



## 2B-BLUE

### Marine Resources

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## 2B-Blue at a glance

### What is 2B-Blue?

It is a broader biotechnology initiative operating across the Mediterranean: a network of 6 interactive Blue Biotechnology Hubs (BBHub) that integrate partners across research, industry, governance, civil society, and the environment, and support public-private cooperation, training, and scientific activities. Each BBHub tests blue biotechnology solutions to different challenges in real-life conditions. These include IMTA systems, bioproducts for cosmetics and nutraceuticals, the valorisation of by-products from aquaculture, and bioremediation.

### Mission:

Facilitate collaboration, knowledge transfer, and innovation to address the challenges of human health, food and energy security, and environmental sustainability.

## The business case study at hand

Bioremed Algae is one of the most interesting technologies and solutions the project has brought to the Hubs. It works as a SaaS platform and comprises a module that includes a bioremediation system to achieve cleaner ports and carbon-neutral seas, while producing profitable macroalgae. The Bioremed Algae pilot uses macroalgae to clean polluted port waters while producing valuable biomass as a by-product. The first pilot has been operating at Alicante Port since the beginning of the year to test the solution in a real-world environment and gather metrics to validate the business model.

## Problems and market needs addressed

The main issue is the bad quality of the port waters, which poses significant environmental problems. It negatively affects human health, causes local businesses to lose money, and reduces professional and leisure water activities. Indeed, larger quantities of heavy metals end up in the water due to increased port operations (scrubber water discharges, antifouling paints, industrial discharges...), urbanisation pressures, and stormwater runoff from intense rainfall events. This phenomenon clashes head-on with the evolution of environmental legislation, environmental incentives in tenders, and port users' requirements, ultimately worsening the port's reputation. Key barriers include:

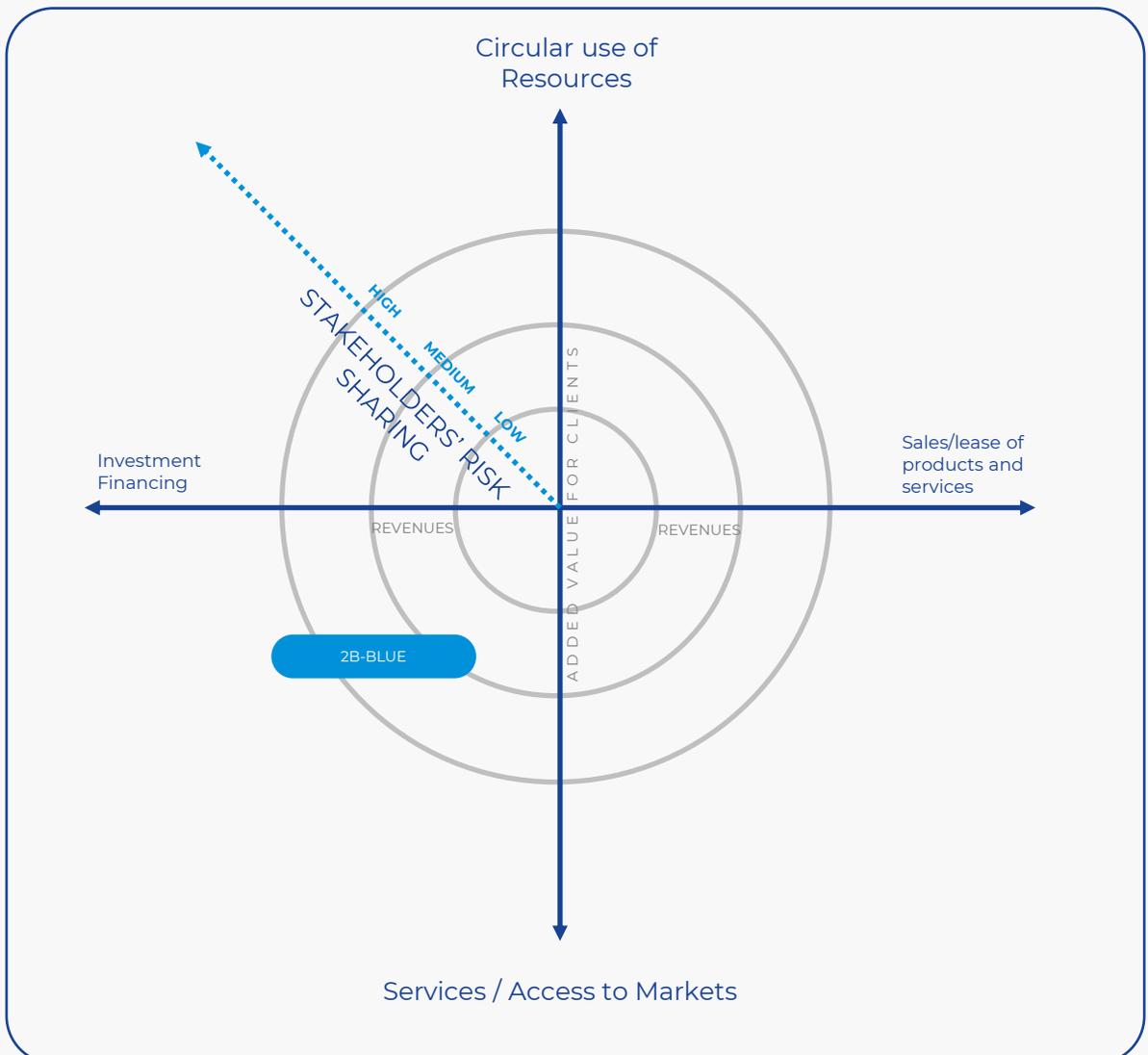
- Ports are complex organisations with multiple decision-makers (environment, operations, finance, management, sometimes public authorities); therefore, the negotiations are slow and relationship-driven, revealing a hard-to-reach market
- Established players limit contacts and business relationships with ports
- Simpler regulatory compliance measures that ports might view as sufficient could create a barrier to the proposed innovation.



