



PROJECT REPORT

EcoeFISHent

SYSTEMIC SOLUTIONS FOR THE
ECO-EFFICIENT VALORIZATION
OF FISHING AND FISH INDUSTRY
SIDE-STREAMS



WORKABLE IDEAS & INITIATIVES
for a SUSTAINABLE ECONOMY

EcoeFISHent

**SYSTEMIC SOLUTIONS FOR
THE ECO-EFFICIENT VALORIZATION
OF FISHING AND FISH INDUSTRY SIDE-STREAMS**

THE PROJECT CHALLENGE:

The fishing and canning industries generates significant waste—up to 60-70% of processed materials—which often represents a major environmental and economic burden. With fish consumption on the rise, the generation of side-streams such as viscera, fins, and skin accounts for 20% to 80% of the original fish weight, contributing significantly to global food waste. While the blue economy has the potential to supply high-value bioactive compounds from the valorisation of such huge amount of fish waste, the path from "industrial side-stream" to "regulated ingredient" is blocked by a lack of harmonized standards for cross-sector upcycling.

OUR CONTRIBUTION:

Within a vast consortium of 40 partners, WIISE covered the role of the legal architect of the Circular Cluster, building the normative framework required to turn biological liabilities into certified raw materials. Moving beyond simple compliance, we have designed a multi-level strategy to navigate the interplay between Animal By-Products (ABP) legislation and the rigorous standards for food, feed, and cosmetic ingredients. Our team managed the critical interface between green extraction technologies and institutional validation, ensuring that every link in the value chain—from the recovery of "ghost" nets to the extraction of skin proteins—is backed by a robust safety dossier.

THE OUTCOME:

By integrating legal due diligence directly into the project's logistics, WIISE's intervention ensured that the six circular value chains created by EcoeFISHent are not only technically viable but commercially and legally ready. Our work has the potential for empowering local SMEs to turn environmental liabilities into economic assets, fostering a sustainable model for the Blue Economy that is positioned for international replication.

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A. PROJECT CORE IDENTIFICATION



INTRODUCTION

Reconciling Industrial Development with Marine Ecosystem Protection EcoeFISHent is a flagship Horizon 2020 Green Deal project designed to demonstrate a replicable and sustainable territorial cluster that transforms side-streams into high-value resources.

Within the EcoeFISHent project, WIISE (FARE) addresses the "Regulatory and Knowledge" pillar, ensuring that innovative upcycling processes meet the highest European and Italian regulatory standards. By transforming "waste" into legal, high-value resources, we provide the regulatory certainty required for the transition to a Blue Circular Economy.

I. FACT SHEET

FULL PROJECT TITLE (ACRONYM):

Demonstrable and replicable cluster implementing systemic solutions through multilevel circular value chains for eco-efficient valorisation of fishing and fish industries side-streams (**EcoeFISHent**).

PROJECT DESCRIPTION:

A systemic R&D initiative to deploy climate-neutral circular economy solutions by interconnecting blue and green economies through six synergic value chains.

REFERENCE PROGRAMME (CALL):

Horizon 2020 - Innovation Action (H2020-LC-GD-2020).

FUNDING BODY:

This project was funded by the European Commission.

CONTRACT ID

GRANT AGREEMENT NO.: 101036428.

SELECTION EXCELLENCE:

Part of the prestigious Green Deal call, the project has been selected for its potential to demonstrate regional systemic change among over 1,550 proposals competing for a €1 billion budget, resulting in an exceptionally rigorous **overall success rate of just 4.7%** (with only 73 projects selected for funding).

DURATION:

Start Date: 01/10/2021

End Date: 30/09/2026

PROJECT BUDGET:

Total Cost: € 18,583,714.47

EU Contribution: € 15,145,267.12

II. CONSORTIUM

CONSORTIUM:

- **Coordinator:** FI.L.S.E. S.p.A. (Finanziaria Ligure per lo Sviluppo Economico) – Italy
- **WIISE Role:** Partner in charge of regulatory aspects, stakeholder relations, data management, and knowledge sharing.
- **Partners:** 40 partners from 8 countries (Italy, Spain, Norway, Bulgaria, France, Belgium, Israel, and Kenya).

