Structural barriers to upscaling Low Trophic Aquaculture (LTA) in Denmark

Seaweed and shellfish can help restore Danish coastal ecosystems, feed a growing demand for sustainable ingredients, and anchor a new coastal industry. The sector has scientific backing, political momentum, and genuine commercial interest. What it lacks is the infrastructure to connect supply with demand at scale. Closing that gap requires a clear picture of where and why the current system stalls.

This brief, developed through the LTA BOOST project in collaboration between OceanMatter ApS and DTU Aqua, maps the key barriers that prevent Danish LTA from reaching commercial scale. It aims to communicate what industry actors, regulatory bodies and funders can do to close the gap.

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THE DANISH LTA LANDSCAPE

Denmark is uniquely positioned to develop a thriving LTA sector. Its coastlines are biologically suited for cultivating seaweed and shellfish, its research institutions are among Europe's most advanced in marine agronomy, and with ongoing environmental pressures for regenerative ocean-farming, production capacity has grown steadily over recent years. Yet the connection between what Danish farms can grow and the offtake needed to form a new viable Danish industry has not been made at any meaningful scale.

A core reason for this gap is structural. Danish LTA exists in a space where producers and industrial buyers rarely communicate directly. Farmers operate at biological timescales within local networks. Institutional buyers operate on procurement cycles, cost-per-unit thresholds, and supplier qualification. Without coordination between these two worlds, supply and demand develop in parallel rather than in relation to each other, and the sector remains stuck below the threshold of commercial viability.

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MARKET ENGAGEMENT

Ocean Matter have been researching LTA demand in Denmark: identifying which industrial off-takers have genuine appetite for cultivated seaweed and oysters, understanding what conditions would need to be met before purchasing decisions are made, and establishing the beginnings of a structured buyer-supplier relationship before significant supply is in place.

This was achieved through conducting a structured outreach campaign between April and June 2026, targeting 46 industrial contacts across six sectors: restaurants and fine dining, canteens and catering, hotels, hospitals and public institutions, foodservice distributors, and education and research (Figure 1). Contacts were selected based on their alignment with regenerative sourcing values, their purchasing volume, and their capacity to engage with novel ingredients at an early stage of market development. Outreach was conducted primarily through direct email, with follow-up meetings held both in person and online.


