, the company also provided design services, field verification, and hydroponic systems. In addition, it functions as a testbed and meeting place for innovation in horticulture.

4.4 Portfolio expansion through Baltic MUPPETS

4.4.1 New product lines

The company began processing waste mussel shells from Ecopelag's Sjötugg production into compost and soil enhancers. In this context, rapid composting methods are being developed that shorten the process to approximately one week compared to several months under

conventional conditions. Scaling trials are currently being conducted in both greenhouse and open-field settings in the vicinity of SLU Alnarp.

4.4.2 Marketa access and positioning

The activities are directed towards garden and crop-based horticulture markets. In addition, brand associations have been strengthened by linking the products and services to the circular-economy narrative developed within Baltic MUPPETS.

4.4.3 Revenue potential and business scalability through Baltic MUPPETS products

The product portfolio has been expanded to include natural, marine-sourced soil enhancers. Following the completion of trials, commercial readiness is anticipated, with a market launch planned for 2025–2026. Through its partnership with Ecopelag and the Baltic Sea Factory, Grobruket is positioned as an important hub for circular innovation.

4.5 Outlook

An evaluation was carried out to determine the appropriate timing for product launch and to assess the associated market potential. The analysis also included an outlook on the replicability of the approach within Nordic horticulture. This provided a basis for identifying opportunities for broader regional application.

5. WITTRUP SEAFOOD

5.1 Founding and development

Wittrup Seafood was founded in Snaptun, Denmark, over 35 years ago by Rasmus and Stig Wittrup. Since 1989 until 2025, they combined a commitment to sustainability with assuring qualitative and consistent supply of blue mussels. They continuously kept innovating to deliver solutions to mussel farming barriers, providing technological solution and ways to efficiency.

Wittrup Seafood operated long-line mussel farms in the Limfjord and along Jutland's east coast and supplied more than 3,000 tonnes of mussels annually, sold across France, BENELUX, Germany and Scandinavia.

5.2 Legal structure and organization

The company was a privately held seafood supplier serving wholesale, supermarket, and catering markets. It is also engaged in innovation and technology development supported by EU and regional funding.

5.3 Pre-project product portfolio, core activities and services

The company's core offerings consisted of farmed blue mussels sold for human consumption across Europe. Production was based on conventional long-line above-surface cultivation methods, with processing and supply chains oriented towards food-grade mussel products. In addition, the company developed business activities in marine habitat restoration through mussel farming and the relaying of biogenic reefs as a commercial activity.

5.4 Portfolio expansion through Baltic MUPPETS

5.4.1 New farming and harvesting technologies

Prototyping efforts have focused on submerged long-line mussel farms designed to avoid ice damage and reduce visual impact. In parallel, machinery has been developed for submerged mussel harvesting, including an automated rope-loop cutter to improve operational efficiency.

5.4.2 Market access and positioning

The company applied a two-tiered business model. In autumn, small mussels were harvested for use in longline production, bottom culture, habitat restoration, as well as feed and processing. In spring and summer, larger mussels were harvested for high-quality food markets. In addition, the company had entered the technology services sector by offering submerged farming expertise and equipment to other operators.

5.4.3 Revenue potential and business scalability through Baltic MUPPETS products

Enhanced farm stealth and protection against ice damage have contributed to more consistent yields and improved social acceptance. Efficiency was increased through mechanized harvesting and rope production, leading to reduced labour and process costs. The company also strengthened value chain integration with Blue Research and other Baltic MUPPETS partners. Furthermore, the developed technologies advanced from technology readiness level (TRL) 6 to TRL 9, demonstrating readiness for commercial deployment.

5.5 Outlook

After closing the business in the end of 2025, no more developments are foreseen.

A second-generation harvester was under development, with the aim to enable the commercial scaling of submerged farming. There is still potential for exploiting the learnings and farming technologies developed, particularly to Northern Europe, where comparable environmental and social challenges exist.

6. KIELER MEERESFARM

6.1 Founding and development

The first mussel farm in Kiel Fjord was established by Coastal Research and Management during the DBU project *EBAMA* (DBU-Abschlussbericht-AZ-27119.pdf). Building on this knowledge and experience, Kieler Meeresfarm UG was founded in 2014 by Tim Staufenberger as a small private spin-off company.

In the following years, the farm expanded and, in 2020, was restructured and newly established as Kieler Meeresfarm GmbH & Co. KG (KMF) by Nikolai Nissen, Kristina Hartwig, and Tim Staufenberger.

At its core, KMF is driven by the belief in regenerative, environmentally friendly, and resource-conscious use of natural resources for the production of food, feed, and marine products. The company actively participates as a partner or subcontractor in scientific projects, helping to advance knowledge and understanding of local resources. KMF also shares insights into biological processes and everyday aquaculture operations with the wider public through tours and presentations. Through its "Adopt a Loop" program (https://www.kieler-meeresfarm.de/adopt-a-loop/), everyone has the opportunity to support the farm directly by symbolically adopting a small section of mussel cultivation—becoming part of the journey towards sustainable aquaculture.

KMF is the first mussel and algae farm in the German Baltic Sea and aims to include nature-inclusive fish rearing in the coming years, working towards establishing an integrated multi-trophic aquaculture system (IMTA).

Current production varies but is around 3.5 tonnes of blue mussels per year and 0.3 tonnes of sugar kelp per year. These modest volumes are planned to increase up to tenfold, shifting the company's focus from primarily project-driven work to becoming a production-driven mussel and algae farm

6.2 Legal structure and organization

The company is a small private enterprise (GmbH & Co. KG) founded by Nikolai Nissen, Dr. Tim Staufenberger, and Kristina Hartwig. Its activities include the production of marine products such as mussels and algae, aquaculture operations, as well as research, education, and public outreach through workshops and farm visits.

6.4 Pre-project product portfolio, core activities and services

The company cultivates mussels, algae, and in the future also fish within integrated systems designed to balance nutrient cycles. Eco-certified mussels are sold to consumers, retailers, and restaurants. Production includes certified organic food-grade mussels, amounting to approximately 3.5 tonnes per year, produced through long-line surface cultivation. In addition, outreach activities are carried out through educational farm tours offered to schools and the general public.

6.5 Portfolio expansion through Baltic MUPPETS

6.5.1 New product lines and cultivation systems

Within the Baltic MUPPETS framework, two submerged monitoring and testing units were established at existing long-line structures, with a pilot focus on small mussels as a novel product. Trial cultivation and harvesting of small mussels, amounting to 1–4 tonnes per year, were conducted with the aim of developing ingredients for pet food.

6.5.2 Market access and positioning

The company has entered the niche pet food sector, building on a circular and locally based production narrative. In collaboration with CAU they focus on developing ingredients for novel pet food products derived from small mussels.

6.5.3 Revenue potential and business scalability through Baltic MUPPETS products

Ecosystem resilience has been enhanced through integrated multi-trophic aquaculture (IMTA) and menu-based predator management. Monitoring capabilities were improved by employing GoPro cameras and drones as part of the Baltic MUPPETS monitoring systems. Process efficiency has further increased through the use of innovative submerged systems and knowledge exchange among project partners.

6.6 Outlook

The launch of pet food ingredients based on small mussels is anticipated for 2025–2026. There is also potential for local replication through community-scale marine gardens and increased farm diversity. The company will continue its involvement in the Baltic MUPPETS project until April 2026, contributing to pilot activities, monitoring, technology validation, and outreach.