PARTNERS LIST:

1. **FI.L.S.E. S.p.A. (Coordinator)** – Italy | www.filse.it
2. **Project Hub 360** – Italy | <https://www.projecthub360.com/>
3. **EIDOS** – Italy | <http://www.eidoscoop.it/>
4. **Università degli Studi di Genova (UNIGE)** – Italy | www.unige.it
5. **Università degli Studi di Torino (UNITO)** – Italy | <https://www.unito.it/>
6. **CIBM (Consorzio per il Centro Interuniversitario di Biologia Marina ed Ecologia Applicata) 'G. Bacci'** – Italy | <https://www.cibm.it/>
7. **AMIU (Azienda Multiservizi e d'Igiene Urbana) Genova S.p.A.** – Italy | www.amiu.genova.it
8. **GE.AM. (Gestioni Ambientali) Spa** – Italy | <https://www.geamspa.net/>
9. **Consorzio OMNIA** – Italy | <https://www.omniaconsorzio.it/>
10. **Il Rastrello Cooperativa Sociale** – Italy | <https://ilrastrello.it/>
11. **Green Evo** – Italy | <https://www.greenevo.it/>
12. **ICSS (Industria Cartaria Santo Spirito)** – Italy | <https://www.icssgroup.com/>
13. **Consorzio TICASS** – Italy | www.ticass.it
14. **ASDOMAR (Generale Conserve S.p.A.)** – Italy | www.asdomar.it

15. **Limhealth Srl** – Italy | <https://www.limhealth.it/>
16. **WIISE S.r.l. (FARE)** – Italy | www.wiisebenefit.com
17. **WWF Italia** – Italy | www.wwf.it
18. **FEDERCOOPESCA (Federazione Nazionale Cooperative della Pesca)** – Italy | <https://federcoopesca.it/>
19. **Cooperativa Armatori Motopescherecci Santa Margherita Ligure** – Italy
20. **Consorzio di gestione Area Marina Protetta del Promontorio di Portofino** – Italy | <https://www.portofinoamp.it/>
21. **Arpal (Agenzia Regionale per la Protezione dell'Ambiente Ligure)** – Italy | www.arpal.liguria.it
22. **Consorzio Proplast** – Italy | www.proplast.it
23. **Angel Consulting Sas** – Italy | <https://www.angelconsulting.it/>
24. **Ardes Srl** – Italy | <https://ardescosmetici.com/>
25. **MICAMO S.r.l.** – Italy | www.micamo.com
26. **Themis Spa** – Italy | <https://www.themis-industries.com/en/>
27. **SAES Getters** – Italy | <https://www.saesgetters.com/it/>
28. **Aqua De Mâ** – Italy | <https://www.aquadema.it/>
29. **COOP Italia – Società Cooperativa SCRL** – Italy | <https://www.coop.it/>
30. **ANFACO – CECOPESCA (National Association of Manufacturers of Canned Fish and Seafood)** – Spain | <https://anfaco.es/>
31. **AIMPLAS (Plastics Technology Centre)** – Spain | <https://www.aimplas.net/>
32. **Syspro Automation** – Spain | <https://sysproautomation.com/>
33. **Nofima AS** – Norway | www.nofima.no
34. **Nasekomo EAD** – Bulgaria | <https://nasekomo.life/>
35. **BVA Nudge Consulting** – France | <https://www.bvanudgeconsulting.com/>

36. **EBN (European Business and Innovation Centre Network)** – Belgium |

<https://ebn.eu/>

37. **Bar Ilan University** – Israel | <https://www.biu.ac.il/>

38. **Gomeh Solutions Ltd** – Israel | <http://www.gomehs.co.il/index.html>

39. **CLOUD – Consulting and production and integration LTD** – Israel

40. **PEDEC (Panel of Eminent Development Consultants) Africa** – Kenya |

<https://www.pedecafrica.net/>

GEOGRAPHICAL SCOPE:

Countries Involved:

Italy, Spain, Norway, Bulgaria, France, Belgium, Israel, and Kenya.

Pilots:

Establishment of a regional reproducible cluster in Northwest Italy (Liguria), with international technology testing and replication sites in Spain, Norway, Bulgaria, France, Belgium, Israel, and Kenya.

III. MISSION AND OBJECTIVES

MISSION

The mission of EcoeFISHent is to establish a climate-neutral, reproducible industrial cluster that harmonizes socio-economic growth with the preservation of marine environments. By deploying bio-based and circular economy strategies, the project transforms fishing industry side-streams and abandoned gear into high-value resources, proving that industrial activities can be reconciled with ecosystem protection.