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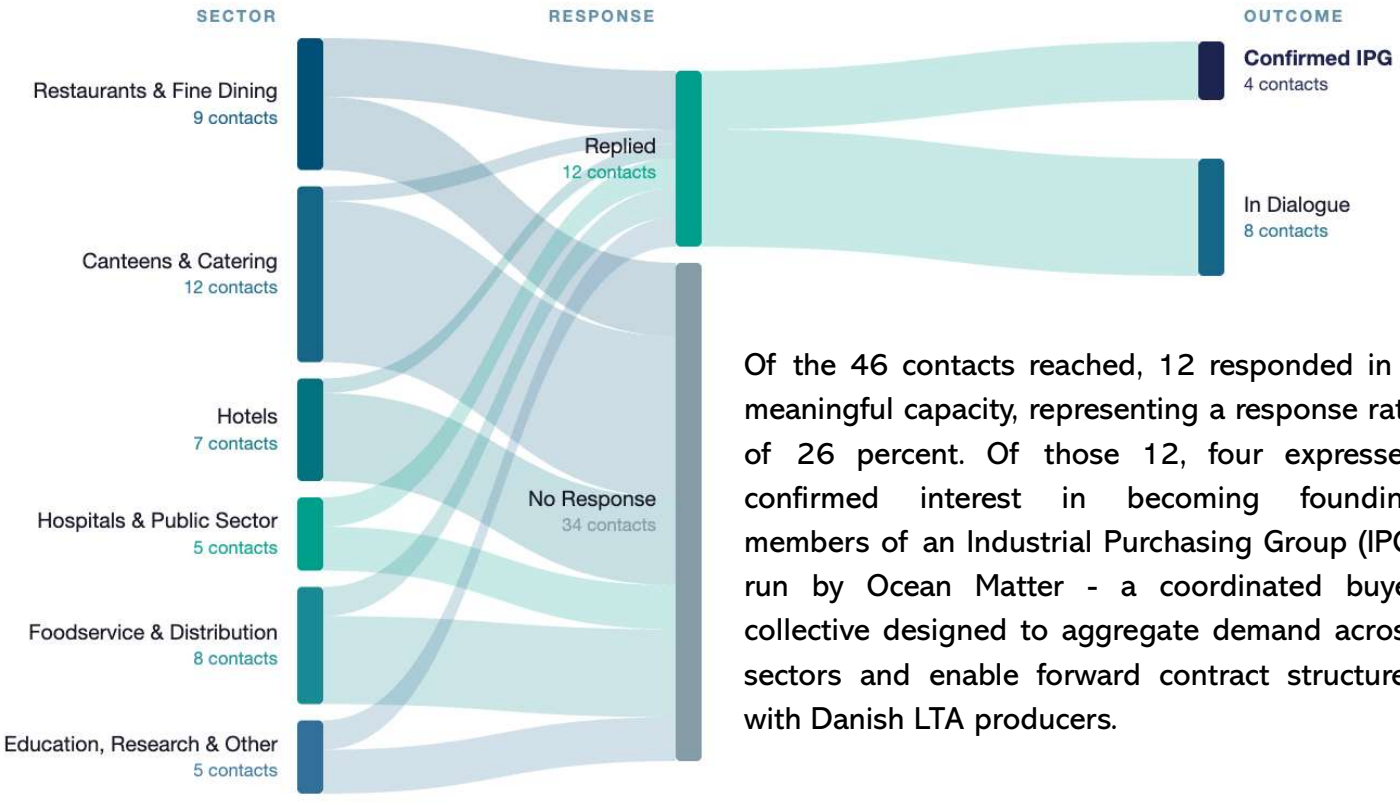

Of the 46 contacts reached, 12 responded in a meaningful capacity, representing a response rate of 26 percent. Of those 12, four expressed confirmed interest in becoming founding members of an Industrial Purchasing Group (IPG) run by Ocean Matter - a coordinated buyer collective designed to aggregate demand across sectors and enable forward contract structures with Danish LTA producers.

PAIN-POINT ANALYSIS

From the dialogues held through the outreach campaign six key industry 'pain-points ' i.e. the largest issues encountered by buyers were identified. The following table maps these barriers against the actors they affect (left) and the practical steps that would address each one (right).

Shelf-life / *Distributors*	At scale, distributors need certainty about how long seaweed and shellfish products remain viable without spoilage, especially for fresh produce. Clear best-practice guidelines covering storage conditions, temperature ranges, and shelf-life windows are a prerequisite for any serious distribution relationship.
Usability / *Chefs and kitchen staff*	The time investment for kitchens to begin working with a novel ingredient is higher than most producers assume. The solution is not training but substitution. One confirmed IPG member stated directly that they "cannot send chefs on two-day seaweed courses". The ask must meet caterers where they are: identify a dish they know and find where seaweed fits naturally. A Japanese-style green seaweed salad recreated using Danish-cultivated dulse requires no new technique and opens a category rather than asking for one. Partnering with culinary schools can accelerate broader adoption.
Price-point / *Buyers and procurement managers*	Price sensitivity varies significantly by sector: fine dining tolerates premiums that institutional catering cannot. Production must become efficient enough to bring the fresh kilo price within realistic range, while initial sales focus on small-format, high-value applications where price-per-portion remains acceptable.
Value of storytelling / *Brand and communications teams*	For companies building identity around sustainability, Danish-cultivated LTA is a compelling ingredient story. The barrier is access to independently verified environmental data that integrates easily into existing reporting frameworks. Make it easy for off-takers to tell the story, and many will.
Cultural acceptance / *Diners and chefs*	Seaweed and oysters remain unfamiliar in most Danish professional kitchens. Without consumer curiosity, chefs default to safe choices. Building familiarity through food events, chef collaborations, and experience-first introductions creates the cultural permission that makes purchasing decisions easier. Individual chefs are already pushing the boundaries of what seaweed can do at a gastronomic level. While these innovators exist in Denmark, they remain largely disconnected from the everyday consumer.
Off-taking quantities / *Restaurants and canteens*	Current consumer demand is not yet sufficient to justify large purchase volumes from most off-takers. Initial contracts should be structured as small-batch pilots scaled to where consumer familiarity actually is. The IPG model addresses this by aggregating demand across multiple buyers simultaneously.