## Business model and sustainability

2B-Blue leverages a Knowledge Sharing and Collaborative Platforms core business model:

- The revenue streams will surge from the lease, sale and /or maintenance of the BIOREMED modules. The business model centres on modular facilities with two potential revenue paths. Ports could either lease the equipment or purchase it outright, with ongoing maintenance services in either case. Additional revenue comes from selling the macroalgae biomass to downstream industries. Cost definition is ongoing, but right now, it is still cheaper than alternative solutions.
- The Circular approach of the solution provides an economic benefit because the sale of the by-product, the macroalgae, generates an income. This income, although not yet significant, supports the cost savings of this solution compared with other alternatives. And globally, the environmental aspect has a significant weight in the customer decision process
- Thanks to the modular system, the solution can be easily tailored to each client, adding as many modules as necessary





## Key leverage points and core Value Proposition

- Circular design: The core concept is elegant in its circularity: using macroalgae to clean polluted port waters while producing valuable biomass as a byproduct. The algae remove nitrogen, phosphorus, and heavy metals from the water. Once harvested, the biomass can be sold to the pharmaceutical, cosmetic, and nutrition industries. Waste treatment thus generates sellable outputs. This strong sustainability component will be used as a differentiating factor.
- Technology: Higher efficiency than other water treatments (nutrient absorption, energy consumption, etc.)
- Market timing: most ports have already completed the "easy" phase of environmental compliance through regulatory measures and tax incentives.
- For ports and cooperatives: The solution is price-competitive. This will allow the price to increase in the future when differentiation is evident and valued by customers, without ceasing to be competitive.

## Maturity status and potential



TRL 6: System is demonstrated in a relevant environment / System Prototyping

- Technology: The current experiments deploy a quite mature solution (**TRL5-6**), meaning it is being tested in a more or less real environment. The team is tracking core functional parameters, including nutrient removal rates, biomass production volumes, and operating costs.
- Users' awareness: Initial feedback from the Alicante pilot confirms a strong interest in tools that demonstrate direct environmental and economic benefits. The team is closing agreements with other Mediterranean ports to test the modules next year, with interested parties looking to validate the business model and Bioremed benefits.
- Market maturity/request: The circular design is robust because the market for macroalgae is robust and growing, from health to cosmetics, and the macroalgae are used to create and extract natural compounds.