SPECIFIC OBJECTIVES

1. **Systemic Side-Stream Valorisation:** Implement a transition from linear waste management to a profitable model that recovers bioactive compounds (e.g., collagen, peptides, omega-3) from fish processing remains for the nutraceutical and cosmetic industries.
2. **Marine Litter Mitigation:** Execute a recovery and recycling framework for abandoned "ghost" fishing nets and lines, converting environmental pollutants into polymer-based automotive components and innovative packaging.
3. **Operationalizing Circular Supply Chains:** Transition from traditional industrial approaches to six interconnected, climate-neutral value chains ranging from food-grade ingredients to sustainable fertilizers and biodiesel.
4. **Advanced Biomass Stabilization:** Develop and validate innovative pre-treatment technologies, such as patented dehydration units (EPPU), and green extraction methods to ensure the safety and viability of recovered resources.
5. **Digital Scalability:** Implement a "Cluster Digital Twin" (CDT) and cloud-based monitoring platform to simulate optimal configurations and provide the performance data required for international replication.
6. **Ecosystem Preservation:** Reduce the environmental footprint of the fishing sector by improving selective fishing tools designed to minimize by-catch and mitigate the impact of abandoned gear on marine life.

IV. PROJECT RESULTS AND IMPACT

KEY PROJECT OUTPUTS

- **Regulatory & Compliance Reports:** Strategic documents including the *Report on Analysis of EU rules, policies, and best practices applicable to Fish Co-Products (FCP)* (D2.4), *Report on compliance requirements* (D1.2) for cross-sector upcycling, and the *Guideline for the compliance of the EcoeFISHent process and the derived products* (D3.6).
- **Patented Technology & Pilots:** Development of the **EcoeFISHent Pilot Pre-processing Unit (EPPU)**, a thermal dehydration technology currently under patent for the stabilization of perishable fish biomass.
- **Technical Maps & Tools:** Creation of the *Updated maps of ghost gears hotspots* (D5.9) and the deployment of *Nets and Bycatch Reduction Devices* (D5.12) to improve selective fishing.
- **Recycled Industrial Products:** Production of **recycled PA6-66 beads** (D4.7) from recovered fishing nets, optimized for automotive and packaging manufacturing.
- **Bio-active Prototypes:** Formulation of high-value antioxidant hydrolysates, collagen, and lipids extracted from tuna and aquaculture side-streams via green extraction flowcharts.
- **Strategic Briefs & Digital Assets:** Publication of **Policy Briefs** on circular value chain implementation and the launch of the *Cluster Digital Twin (CDT)* platform for regional performance simulation.
- **Project Identity & Dissemination:** Comprehensive *Visual Identity Kit* (D7.1), dedicated project portal, and specific educational gadgets realized with recovered marine materials.

PROJECT OUTCOMES

- **Waste Reduction:** Significant decrease in upstream food loss and environmental impact through the systematic recovery of side-streams accounting for 60-70% of fish weight.
- **Marine Preservation:** Mitigation of marine litter and "ghost fishing" through the active recovery and upcycling of abandoned nets and lines.
- **Socio-Economic Development:** Creation of new "Green & Blue" job opportunities and specialized roles in coastal regions like Liguria and Kenya.
- **Regulatory De-risking:** Establishment of standardized protocols and best practice manuals that bridge the gap between technical innovation and market authorization.
- **Scalability & Replication:** Provision of a validated model for international replication of circular clusters, improving economic security in participating Mediterranean and East African regions.
- **SDG Alignment:** Direct contribution to UN Sustainable Development Goals, specifically Responsible Consumption (SDG 12), Climate Action (SDG 13), and Life Below Water (SDG 14).

B. FOCUS ON THE WIISE CONTRIBUTION



INTRODUCTION

In a systemic project like EcoeFISHent, where innovation spans from high-tech biomass extraction to the recycling of marine polymers, the technical ability to upcycle is only half the battle. The true "bottleneck" is often the legal status of the materials themselves. WIISE (FARE) serves as the strategic lead for regulatory compliance, transforming the potential risk of using industrial side-streams into a certified competitive advantage.

While technical partners focus on the stabilization of fish biomass, WIISE provides the **legal architecture** required to move these outputs from the pilot plant to the open market. Our contribution bridges the gap between the Blue Economy's environmental goals and the stringent safety requirements of the EU Green Deal. By integrating regulatory foresight directly into the value chain design, we ensure that every innovation—whether it is a collagen-based nutraceutical or a recycled automotive component—possesses the necessary legal "passport" to circulate within the European Single Market.

Our role is to demonstrate that '**Open Innovation**' requires a '**Strategic Compliance Framework**': a system where industrial side-streams are transformed from environmental liabilities into fully certified, high-value assets

V. ROLE AND OBJECTIVES WITHIN THE PROJECT

ROLE IN THE CONSORTIUM

Lead for Regulatory Strategy and Compliance: Oversight of the transition from industrial side-streams to certified raw materials.