CASE STUDY 1 - GREENWAVE

What is the concept: GreenWave is a US-based non-profit that supports regenerative ocean farmers, operating a network of kelp and shellfish farms across the US East Coast and Alaska. Their 2026 State of the Kelp Industry report - based on data from 248 permitted farms across the US and Canada - provides the most rigorous mapping of LTA sector barriers, bottlenecks, and progress signals published to date, and offers direct parallels for the Danish context.

Where is it and how did it start: Founded in 2014 in Connecticut by fisherman-turned-farmer Bren Smith, GreenWave grew out of a conviction that small-scale ocean farmers needed **coordinated support across the value chain - not just production assistance.** Over a decade, GreenWave developed farmer networks, seed production hubs, buyer-supplier matching (via the Seaweed Source platform), and product development partnerships between farms and downstream buyers in food, personal care, and agriculture.

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Key learnings for Denmark: GreenWave's 2026 report identified three structural gaps across all regions: a scale-up gap (buyers lack anchor purchasing volume), a missing middle (insufficient aggregation and logistics between farm and buyer), and a price gap (farmed seaweed is expensive relative to imports). Only 27% of North American farms are profitable - and the distinguishing factor is consistent: **forward contracts secured before planting.** Farmers who know their buyer before putting seed in the water grow. Those who do not, stagnate. Consumer-facing specialty food failed as an industry anchor. Real business to business (B2B) volume lives in institutional foodservice, agricultural biostimulants, and biomaterials.

Read more:

https://www.greenwave.org/

CASE STUDY 2 - OYSTERHUNT

The Oysterhunt[2] is an annual event organised by the NGO Danmarks Skaldyrshovedstad. The event is a gastrotourism research collaboration, aimed to encourage people to try new ways of eating (the invasive) Pacific oyster, learn about coastal ecology and partake in a citizen science activity. As part of the event, the participants are shown how to open and cook oysters in a number of different ways, challenging the 'cultural' permission.

https://www.skaldyrskysterne.dk/

POLICY RECOMMENDATIONS

1. Shift funding toward demand-side validation. The key constraint is not only supply - it is the absence of structured demand. A farmer who knows their buyer before putting seed in the water invests and grows. Therefore, to support a growing industry policy should aim to facilitate buyer-supplier match-up and establish contracts in advance of growing season.

2. Create regulatory pull through public procurement. Setting targets or preferences for Danish-cultivated seaweed and shellfish in public catering - hospitals, canteens, institutional kitchens - would generate structural demand that no grant programme can replicate. Appetite exists in the public sector. Regulation can convert appetite into commitment.

3. Fund the missing middle. Small farms cannot serve specific institutional buyers without an intermediary layer that cleans, packs, stores, and distributes product to commercial specification. Investment in shared processing and cold-chain infrastructure would unlock commercial relationships that are currently impossible regardless of buyer willingness.

4. Working towards industrial off-take. Moving meaningful volume through the food system requires buyers with scale: breweries, bakeries, ready-meal manufacturers, sauce producers, etc. who can absorb large quantities of seaweed as a functional ingredient rather than a premium garnish. Demand-side development should not stop at restaurants. Industrial offtake is where the economics of Danish LTA production begin to make sense.

References:

[1]GreenWave (2026). 2026 State of the Kelp Industry.

[2]D.Townsend et a. (2025) How Denmark's oysters are transforming foodies into citizen scientists, the Conversation.

This Policy Brief was written by Ocean Matter Aps, working with DTU Aqua as part of the LTA Boost project.

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