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## Lessons learnt on critical issues' management

Market access in a hard-to-reach environment. The main critical issue has been accessing a complex and conservative market. Ports are multi-actor organisations where decisions are slow, hierarchical and highly relationship-driven. Negotiations require aligning several stakeholders, which extends sales cycles and raises the cost of market entry. This confirms that purely technical arguments are not enough; trust-building and long-term engagement are essential.

Leveraging the “beachhead” and peer network effect. A key lesson is the importance of a beachhead strategy. Once the solution is validated in a single port, the dynamics change: ports talk to each other, observe pilots in operation and gain confidence from peer references. One successful implementation can therefore unlock a cascade of adoptions, making it more effective to concentrate early resources on one flagship pilot than to spread efforts thinly across many targets.

Understanding and positioning against competing options. Competition is not limited to similar technologies; it also includes established service providers with strong relationships who could expand their offerings, as well as simpler regulatory tools such as bans, antifouling rules, or fee policies. These alternatives are familiar, easy to implement and perceived as “good enough”. The lesson here is the need for proactive dissemination that clearly explains the added value of the new biotechnology, its effectiveness, long-term cost benefits and environmental performance, compared with these baseline options.

Managing technical uncertainties at medium TRL. Operating at a medium TRL with an ongoing pilot inevitably brings technical issues and uncertainties around cost structure and efficiency. The experience shows that these challenges are manageable when there is a strong consortium: the partnership with the university, research centres and a high-technology provider has been crucial for rapid problem-solving, iterative improvement and gradual de-risking of both the technology and its business model. This collaborative setup is therefore a key asset in managing critical technical issues during the piloting phase.

## Next steps to consolidate the business journey

Business and revenue model. The first priority is to consolidate the business model around a clear and bankable value proposition. Using pilot data on CAPEX, OPEX and maintenance, the team should compare leasing, sale + service and full-service (pay-per-m<sup>3</sup> or performance-based) options, then select one primary revenue model (with one fallback). This choice should be consistently embedded in commercial offers, financial plans and investor materials. As TRL advances, financial projections must be updated, refining installation and operating costs and building 3–5-year scenarios (conservative/base/optimistic) that demonstrate positive unit economics, clear payback periods and cost competitiveness versus alternative water treatment and compliance options.

Peer scaling on the market. At the market level, efforts should focus on formalising the beachhead and replication strategy and translating it into a structured go-to-market plan. A flagship port (e.g., Alicante or the best-performing demo site) should be secured under a full-operational contract with defined KPIs and used to produce a concise case study with technical results, economic analysis, and a strong testimonial. This reference site can then be leveraged through port networks and associations, peer visits, webinars and reference tours to reach other ports. In parallel, competitive positioning should be sharpened through a simple comparison with incumbent port service providers and alternative chemical, mechanical or nature-based solutions, clearly emphasising differentiators such as dual revenue (service + biomass), modularity, visibility, circularity and alignment with EU green/blue policies and ESG frameworks.

Business model de-risking. To strengthen bankability and long-term sustainability, biomass revenue potential and risk mitigation need to be made explicit. For each demo site, annual biomass yields and target prices by sector (pharma, cosmetics, nutraceuticals, ingredients) should be quantified and used to engage potential buyers, aiming for letters of intent or MoUs that provide a predictable offtake and “equivalent comfort” for lenders and investors. These assumptions should feed into port business cases (as cost offsets) and investor-facing projections. In parallel, a structured risk register, formalised partnerships with universities, research centres and technology providers, and appropriate insurance and phased deployment plans should be documented to demonstrate manageable and well-mitigated technical and market risks.



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Enhance the Governance. Robust governance structures, clear roles and responsibilities, and the capabilities of the core team and partners should be explicitly presented. Systematic tracking of KPIs (nutrient removal, water quality improvement, CO<sub>2</sub> reduction, biomass production) should underpin a professional business plan, investor deck and organised data room. This combination of performance evidence, transparent documentation and strong partnerships will position the platform not only as an innovative environmental solution, but as a scalable, replicable and financially solid Bioremediation-as-a-Service business.