Technical and Regulatory Partner: Responsible for legal, technical-regulatory, public relations, and institutional liaison services.

SPECIFIC OBJECTIVES

- **Regulatory De-risking:** Defining the legal "passport" for fish-derived materials to safely enter the food, cosmetic, and packaging markets.
- **Safety & Compliance Validation:** Reconciling Animal By-Product (ABP) regulations with stringent EU safety standards for new bio-based applications.
- **Logistical Oversight:** Designing compliant protocols for the collection and transport of biomass within the regional cluster.
- **Institutional Mediation:** Acting as the primary liaison with health and environmental authorities to facilitate official approval of circular solutions.
- **Governance & Data Management:** Managing the project's knowledge assets and data strategy to protect intellectual property and support EU policy goals.

VI. ACTIVITIES AND WORK PACKAGES (WP)

PROJECT WORKPLAN TIMELINE (2021–2026)

The project follows a five-year progression (60 months) to transition from regional side-stream mapping to the implementation of systemic circular clusters.

Year 1 (Months 1–12): Baseline, Mapping & Compliance Setup

- Comprehensive mapping of exploitation routes for fishing and canning industry side-streams in the Italian territory.
- Baseline analysis of EU and national regulatory frameworks for cross-sector upcycling of fish biomass as food or ABP.
- Deployment of the initial logistical plan for the collection and stabilization of raw fish materials.

Year 2 (Months 13–24): Pilot Design & Extraction Testing

- Installation and testing of the EcoeFISHent Pilot Pre-processing Units (EPPU) for biomass stabilization.
- Laboratory-scale extraction of high-value bio-actives (collagen, omega-3, peptides) using green technologies.
- Development of the first prototypes for biodegradable packaging and recycled polymer beads from abandoned nets.

Year 3 (Months 35–36): Validation & Cluster Integration

- Full-scale validation of the six Circular Value Chains (CVCs) from extraction to final product prototype.
- Implementation of the Cluster Digital Twin (CDT) to monitor performance, flow efficiency, and environmental impact.
- Execution of safety assessments and regulatory dossiers for the transition from pilot to semi-industrial production

Year 4 (Months 37–48): Industrial Demonstration & Market Alignment

- Scaling up the production of bio-based ingredients for the cosmetic and nutraceutical industries.
- Integration of recycled marine polymers into the automotive manufacturing chain.
- Testing of selective fishing tools and by-catch reduction devices in real-world maritime environments.

Year 5 (Months 49–60): Replication, Exploitation & Policy Advocacy

- Finalizing business models and exploitation plans for the sustainable territorial cluster.
- Launching replication activities in international sites (Kenya, Israel, Norway, Spain, and Bulgaria).
- Publication of policy briefs and best practice manuals to influence EU circular economy legislation.

CONTRIBUTION TO THE PROJECT WPs

Throughout the project lifecycle, WIISE has acted as the **Regulatory Quality Controller** for the food sector and relevant sectors thereof, ensuring that the high-tech innovations emerging from the laboratories—such as bioactive peptides and recycled polymers—translate into legally marketable goods. By synchronizing the technical advancements of the circular value chains with European safety standards, we have cleared the path for these sustainable resources to transition from pilot-phase experiments to commercial-grade raw materials.

Activity Groups / WP	Activities Performed by FARE
Logistics & Compliance (WP1)	Conducted cross-border analysis of legislation regarding the transport and stabilization of fish side-streams, ensuring secondary flows meet safety standards.
Circular Strategy & Safety (WP2)	Developed the legal framework for "Regulatory Market Synchronisation," aligning fish-derived bio-actives (e.g. collagen, omega-3) with EU food requirements, and conditions for use in other sectors (e.g. feed, cosmetics, fertilisers).
Value Chain Validation (WP3 & WP4)	Evaluated the compliance of upcycled products for the manufacturing and processing of FFS and FCP to obtain food supplements, feed, cosmetics, biodegradable packaging (FCM) against stringent industrial regulations.
Knowledge & Data Management (WP6)	Managed intellectual property (IP) of partners and provided solutions for the commercial exploitation of EcoeFISHent results outside the consortium (e.g. <i>novel food</i> consultation process, ABP alternative method authorisation).
Strategic Dissemination (WP7)	Executed high-level outreach through specialized agribusiness channels and WIISE's editorial platforms (e.g., <i>Food Times</i> ; <i>GIFT - Great Italian Food Trade</i>), translating technical results into policy-relevant insights.
Institutional Relations & Lobbying (WP7)	Represented the sector's interests before health and environmental authorities to advocate for harmonized standards that support the growth of the Blue Circular Economy by supporting the draft of policy briefs within the project and in cooperation with other EU-funded projects.

SUMMARY OF REGULATORY & TECHNICAL STEPS

As a strategic partner for **Regulatory Compliance**, WIISE focused on dismantling the legal barriers that prevent fish industry side-streams from being repurposed into high-value consumer and industrial products.

Phase	Objective	Actions Taken
I. Legal Mapping	Identify barriers	Analysed EU and national regulations concerning Food Legislation and Food Hygiene, Animal By-Products (ABP) and Waste Framework Directive to identify bottlenecks in resource recovery.
II. Status Qualification	Define "Food", "ABP", "Waste"	Established the status and conditions of use of fish biomass between "food", "ABP" and "waste".
III. Market Authorization	Regulatory Compliance	Drafted technical-legal guidance to align bio-active extracts (e.g. collagen, omega-3) with food and ABP safety and hygiene requirements.
IV. Cross-Sector Integration	Standardization	Legal support for the request of authorisation of 'Standard Method 7' and 'alternative method' for the use and disposal of ABP and derived products.
V. Policy Advocacy	Added Value	Produced Policy Briefs to propose harmonized standards for the Blue Circular Economy, facilitating the replication of the cluster model across the EU.

VII. RESULTS, IMPACT, AND OPPORTUNITIES

SPECIFIC PROJECT OUTPUTS PRODUCED BY WIISE

Compliance Roadmaps: Legal guidance facilitating the market entry of fish-derived bio-actives (collagen, peptides, oils) into the food, feed and cosmetic sectors.

Technical Communication Series: A targeted collection of articles and briefings designed to bridge the gap between circular economy research and industrial application.

IMPACT GENERATED BY WIISE

Regulatory De-risking: Reduced investment uncertainty for SMEs by clarifying the complex interplay between Animal By-Product (ABP) laws and consumer safety standards.

Knowledge Transfer: Leveraged specialized editorial platforms, such as *Food Times* and *Great Italian Food Trade (GIFT)*, to ensure project outcomes reached EU policymakers and stakeholders in the blue economy.

Standardized Operations: Provided the legal basis for the functioning of the "Cluster Digital Twin," ensuring that data sharing and resource tracking remain compliant with EU data protection and trade laws.

OPPORTUNITIES CREATED

Market Expansion: Established a replicable legal model for Mediterranean and East African regions to export upcycled marine products to the EU.

Dossier Readiness: Prepared the technical-legal foundation for future health claim applications regarding the nutritional benefits of fish-derived nutrients.

Industrial Symbiosis: Facilitated new cross-sector partnerships between the fishing industry and the automotive/packaging sectors through verified material compliance.

CONCLUSION

LESSONS LEARNED

Through the EcoeFISHent project, WIISE has deepened its expertise in managing the complex regulatory transition from industrial side-streams to high-value consumer ingredients, in relation to products of animal origin, their ABPs and derived products. We have refined our methodology for navigating the overlap between *General Food Law*, *ABP Regulation* and Waste Framework Directive for food, feed and cosmetics uses. These insights are now integrated into our strategic services, providing a clear roadmap for organizations seeking to transform bio-based liabilities into compliant, market-ready assets within the EU circular economy.



WHY PARTNER WITH WIISE?

Our leadership in securing the legal framework for the EcoeFISHent circular cluster proves we are the essential partner for blue and green economy consortia requiring:

- **Circular Regulatory Architecture:** Proven expertise in navigating the complex transition from food to **Animal By-Products (ABP)** and waste status to high-value industrial and consumer raw materials, creating clear legal pathways for upcycling.
- **Strategic Policy Advocacy:** Demonstrated ability to author high-impact **Policy Briefs** and best practice manuals that bridge the gap between regional pilot results and European legislative reform in the Blue Circular Economy.
- **Systemic De-risking:** Unique experience in aligning technical extraction innovations with **EFSA** safety requirements for ABPs and derived products (alternative method), ensuring that R&D investments result in legally marketable assets within the EU Single Market.
- **High-Impact Dissemination:** Direct access to specialized agribusiness and legal platforms (e.g., *Food Times*; *Great Italian Food Trade - GIFT*), providing a powerful voice to reach institutional stakeholders, industrial partners, and over 450 million European consumers.

DIRECT CONTACT FOR PARTNERSHIPS:

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